POSTING MATH TO THE WEB USING TOOLS ON THE WAKE FOREST STANDARD LOAD

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Introduction

Wake Forest University has an encompassing laptop program in which students, faculty and staff are issued IBM ThinkPads. All students entering WFU are issued ThinkPads as freshmen. The students keep the laptops for two years and then receive new laptops at the beginning of their junior year. Faculty and staff are placed on a similar two-year replacement cycle.

Each year a "standard load" is developed for the ThinkPad model that is going to be distributed. For the past few years, there have only been minor changes to the standard load with the usual version upgrades to software. However, this year, 2002, we have had more significant changes. We were somewhat forced to switch from Windows 98 to Windows XP for our standard load operating system (Wake Forest University, n.d.). Fortunately or unfortunately this meant we had to examine all of our software to ensure that it would continue to work with our load.

In conjunction with this examination, it seemed a good time to reevaluate some of the tools that were available on our standard load that could be used to post mathematics to the web. Further, the Department of Mathematics decided to reconsider the software package that it had been using for LaTeX on the ThinkPad. This reevaluation was done in hopes of finding a cheep, yet easily installable, version of LaTeX that could be provided not only to faculty but to students in the department as well. It would have been cost prohibitive to provide the current package to students.

Here we will look at three starting points for producing mathematical symbols and see what can be done to make them web accessible. This is not an exhaustive examination, but it is an examination of tools that are readily available to WFU mathematics faculty and students.

The "Starting Point" Tools

Since the beginning the IBM ThinkPad program at WFU, the University has had a software licensing agreement with Microsoft for the Microsoft Office suite. Sometimes not a popular choice, but often a practical one, is Microsoft Word and using the equation editor to produce symbols, equations and formulas. Since Word is used to some extent by practically everyone on campus already, there is

little additional instruction needed to be able to use the equation editor. It has a simple point and click interface which is fairly intuitive. It does involve much switching back and forth between the mouse and the keyboard which at times can be frustrating.

A second possibly useful tool on our standard load is Waterloo Maple. A few years ago, WFU bought a campus wide site license so that Maple could be preloaded on to the ThinkPads as part of the standard load. At the time the license agreement was entered into, Maple would not have been a practical way of posting a document on to the web; however, now Maple has the ability to save documents in HTML format. Waterloo Maple also provides some other tools that can be used to web enable their documents. That will be discussed below. Currently we are using Maple 7.0.

Thirdly, we will look at our LaTeX program. This year, as noted above, the Department of Mathematics wanted to find a user-friendly and economical solution to provide LaTeX to faculty and students. What was decided on was a combination of MiKTeX and WinEdt. MiKTeX is free making it very attractive. MiKTeX is also easy to install making it a good choice for students. The package comes with a DVI viewer and routines for producing postscript and PDF files. WinEdt is a text editor designed to work with the MiKTeX package. The GUI interface makes it easy to run the LaTeX, PDF and postscript routines.

There are some additional tools on our load that can be used in combination with our three starting points. Our standard load grows each year with additions. Along with that, our software license agreements grow too. This year WFU negotiated a licensing agreement with Adobe Systems Incorporated for all of the Adobe products. Our standard load now comes with keyed versions of most Adobe products and with the full version of Adobe Acrobat 5.0. Now, producing widely readable PDF files from our standard load has become simple.

Microsoft Word

Word, of course, will not be the first choice for every one, but is a good starting place for some. Microsoft has a built in equation editor that can be handy to use. Especially if one is doing a quick project with few equations. The point and click nature of the interface for the equation editor means that little extra learning has to take place in order to start producing mathematical formulas.

One can simply post the Word document itself for downloading on the web. This can be quite convenient especially when working in the uniform environment of WFU were every one has a standard load. Of course, people from outside our standardized campus may not be able to read the .doc file. So, conversions need to be considered.

Word has the ability to convert its files into an HTML format; however, the files it creates can be large and next to impossible to edit later in a different HTML editor. Further, the “save as” process will create a individual image file for each and every equation in the file. This creates a lot of extra baggage one must deal with when transferring the files to a web server. It can be noted Macromedia Dreamweaver, a HTML editor and another program on our standard load, has a built in command “clean up Word HTML”. This may or may not give you good results. For instance, Dreamweaver may not recognize the proper version of Word that is being use and may possibly delete too much from the file. The advantage of converting to HTML is that no extra viewers will be needed for the

file to be read by anyone.

The Word file may also be converted into postscript or PDF. With our load, converting to PDF is as simple as clicking on a button on the Word toolbar. The full version of Adobe Acrobat provides this capability. PDF file can be accessed by just about anyone as the Acrobat reader is free from Adobe.

Creating postscript from a Word file take a few more steps, but is not complicated. The process is as follows: With the Word file open, choose file then print. In the print dialogue box, select a postscript driver and check the "print to file" box. After the print process is complete, Word will have generated a .prn file. This actually is a postscript file, but the extension needs to be changed. A viewer such as Ghostview will need to be used.

An addition can be made to the equation editor. It is a more professional version called MathType. If an individual decides Word will be their editor of choice, MathType may be worth investigating. However, the cost would prohibit wide distribution on a campus since it the cost is not nominal. MathType does provide some additional symbols and formula formats, but can not be recommended for a casual user.

Waterloo Maple

Maple as a starting point for producing a web document may not even occur to some, but similarly as with Word the Maple worksheet file can be posted to the web. Again, the reader of the file would need the Maple program to read the file. This is not a problem in our environment, but may not allow for wide distribution.

The Maple file can undergo conversions as well. Just as with Word, the Maple file can be "saved as" an HTML file again creating many image files that must be dealt with when posting. Maple does have the added capability of saving the mathematical symbols in MathML format. MathML is a markup language similar to HTML but used for mathematics (Frounentin, 2002). However, most web browsers do not have the built in capability of reading MathML. Thus a plug-in is needed for the end user to be able to view pages saved this way. To do this, Waterloo Maple provides such a plug-in, the WebEQ MathML Viewer. This plug-in can be downloaded directly from Maple on to a users machine at no cost. An interesting twist to this viewer is that the viewer does not have to be installed on the user's machine to work. If the viewer is not installed, WebEQ will invoke the viewer over the internet from Waterloo Maple (Waterloo Maple, 2002).

In Maple, you can also switch between three different ways of entering in information. Not only can you input the traditional Maple input, but now you can also input regular text and a format called "standard math". The regular text option gives you the ability to use Maple as you would a simple word processor. Here you could add in explications and details to what is going on in the Maple worksheet. The standard math option gives you the ability to create, for example, displayed formulas with mathematical symbols such as summations and integrals with out having to execute lines at the Maple prompt. There is no GUI interface for this. So you must know the Maple command setup for the types of symbols you want to produce. This would probably be more useful when additional comments are needed on an existing worksheet rather than being used to create a document for posting to the web from scratch.

PDF files can be made from Maple worksheets too. However, this is not as easy as just clicking on a button as in Word. It is still easy just a different process. When the full version of Adobe Acrobat is installed, you will notice two additional printing options. In the print dialogue box, under the printer name drop-down menu there will be listed Acrobat Distiller and Acrobat PDF Writer. With our load, results seem to better with the Acrobat Distiller option. Some of the symbols get garbled using the PDF Writer. Note that postscript files of Maple worksheets can be created using the printing process described in the previous section.

MiKTeX with WinEdt

There are a plethora of share/freeware versions of LaTeX floating around the internet. We decided to only look at versions that were currently being use by members of the department. After evaluations on the prices of products, how they install, if they worked with Windows XP, and what tools they came with, we settled on MiKTeX and WinEdt.

MiKTeX contains the routines to TeX and LaTeX documents as well as routines for producing PDF files, postscript files, and doing some file type conversions. MiKTeX really stays in the background and is never seen after the install. WinEdt is a text editor that is designed to be used with MiKTeX. All of the MiKTeX routines can be ran with the click of a button within WinEdt.

If you are already a LaTeX user, this combination is a pretty good set up. Postscript and DVI files are easily and quickly produced. Acrobat is not used here when creating the PDF file. A routine from the MiKTeX package is used instead. Also, the printing procedure for creating a postscript file need not be used as MiKTeX has its own procedure for creating that file type. It can be noted there is an absence of a latex2html routine which is often used in UNIX environments. However, we can note that there is yet another plug-in that can be obtained to interpret LaTeX commands.

IBM makes techexplorer, a Hypermedia Browser, that can translate MathML, TeX and LaTeX in to web readable symbols (IBM, n.d.). Techexplorer comes in both a professional version and an introductory version. The introductory version can be downloaded for free from IBM. It will be quickly obvious that this plug-in does not interpret every LaTeX command that it encounters. So this plug-in would be better used for adding simple LaTeX commands into an HTML document, rather than expecting a reader to be able to view all commands in an existing LaTeX file. A big disadvantage to the introductory versions of techexplorer is that it will not allow you to print at all. To do that, you must purchase the professional version.

Summary

Each of the three starting points discussed here within can be valid starting places for producing web documents depending on the knowledge base of the producer. To get information onto the web in a timely fashion, it can be best to start with a program you already know. Then as your knowledge base increases, you can branch out into some other ways of producing documents.

With all three options, widely viewable postscript and PDF files can be made. HTML documents can be produced from Word and Maple files, but not from LaTeX with our setup. And if you know

that your reader has or can get the proper viewer, the .doc, .mws or .tex file can be posted straight to the web. Certainly, this will limit your audience, but is not a problem in an uniform environment such as ours.

A word of caution: You may also need to be weary of the fact what-you-see is not always what-you-get. Given different font sets on computers and printers, a character can sometimes appear in a document viewer yet fail to print properly. Further, the converse can happen. That is, a character that is improperly displayed in a viewer can print perfectly fine. If your goal is to create a document that ultimately your reader is going to print, it would be advisable to test print the document yourself.

Each of the three programs discussed here have their positive aspects as well as negative ones. Unfortunately none of the three can be said to be the overwhelming one best way to get mathematics onto the web. There is one final and last option that we have ignored thus far. A handwritten document may be scanned and placed on the web as a PDF or image file. This option may not look very good when viewed on screen, but is very acceptable when printed. This may seem simplistic, but we leave very few stones unturned. Truth be told, we use all four of these options for the production of web documents.

References

Design Science. (2002). *MathType*. Retrieved September 19, 2002, from http://www.mathtype.com/. Long Beach, CA: Design Science.

Froumentin, M. (2002). *W3C Math Home*. Retrieved September 19, 2002, from http://www.w3.org/Math/. Cambridge, MA: WC3.

IBM (n.d.). *techexplorer hypermedia browser*. Retrieved September 23, 2002, from http://www-3.ibm.com/software/network/techexplorer/. White Plains, New York: IBM Corporation.

Lang, R. (2002). *Ghostscript, Ghostview and GSview*. Retrieved September 19, 2002, from http://www.cs.wisc.edu/~ghost/index.html.

Schenk, C. (2002). *MiKTeX: typesetting beautiful documents*. Retrieved August 29, 2002, from http://www.miktex.org/.

Simonic, A. (2002). *WinEdt shell*. Retrieved August 29, 2002, from http://www.winedt.com/.

Wake Forest University. (n.d.). *ThinkPad program.* Retrieved September, 23, 2002 from http://www.wfu.edu/Computer-information/thinkpad/. Winston-Salem, NC. Wake Forest University.

Waterloo Maple. (2002). *Welcome to Waterloo Maple's MathML home page*. Retrieved September 18, 2002 from http://www.maplesoft.com/standards/MathML/info.html. Ontario, Canada: Waterloo Maple.