

## TUG 2012: A first-time attendee

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On July 16–18, 2012, I attended the 33<sup>rd</sup> annual meeting of the T<sub>E</sub>X Users Group in Boston, MA. It was not only my first time attending such an event but my first time presenting. Though I did not know what to expect, I found my experience to be both enjoyable and educational. The 2012 conference was held at the Omni Parker House located in the heart of downtown Boston at the corner of School and Tremont Streets. This hotel has the distinction of being the longest continuously operating hotel in the US and fits right in with the rich history of downtown Boston. The hotel lies along the Freedom Trail, a 2.5 mile mostly-red-brick path that connects Boston's most significant historic sites starting from Boston Commons and ending at the *USS Constitution*.

My trip to the conference was a red-eye flight from Los Angeles. By the time I arrived in Boston, I was as well-rested as anyone could be after such a flight. Getting to the hotel from Logan International was made easy by Dave Walden's clear travel instructions on the TUG website. I took the Silver Line bus to South Station. From there, I took the Red Line subway (the T) to the Park Street station which was a short walk to the hotel.

### Downtown Boston and the Omni Parker House

School Street is so named because it was the site of the first public school in the United States, the Boston Latin School. The Boston Latin School is also the oldest existing school in the United States and has moved several times from its original location. About half-a-mile away is the Boston Common, another record for the city of Boston as it is the oldest city park in the US. A first time visitor to the city can't help but be in awe of the history that surrounds them.

Just across from the Omni Parker House and also on the corner of School and Tremont Streets is King's Chapel. In addition to being a historic landmark that lies along the Freedom Trail, King's Chapel is also a place of worship. The Chapel is open to visitors except during times of worship. As it was Sunday, I didn't have the opportunity to see inside the chapel but did manage to visit the nearby cemetery — the King's Chapel Burying Ground.

Though the cemetery shares a name with the nearby church, it is in fact the property of the city and was founded in 1630, making it Boston's first cemetery. It remained Boston's only burial site for thirty years. The church itself didn't come into exist-



(a) Silver Line bus stop



(b) Train at South Station

**Figure 1:** From Logan International airport to downtown Boston



**Figure 2:** Markers at the King's Chapel Burying Ground

tence until some time later, in 1689, and was built on the burial grounds as no one in Boston wanted to sell land to a non-Puritan church. There are a few notable historic figures who can call the King's Chapel Burying Ground their final resting place. They include John Winthrop, Massachusetts's first governor and William Dawes, Paul Revere's companion on his famous ride. Though regular burials ceased in 1896, the occasional burial still takes place.

Not far from the King's Chapel Burying Ground is the Granary Burying Ground, another tourist attraction located on Tremont Street along the Freedom Trail. This cemetery is the final resting place of three signers of the Declaration of Independence and all five victims of the Boston Massacre in 1770. Also prominent in the cemetery is an obelisk erected in 1827 to the parents and relatives of Benjamin Franklin. The obelisk was constructed from granite obtained from the Bunker Hill Monument quarry to replace the original family gravestones which had deteriorated over time.

One of the notable men buried at the Granary Burial Ground is John Hancock, most remembered not because he served as President of the Second Continental Congress or that he was the first and



(a) The John Hancock Memorial



(b) The Paul Revere Memorial



(c) The Samuel Adams Marker

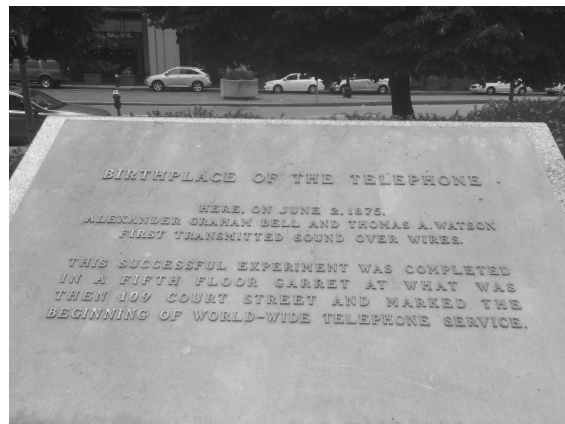
**Figure 3:** Markers at the Granary Burying Ground

third Governor of Massachusetts but rather for the prominence of his large and stylish signature on the Declaration of Independence. It is believed that Hancock made his signature so large as an act of defiance to King George III. This story couldn't be further from the truth.

As the President of the Second Continental Congress, Hancock was the first to sign the now historical document. At the time, the Declaration of Independence wasn't a formal declaration of independence from Britain but rather was intended to be copied and distributed among the colonies to explain the need to declare independence. As a result, Hancock thought he would be the nearly the only person to sign the document (along with the Secretary of the Congress, Charles Thompson), and so made his signature large. As the Declaration of Independence gained support, other delegates stated adding their names over a period of weeks and months.



(a) Boston City Hall



(b) The first telephone marker in front of the JFK building.

**Figure 4:** Government sites in Boston

For the beer drinkers reading this, it may be surprising to note that the face featured on a Sam Adams beer isn't actually Sam Adams but Paul Revere. It is said that Samuel Adams was not a good-looking fellow while Paul Revere, on the other hand, was considered a handsome chap. Both men are buried at the Granary Burying Ground.

Downtown Boston doesn't just feature historical sites and landmarks. It is also the center of the city's government, the section of which is, appropriately, named the Government Center. Not far from the hotel is both the City Hall Plaza and the John F. Kennedy Federal Building. In front of the JFK Building on Cambridge Street sits a plaque commemorating the first sound transmission over wire, an event that led to the practical invention of the telephone.

The event the plaque commemorates isn't the one we are all familiar with that took place on March 10th, 1876, when Alexander Graham Bell shouted the words, "Mr. Watson, come here, I want to see you".

In 1875, Bell under the advice of another scientist, Joseph Henry, stated working on an electrical multi-reed device to transmit the human voice over wires. Bell didn't have the necessary skill or knowledge to work on such a device, but a chance meeting with Thomas Watson changed all that.

The principle behind the reed design operated on the same principle as the human ear. The pinna collects sound and concentrates it as it travels down the auditory canal. Vibrations on the tympanic membrane then transmit energy to the ossicles or ear bones which is then converted into electrical impulses by the cochlea to be interpreted by the brain. The ear bones are a system of levers that amplify the force on the cochlea. This allows the tympanic membrane to be relatively small. Bell reasoned that if he had a larger membrane, he would be able to collect more sound and move a steel reed placed in a magnetic field. This would turn sound energy into an electrical current as the reed moves through the magnetic field.

On June 2, 1875, while troubleshooting the multi-reed device, Watson plucked one of the reeds to check the tension believing it to be too tight. Bell, who happened to be listening at the right time in the next room, heard the metallic twang and the first working model of the telephone was born.

## The Conference

**The Attendees and Presenters** There were 61 participants and 23 presenters (of which I was one) listed in the TUG program, with participants coming from Australia, Canada, UK, Germany and Egypt. Attending the conference was a bit of a surreal experience as I saw so many people who were as passionate as I was about  $\TeX$  and its future development. Where most of the conferences I have attended in the past tend to be specialized events geared toward one topic and where everyone—more or less—is in the same field, I found this to be quite different. Instead I found people with a wide array of specialties and talents.

**Day One** The conference started with an opening from the TUG president, Steve Peter, which was then followed by a presentation by a  $\LaTeX$  consultant, Amy Hendrickson of  $\TeX$ nology Inc. Amy's talk focused on the use of `\csname` to create  $\LaTeX$  macros and dynamically generate a series of definitions. Amy demonstrated its use to redefine the footnotes command to produce endnotes and to dynamically create online reports. This is something I definitely have to look into and learn about.

After a break, Frank Mittelbach talked about  $\LaTeX$ 3 and the direction of the  $\TeX$  typesetting

engine. When  $\TeX$  was started over two decades ago, computing power was far more limited compared to what is available today and, as a result, so too were some of the algorithms. Frank compared the limitations of  $\TeX$ 's algorithms to  $\LaTeX$ 3 and how they were overcome, to what degree and what still needs to be done. Given the increase in computing power and the work that has been done in recent years, the present system could be a viable one and remain so for some time.

Next was a presentation on font design by Steve Peter. Steve is a linguist and font designer and showed how font design can be done using the `META-FONT` package.

Will Robertson next came on to show his work on the `fontspec` and `unicode-math` packages. Will's talk focused on his experiences in developing these packages while at the same time learning how to program—one of the consequences of which was contributing code to the  $\LaTeX$ 3 project.

Will's talk was followed by lunch and a group photo of the conference attendees.

The next group of talks focused on using the  $\TeX$  engine to typeset foreign languages. Unfortunately, the talk on using  $\LaTeX$  to typeset Mayan hieroglyphics by Bruno Delprat and Stepan Orevkov had to be cancelled. It was a little disappointing as I have always found it interesting how the  $\TeX$  typesetting engine can be used in so many ways, from typesetting chess boards to creating Sudoku puzzles. Fortunately, the next talk by Sherif Mansour on typesetting Arabic proved just as interesting.

Sherif is a graduate student from Cairo University whose research is focused on improving Arabic typesetting using the AlQalam font in Lua $\TeX$ . One of the problems Sherif faces is the typesetting of right-to-left fonts in Lua $\TeX$ . Each written line on a page in the Arabic language is about the same length and this makes line breaking difficult. This makes for a difficult problem to solve as the various shapes can also change in subtle ways for the same characters. Though I don't envy Sherif I am interested in his future work. Maybe I can find a way to use  $\LaTeX$  to help me learn Arabic.

The next presentation by Norbert Preining focused on the problems of typesetting in Japanese. Japanese typesetting differs from English in that there are four different writing systems: Kanji, Hiragana, Katakana and Roman letters, the difficulties of which are further compounded as Japanese employs both vertical and horizontal typesetting styles.

Federico Garcia next talked about music typesetting. As a developer working on writing a professional music typesetting system in  $\TeX$ , Federico

highlighted some of the problems experienced with typesetting music. Though I am not a musician, I could appreciate some of the problems he faced. One of these problems is getting the  $\text{\TeX}$  engine to automatically (and correctly) place the beams when creating a sheet of music. Federico compared his system with other music typesetting systems. While many problems need to be solved before he has a fully functional system, he believes they can be solved.

**Day Two** The first talk of the day by Troy Henderson focused on some of the web-based utilities he had developed to generate and plot functions in  $\text{\METAPOST}$ . I haven't paid too much attention in the past where  $\text{\METAPOST}$  or  $\text{\PSTricks}$  is concerned, choosing to favor  $\text{\TikZ}$  instead. I may have to reevaluate that position as the online utilities may help me learn and pick up the code quicker.

The next talk by Richard Koch focused on installing  $\text{\TeX}$  on the Mac using the  $\text{\MacTeX}$  install package. The key feature of this package, like everything Mac, is its ease of use and  $\text{\LaTeX}$  can be installed with a single click of the button. Richard demonstrated a full  $\text{\TeX}$  installation during the course of his talk; we were all assured that an actual installation took place and no trickery was involved.

If you are an iPad owner then Bill Cheswick's talk on  $\text{\iTeX}$  should be of interest. The  $\text{\iTeX}$  app is a  $\text{\LaTeX}$  reader for the iPad and shouldn't in any way be confused with Donald Knuth's proposed XML-based successor to  $\text{\TeX}$ . When typesetting a book, or a page or any document, the final page size is generally known down to the nanometer.  $\text{\TeX}$  then uses some clever algorithms to optimize the presentation for a high standard of quality output. Unfortunately, this poses some problems for ebook readers. As there are varying screen sizes as well as the different ways one can hold a reader, it would be difficult and time-consuming to run  $\text{\TeX}$  over a document every time a reader shifts position.

The  $\text{\iTeX}$  application solves this by using  $\text{\TeX}$  to create precomputed images for portrait and landscape layouts in both standard and large type versions. These images are then stored in a container file that the app can read. Besides being a reader, the app also converts text into  $\text{\LaTeX}$  typeset output. Bill demonstrated this by importing and converting text from Project Gutenberg and [arXiv.org](http://arxiv.org). The app is free on Apple's app store for anyone interested to try.

**$\text{\LaTeX}$  and Thesis Talks** The next two presentations after the break focused on theses and dissertations. While my talk dealt with the various packages students can use to make their lives easier, Peter

Flynn's talk dealt with the creation of a  $\text{\LaTeX}$  class file for the University College Cork (UCC). Given the number of thesis class files present on the CTAN server, and that we can assume there are far more unofficial class files elsewhere, the question we must ask is, "do we really need another thesis class file?" According to Peter Flynn, we do.

Generally speaking, a thesis class file is supposed to meet the formatting requirements of a particular university by ensuring page dimensions and margins are set correctly. But this is not the only requirement. Students are also required to enter the formal names of their departments and the colleges they belong to. Given that a university might have a complex departmental infrastructure and even stranger naming standards, the best way to ensure that students enter this information correctly is to enter them as options to the  $\text{\documentclass}$  command rather than allow authors to enter this information themselves. The Cork class file was tested on January 2010 over the course of 18 months and so far the response has been favorable — so favorable, in fact, that other institutions are looking to adopt or base their class file on Cork's.

Like most university class files in my experience, the UCC class file was designed to be minimalist in nature but at the same time meet the needs of as many students as possible. Any package that is added must be done carefully so as not to break any other existing packages and must be done to meet the needs of as many students as possible. Unfortunately, with the number of disciplines and in some cases, cross-disciplines, this means that all the needs of every student cannot be built into a single class file and students will need to add packages as they see fit. This was the subject of my talk.

Typically, when a student looks for a  $\text{\LaTeX}$  consultant they are under a lot of stress. Generally, any attempts to compile a document freezes and ends up with hundreds of errors. Part of my job as a consultant isn't to just fix these problems and get the document compiling again but to offer solutions and make lives easier. Once a project is concluded, students still need to make edits before the final submission.

$\text{\LaTeX}$  has a multitude of packages and, at a quick glance, it almost seems as if you can do anything. By knowing a student's discipline or what their thesis is about, a consultant can often give advice on the best package to optimize the writing process. Students in engineering or the sciences, for example, may find it easy to take advantage of the  $\text{\siunitx}$  package which will allow them to enter

mathematical units easier rather than having to enter math mode then enter a confusing list of symbols. Science students who deal with chemical equations may also take advantage of the `mchem` package for the same reason. I talked about some past projects and how proper package use helped my clients.

**Post-Lunch Talks** The next talk by Boris Veytsman was on using  $\text{\TeX}$  on the iPad: “ $\text{\TeX}$  and friends on a Pad”. Though I can’t imagine actually typing  $\text{\LaTeX}$  code on a flat screen I am nonetheless excited at the possibility. Maybe I work too much and need to get out once in a while. Who knows? But, bottom line, it is possible to have  $\text{\LaTeX}$  on an iPad.

Bart Childs then talked about the problems of automating the process of converting text from word processors into  $\text{\LaTeX}$ . The problems that some converters face is that they usually attempt to make the final output look like the original typewritten document as much as possible. This introduces complex and, oftentimes, terrible  $\text{\LaTeX}$  code. Bart’s goal was to find a conversion process that would produce code that was accurate, clean and maintainable.

Bart primarily used a hybrid process based on the `Writer2 $\text{\LaTeX}$`  plugin for OpenOffice and macros written in Emacs Lisp. Bart talked about his tests on converting a book on rotordynamics (which was heavy on the mathematical side), a C++ programming text, a memoir written by a friend that contained portions in the Czech language, and a novel.

**Final Talks for Day Two** Frederico Garcia’s second talk focused on his `colordoc` package. This package was based on Frank Mittelbach’s `docstrip` package. It highlights braces and other code delimiters and makes for slightly more readable code. This package is sure to come in handy if you have ever need to troubleshoot code and aren’t sure if there is an extra brace or bracket lurking somewhere.

The final talk for the day by Jim Hefferon and Michael Doob focused on the `Asymptote` graphics program. Hefferon and Doob showed some of the features of the package and its ease of use in generating graphics.

**Roundtable Discussion** The day concluded with a roundtable discussion moderated by Dave Walden with some of the  $\text{\TeX}$  consultants present as panelists, of which I was one. The other consultants included Peter Flynn, Amy Hendrickson, Christina Thiele, Steve Peter and Boris Veytsman. Questions asked by the audience focused on the business aspects of  $\text{\TeX}$  consulting, such as how consultants got business and how they dealt with problem clients, just to name a few.

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**Figure 5:** Conference room at the Omni Parker House where TUG 2012 took place

After the roundtable discussion, proceedings concluded for the day. Participants met for a banquet at the Oceanaire Seafood Room for dinner; the restaurant is located across City Hall Plaza.

**Day Three** The first talk of the day, by Pavneet Arora, was titled “Sleep de(p)rived typesetting”, and focused on the process of typesetting. The second talk by Bob Neveln and Bob Alps looked at a Python program they created to check the syntax of mathematical proofs: `ProofCheck`. Mathematical proofs were checked against the syntax developed by A. P. Morse in his book, *A Theory of Sets*. The authors presented recent updates to the system that are designed to make proof checking easier to users.

For the next talk, Christina Thiele talked about her experiences using  $\text{\TeX}$ , first to typeset articles and journals in academia to the creation of her company, Carleton Production Center. Christina also highlighted some of the changes in  $\text{\TeX}$  that took place when she first started using it almost thirty years ago as well as the changes in software and hardware she underwent in her career as a consultant.

The following talk by Will Robertson and Frank Mittelbach looked at the origin, the development and recent changes to  $\text{\LaTeX}3$ . The key aspects and ideas behind  $\text{\LaTeX}3$  were developed in the early 1990s but it wasn’t until recently that code came into widespread use. The talk focused on the what  $\text{\LaTeX}3$  can currently do and their plans for the future.

**After Lunch** The next talk by Boris Veytsman and Leyla Akhmadeeva focused on the results of a recent study conducted by the two authors to test whether typographic style influenced a reader’s ability to comprehend and remember contents in a passage. It

is generally believed among typographers that typography is more than an art as it can influence a person's comprehension and reading speed. To test this hypothesis, the authors gave university students a one-page passage and tested their comprehension. L<sup>A</sup>T<sub>E</sub>X was used to control various typographic features from fonts, page layout and justification. This preliminary study was intended for textbook designers where comprehension of text is very important. The preliminary study indicated that typography does not play a part in reading speed or comprehension and the human brain may be flexible enough to allow us to read even badly designed pages.

While this first study may indicate that typography does not have an effect, I definitely would like to see more research on the area. Though short passages using bad typography may not show an effect on comprehension, perhaps the effects of typography and longer passages may affect a person's ability to understand a passage.

Norbert Preining followed with a talk about the recent changes and additions to T<sub>E</sub>X Live. One of the biggest changes is the extension of the T<sub>E</sub>X Live manager to read multiple repositories, something that has been a feature of MiK<sub>T</sub>E<sub>X</sub> for some time. Norbert also gave an overview of the other changes to T<sub>E</sub>X Live 2012.

The final talk of the conference was by Didier Verna and looked at possible modern implementations of T<sub>E</sub>X. Didier said his current project came about from a discussion he had with Donald Knuth, the creator of the T<sub>E</sub>X typesetting system. T<sub>E</sub>X was initially designed to be a simple system as the com-

puter resources of the time were limited and this meant that a full programming language could not be implemented.

In the time that has passed, we have seen an exponential growth in computing power along with our skills in language design and implementation. Could this be a way to modernize T<sub>E</sub>X? Didier says this is possible and can be done using an old, but very established modern programming language, Common Lisp. Didier focused on the features of the language that made it ideally suited to the task of modernizing T<sub>E</sub>X and gave some demonstrations.

### Concluding Remarks and Observations

I have always known somewhere in the back of my mind that the development of L<sup>A</sup>T<sub>E</sub>X is community-based, much like many open-source projects. Though I am just a user of the system, it was great to meet others like me as well as some of the developers who are going to continue building and contributing to the evolution of L<sup>A</sup>T<sub>E</sub>X. As a first-time participant I truly had a wonderful time and attending future conferences is something that I definitely look forward to. Attending gave me the chance to meet others who were just as interested in L<sup>A</sup>T<sub>E</sub>X as I was and also gave me the chance to see the future of T<sub>E</sub>X. Attending is definitely something I can recommend to any TUG member who hasn't done so.

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