

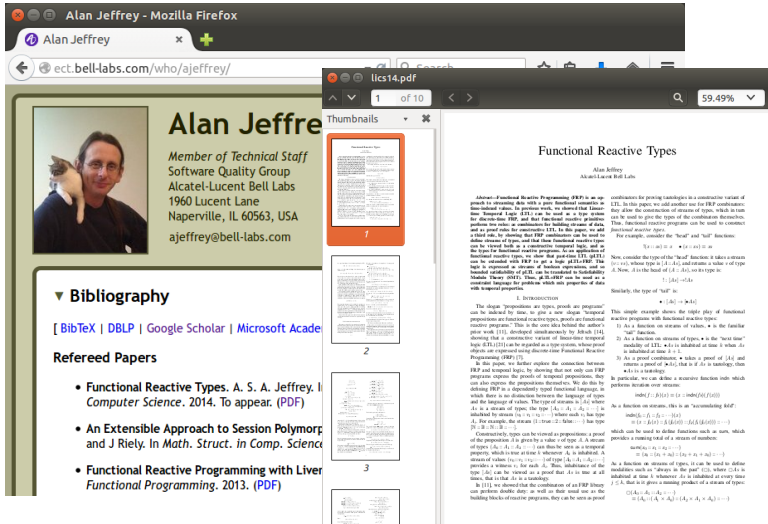


# TOOLS FOR WRITING A RESEARCH PAPER

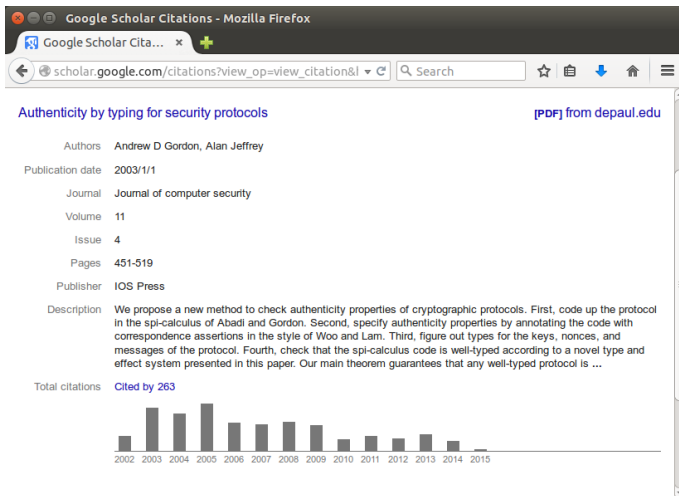
Alan Jeffrey (Bell Labs)

University of Illinois at Chicago, January 2015

## PDF FILE: THE ATOMIC UNIT OF PUBLICATION



# PDF FILE: THE ATOMIC UNIT OF PUBLICATION



The screenshot shows a Mozilla Firefox browser window displaying a Google Scholar citation page. The address bar shows the URL: scholar.google.com/citations?view\_op=view\_citation&l. The page title is "Authenticity by typing for security protocols" and it is labeled as a "[PDF] from depaul.edu". The authors are listed as Andrew D Gordon and Alan Jeffrey. The publication date is 2003/1/1, the journal is Journal of computer security, volume 11, issue 4, pages 451-519, published by IOS Press. The description states: "We propose a new method to check authenticity properties of cryptographic protocols. First, code up the protocol in the spi-calculus of Abadi and Gordon. Second, specify authenticity properties by annotating the code with correspondence assertions in the style of Woo and Lam. Third, figure out types for the keys, nonces, and messages of the protocol. Fourth, check that the spi-calculus code is well-typed according to a novel type and effect system presented in this paper. Our main theorem guarantees that any well-typed protocol is ...". The total citations are 263, with a bar chart showing the distribution from 2002 to 2015. The chart shows a peak in 2005 with 10 citations, followed by a decline and then a slight increase in 2013 and 2014.

Authenticity by typing for security protocols [PDF] from depaul.edu

Authors Andrew D Gordon, Alan Jeffrey

Publication date 2003/1/1

Journal Journal of computer security

Volume 11


Issue 4

Pages 451-519

Publisher IOS Press

Description We propose a new method to check authenticity properties of cryptographic protocols. First, code up the protocol in the spi-calculus of Abadi and Gordon. Second, specify authenticity properties by annotating the code with correspondence assertions in the style of Woo and Lam. Third, figure out types for the keys, nonces, and messages of the protocol. Fourth, check that the spi-calculus code is well-typed according to a novel type and effect system presented in this paper. Our main theorem guarantees that any well-typed protocol is ...

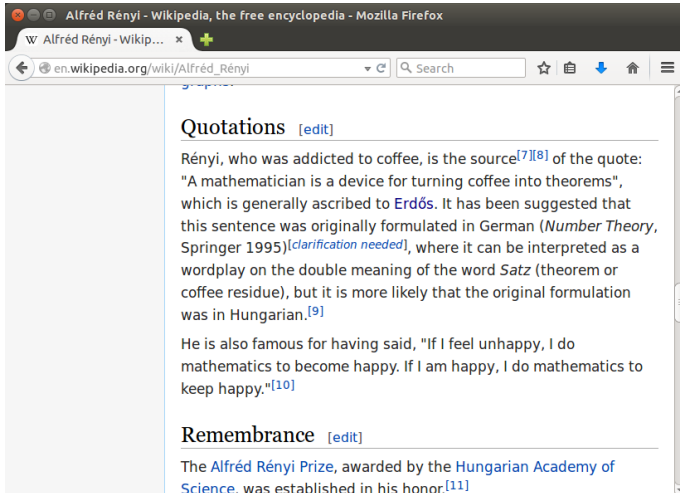
Total citations Cited by 263



Year	Citations
2002	2
2003	8
2004	7
2005	10
2006	6
2007	5
2008	6
2009	5
2010	2
2011	3
2012	2
2013	4
2014	3
2015	1

PDF files aren't just read by humans...

# PDF FILE: THE ATOMIC UNIT OF PUBLICATION



A computer scientist is a device for turning coffee into PDF files.

# TOOLS

My toolset (YMMV):

- Google Drive (cloud storage)
- Git (source control)
- Evince (PDF viewer)
- Emacs (text editor)
- Make (build management)
- L<sup>A</sup>T<sub>E</sub>X (document preparation)
- BibT<sub>E</sub>X (bibliography)
- Beamer (presentation)

# TOOLS

My toolset (YMMV):

- Google Drive (cloud storage)
- Git (source control)
- Evince (PDF viewer)
- Emacs (text editor)
- Make (build management)
- L<sup>A</sup>T<sub>E</sub>X (document preparation)
- BibT<sub>E</sub>X (bibliography)
- Beamer (presentation)

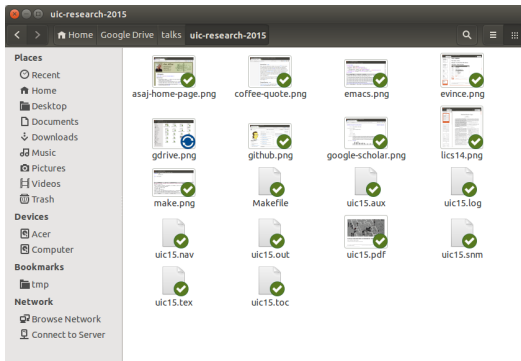
Note: many of these are tools for maintaining software.

# CLOUD STORAGE

My choice: Google Drive

Because: \$10/TB/mo, clients

Alternates: DIY, Amazon, MyDrive, ...

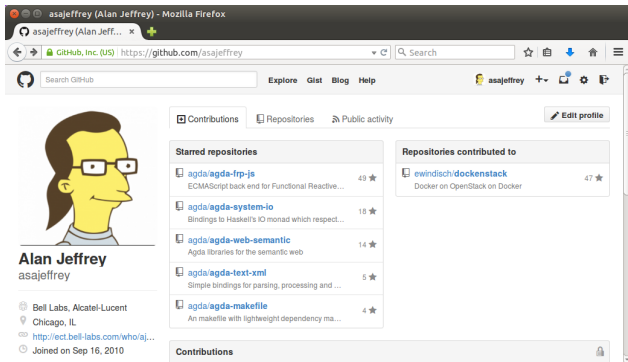


# SOURCE CONTROL

My choice: git

Because: github, distributed source control

Alternates: svn, darcs



The screenshot shows the GitHub profile page for user 'asajeffrey'. The browser window title is 'asajeffrey (Alan Jeffrey) - Mozilla Firefox'. The address bar shows 'https://github.com/asajeffrey'. The page header includes a search bar, navigation links (Explore, Gist, Blog, Help), and the user's name 'asajeffrey' with a plus icon and settings gear. The profile section on the left features a cartoon avatar of a man with glasses and a ponytail, the name 'Alan Jeffrey', the username 'asajeffrey', and bio information: 'Bell Labs, Alcatel-Lucent, Chicago, IL', a website link 'http://ect.bell-labs.com/who/aj...', and 'Joined on Sep 16, 2010'. The main content area has tabs for 'Contributions', 'Repositories', and 'Public activity', with an 'Edit profile' button. The 'Stared repositories' list includes: 'agda/agda-frp-js' (49 stars), 'agda/agda-system-io' (18 stars), 'agda/agda-web-semantic' (14 stars), 'agda/agda-text-xml' (5 stars), and 'agda/agda-makefile' (4 stars). The 'Repositories contributed to' list includes 'ewindisch/dockenstack' (47 stars). A 'Contributions' section is partially visible at the bottom.

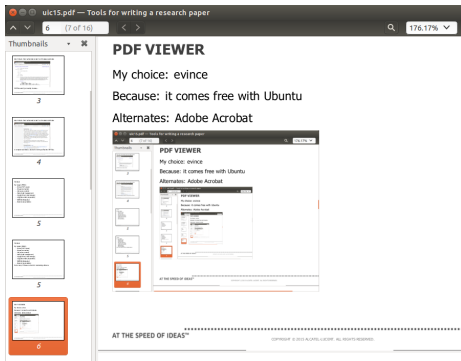


# PDF VIEWER

My choice: evince

Because: it comes free with Ubuntu

Alternates: Adobe Acrobat

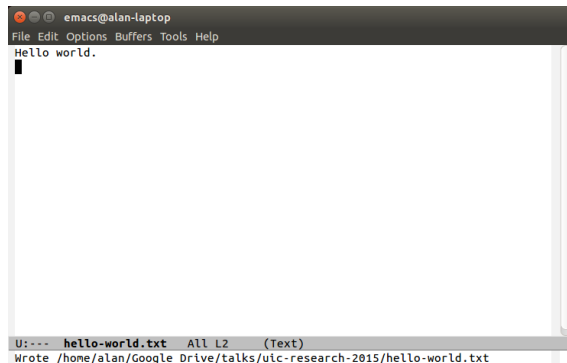


# TEXT EDITOR

My choice: emacs

Because: I ♥ M-x set-controls "/usr/bin/sun --heart" t

Alternates: vi, vim, Notepad, gedit, Eclipse, ...

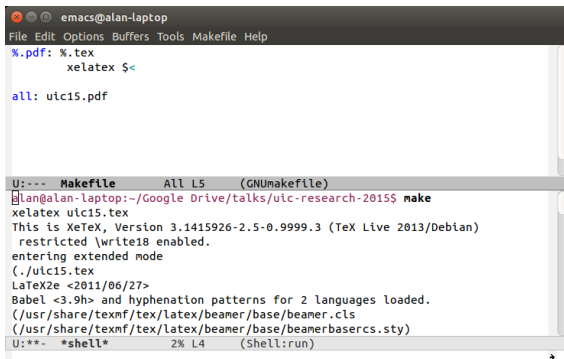


# BUILD MANAGEMENT

My choice: make

Because: I am old school

Alternates: ant, maven, grunt, ...



```
emacs@alan-laptop
File Edit Options Buffers Tools Makefile Help

%.pdf: %.tex
    xelatex $<

all: uic15.pdf

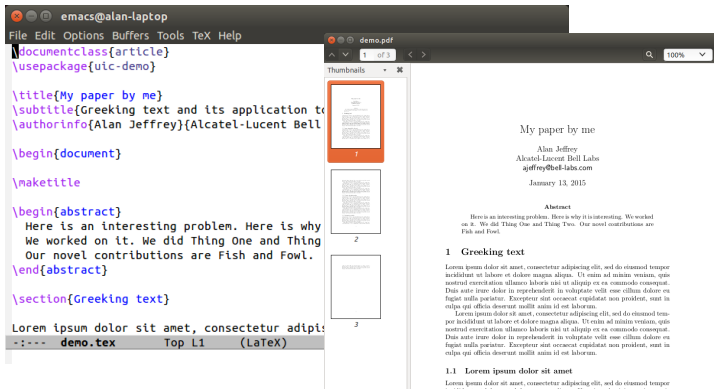
U:--- Makefile      All L5      (GNUmakefile)
alan@alan-laptop:~/Google Drive/talks/uic-research-2015$ make
xelatex uic15.tex
This is XeTeX, Version 3.1415926-2.5-0.9999.3 (TeX Live 2013/Debian)
 restricted \write18 enabled.
entering extended mode
./uic15.tex
LaTeX2e <2011/06/27>
Babel <3.9h> and hyphenation patterns for 2 languages loaded.
(/usr/share/texmf/tex/latex/beamer/base/beamer.cls
(/usr/share/texmf/tex/latex/beamer/base/beamerbasercs.sty)
U:**- *shell*      2% L4      (Shell:run)
```

# DOCUMENT PREPARATION

My choice:  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

Because: I was on the dev team

Alternates: Word, LibreOffice

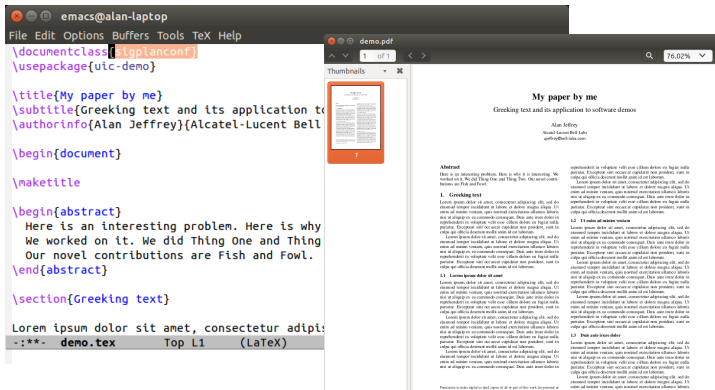


# DOCUMENT PREPARATION

My choice:  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

OK, not just because I was on the dev team

Supported by the high-impact venues (IEEE, ACM, Springer, Elsevier...)



# DOCUMENT PREPARATION

My choice:  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

OK, not just because I was on the dev team

- Not WYSIWYG
- Markup is logical structure, not visual structure
- High-quality typesetting, especially of mathematics
- Plays well with source control, build management
- Open source (before there was such a thing)
- Package infrastructure (ctan.org has 4820 packages by 2238 people)

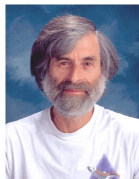
# DOCUMENT PREPARATION

My choice:  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$

OK, not just because I was on the dev team

- Not WYSIWYG
- Markup is logical structure, not visual structure
- High-quality typesetting, especially of mathematics
- Plays well with source control, build management
- Open source (before there was such a thing)
- Package infrastructure (ctan.org has 4820 packages by 2238 people)

Developers include not just one, but two Turing Award winners



# BIBLIOGRAPHY

My choice: Bib<sub>T</sub>E<sub>X</sub>

Because: everyone uses it

Alternates: ?

```
emacs@alan-laptop
File Edit Options Buffers Tools Entry-Types BibTeX-Edit Help

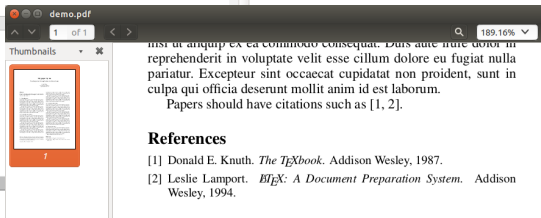
culpa qui officia deserunt mollit anim id est laborum.

Papers should have citations such as-\cite{Knuth:TeXbook,Lamport:LaTeXbook}.
[]
\bibliographystyle{plain}
\bibliography{demo}

\end{document}

-:--- demo.tex          95% L107   (LaTeX)
@book{Knuth:TeXbook,
  author = {Knuth, Donald E.},
  title = {The \TeX book},
  year = {1987},
  isbn = {0-201-13447-0},
  publisher = {Addison Wesley}
}

@book{Lamport:LaTeXbook,
  author = {Lamport, Leslie},
  U:--- demo.bib        Top L1     (BibTeX)
Mark set
```



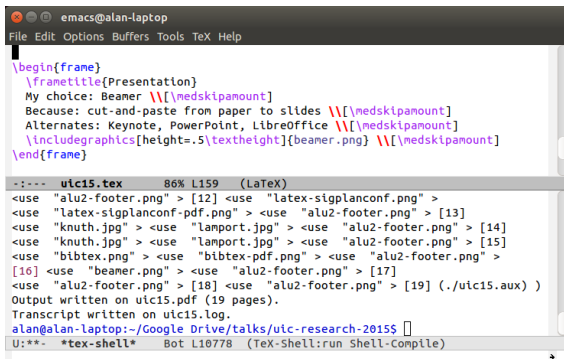


# PRESENTATION

My choice: Beamer

Because: cut-and-paste from paper to slides

Alternates: Keynote, PowerPoint, LibreOffice



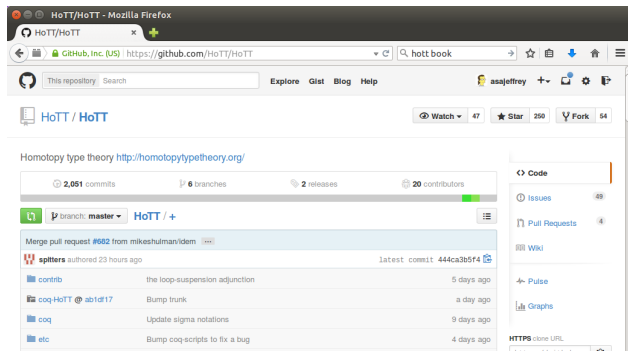
```
emacs@alan-laptop
File Edit Options Buffers Tools TeX Help

\begin{frame}
\frametitle{Presentation}
My choice: Beamer \\\medskipamount
Because: cut-and-paste from paper to slides \\\medskipamount
Alternates: Keynote, PowerPoint, LibreOffice \\\medskipamount
\includegraphics[height=.5\textheight]{beamer.png} \\\medskipamount
\end{frame}

-:--- uic15.tex      86% L159   (LaTeX)
<use "alu2-footer.png" > [12] <use "latex-sigplanconf.png" >
<use "latex-sigplanconf-pdf.png" > <use "alu2-footer.png" > [13]
<use "knuth.jpg" > <use "lamport.jpg" > <use "alu2-footer.png" > [14]
<use "knuth.jpg" > <use "lamport.jpg" > <use "alu2-footer.png" > [15]
<use "bibtex.png" > <use "bibtex-pdf.png" > <use "alu2-footer.png" >
[16] <use "beamer.png" > <use "alu2-footer.png" > [17]
<use "alu2-footer.png" > [18] <use "alu2-footer.png" > [19] (./uic15.aux) )
Output written on uic15.pdf (19 pages).
Transcript written on uic15.log.
alan@alan-laptop:~/Google Drive/talks/uic-research-2015$ 
U:*** *tex-shell*   Bot L10778 (TeX-Shell:run Shell-Compile)
```

# CASE STUDY: THE HOTTBOOK

- Homotopy Type Theory
- From the IAS 2012-13 year on Univalent Foundations of Mathematics
- 20 authors, 600pp, mostly written in a year
- Used git (on github.com/HoTT/HoTT), emacs,  $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ ,  $\text{BibT}_{\text{E}}\text{X}$
- Licensed under Creative Commons, hardback book is \$30



# SUMMARY

Treat writing like software:

- Learn to touch-type
- Think about licensing
- Use source control, build management, etc.
- Distinguish source from executable
- Aim for minimal, elegant solutions
- Have professional pride in your work
- Make your work easy to navigate
- Think about the structure of your work (balanced tree if possible)
- Consider how humans will use your work

# Q&A

Tools, research, working at a research lab...?