Background Report: ABCD - ABC Music Notation extendeD with programming features*

Trent Jeffery
The University of British Columbia
Vancouver, B.C.
y3f0b@ugrad.cs.ubc.ca

Ziyang Jin
The University of British Columbia
Vancouver, B.C.
f4a0b@ugrad.cs.ubc.ca

Victoria Wang
The University of British Columbia
Vancouver, B.C.
y7x9a@ugrad.cs.ubc.ca

Yifan Yang
The University of British Columbia
Vancouver, B.C.
p7w9a@ugrad.cs.ubc.ca

ABSTRACT

This is our project background research report for our new Domain Specific Language - ABCD, the extended language that adds programming features to the classic ABC notation. This report gives an overview of ABCD, its value, and how it is related to ABC. We also compare similiar music programming languages, discuss their design decisions. In the end, we describe a blueprint of ABCD and offer a few examples to showcase language implementatiopn.

KEYWORDS

Programming Language, Music, ABC Music Notation, Alda, Chuck, Overtone, EBNF, Parsing, Compiler

ACM Reference Format:
Trent Jeffery, Ziyang Jin, Victoria Wang, and Yifan Yang. 2017. Background Report: ABCD - ABC Music Notation extendeD with programming features. In *Proceedings of The University of British Columbia (CPSC 311 2017W1).* ACM, New York, NY, USA, 2 pages. https://doi.org/10.1145/nnnnnnn.nnnnnnn

1 OVERVIEW

aaa

2 VALUE/IMPORTANCE/IMPACT

aaa

3 SIMILAR WORK

aaa

3.1 Alda

aaa

3.2 Chuck

aaa

3.3 Overtone

Overtone is an Open Source toolkit for designing synthesizers and collaborating with music. It provides:

- A Clojure API to the SuperCollider synthesis engine
- A growing library of musical functions (scales, chords, rhythms, arpeggiators, etc.)
- Metronome and timing system to support live-programming and sequencing
- Plug and play MIDI device I/O
- A full Open Sound Control (OSC) client and server implementation.
- Pre-cache - a system for locally caching external assets such as .wav files
- An API for querying and fetching sounds from http://freesound.org
- A global concurrent event stream

[1]

4 POTENTIAL PROJECT

4.1 Features

4.2 Concrete Syntax

4.3 Parse into AST

4.4 Compiler

5 CITATIONS

Citations to articles [5–7, 17], conference proceedings [7] or maybe books [24, 32] listed in the Bibliography section of your article will occur throughout the text of your article. You should use BibTeX to automatically produce this bibliography; you simply need to insert one of several citation commands with a key of the item cited in the proper location in the `.tex` file [24]. The key is a short reference you invent to uniquely identify each work; in this sample document, the key is the first author's surname and a word from the title. This identifying key is included with each item in the `.bib` file for your article.

The details of the construction of the `.bib` file are beyond the scope of this sample document, but more information can be found in the *Author's Guide*, and exhaustive details in the *LaTeX User's Guide* by Lamport [24].

This article shows only the plainest form of the citation command, using `\cite`.

*The authors' names are ordered by last name.

CPSC 311 2017W1, 2017, Vancouver, BC, Canada

ACM ISBN 978-x-xxxx-xxxx-x/YY/MM.
https://doi.org/10.1145/nnnnnnn.nnnnnnn

Some examples. A paginated journal article [39], an enumerated journal article [10], a reference to an entire issue [9], a monograph (whole book) [23], a monograph/whole book in a series (see 2a in spec. document) [16], a divisible-book such as an anthology or compilation [12] followed by the same example, however we only output the series if the volume number is given [13] (so Editor00a's series should NOT be present since it has no vol. no.), a chapter in a divisible book [35], a chapter in a divisible book in a series [11], a multi-volume work as book [22], an article in a proceedings (of a conference, symposium, workshop for example) (paginated proceedings article) [3], a proceedings article with all possible elements [34], an example of an enumerated proceedings article [14], an informally published work [15], a doctoral dissertation [8], a master's thesis: [4], an online document / world wide web resource [2, 28, 36], a video game (Case 1) [27] and (Case 2) [26] and [25] and (Case 3) a patent [33], work accepted for publication [29], 'YYYYb'-test for prolific author [30] and [31]. Other cites might contain 'duplicate' DOI and URLs (some SIAM articles) [21]. Boris / Barbara Beeton: multi-volume works as books [19] and [18].

A couple of citations with DOIs: [20, 21].

Online citations: [36–38].

6 CONCLUSIONS

This paragraph will end the body of this sample document. Remember that you might still have Acknowledgments or Appendices; brief samples of these follow. There is still the Bibliography to deal with; and we will make a disclaimer about that here: with the exception of the reference to the LaTeX book, the citations in this paper are to articles which have nothing to do with the present subject and are used as examples only.

REFERENCES

[1] Sam Aaron. 2016. Collaborative Programmable Music. (2016). Retrieved November 8, 2017 from https://github.com/overtone/overtone/blob/master/README.md

[2] Rafal Ablamowicz and Bertfried Fauser. 2007. CLIFFORD: a Maple 11 Package for Clifford Algebra Computations, version 11. (2007). Retrieved February 28, 2008 from http://math.tntech.edu/rafal/cliff11/index.html

[3] Sten Andler. 1979. Predicate Path expressions. In *Proceedings of the 6th. ACM SIGACT-SIGPLAN symposium on Principles of Programming Languages (POPL '79)*. ACM Press, New York, NY, 226–236. https://doi.org/10.1145/567752.567774

[4] David A. Anisi. 2003. *Optimal Motion Control of a Ground Vehicle.* Master's thesis. Royal Institute of Technology (KTH), Stockholm, Sweden.

[5] Mic Bowman, Saumya K. Debray, and Larry L. Peterson. 1993. Reasoning About Naming Systems. *ACM Trans. Program. Lang. Syst.* 15, 5 (November 1993), 795–825. https://doi.org/10.1145/161468.161471

[6] Johannes Braams. 1991. Babel, a Multilingual Style-Option System for Use with LaTeX's Standard Document Styles. *TUGboat* 12, 2 (June 1991), 291–301.

[7] Malcolm Clark. 1991. Post Congress Tristesse. In *TeX90 Conference Proceedings*. TeX Users Group, 84–89.

[8] Kenneth L. Clarkson. 1985. *Algorithms for Closest-Point Problems (Computational Geometry).* Ph.D. Dissertation. Stanford University, Palo Alto, CA. UMI Order Number: AAT 8506171.

[9] Jacques Cohen (Ed.). 1996. Special issue: Digital Libraries. *Commun. ACM* 39, 11 (Nov. 1996).

[10] Sarah Cohen, Werner Nutt, and Yehoshua Sagic. 2007. Deciding equivalances among conjunctive aggregate queries. *J. ACM* 54, 2, Article 5 (April 2007), 50 pages. https://doi.org/10.1145/1219092.1219093

[11] Bruce P. Douglass, David Harel, and Mark B. Trakhtenbrot. 1998. Statecarts in use: structured analysis and object-orientation. In *Lectures on Embedded Systems*, Grzegorz Rozenberg and Frits W. Vaandrager (Eds.). Lecture Notes in Computer Science, Vol. 1494. Springer-Verlag, London, 368–394. https://doi.org/10.1007/3-540-65193-4_29

[12] Ian Editor (Ed.). 2007. *The title of book one* (1st. ed.). The name of the series one, Vol. 9. University of Chicago Press, Chicago. https://doi.org/10.1007/3-540-09237-4

[13] Ian Editor (Ed.). 2008. *The title of book two* (2nd. ed.). University of Chicago Press, Chicago, Chapter 100. https://doi.org/10.1007/3-540-09237-4

[14] Matthew Van Gundy, Davide Balzarotti, and Giovanni Vigna. 2007. Catch me, if you can: Evading network signatures with web-based polymorphic worms. In *Proceedings of the first USENIX workshop on Offensive Technologies (WOOT '07)*. USENIX Association, Berkley, CA, Article 7, 9 pages.

[15] David Harel. 1978. *LOGICS of Programs: AXIOMATICS and DESCRIPTIVE POWER.* MIT Research Lab Technical Report TR-200. Massachusetts Institute of Technology, Cambridge, MA.

[16] David Harel. 1979. *First-Order Dynamic Logic.* Lecture Notes in Computer Science, Vol. 68. Springer-Verlag, New York, NY. https://doi.org/10.1007/3-540-09237-4

[17] Maurice Herlihy. 1993. A Methodology for Implementing Highly Concurrent Data Objects. *ACM Trans. Program. Lang. Syst.* 15, 5 (November 1993), 745–770. https://doi.org/10.1145/161468.161469

[18] Lars Hörmander. 1985. *The analysis of linear partial differential operators. III.* Grundlehren der Mathematischen Wissenschaften [Fundamental Principles of Mathematical Sciences], Vol. 275. Springer-Verlag, Berlin, Germany. viii+525 pages. Pseudodifferential operators.

[19] Lars Hörmander. 1985. *The analysis of linear partial differential operators. IV.* Grundlehren der Mathematischen Wissenschaften [Fundamental Principles of Mathematical Sciences], Vol. 275. Springer-Verlag, Berlin, Germany. vii+352 pages. Fourier integral operators.

[20] IEEE 2004. IEEE TCSC Executive Committee. In *Proceedings of the IEEE International Conference on Web Services (ICWS '04)*. IEEE Computer Society, Washington, DC, USA, 21–22. https://doi.org/10.1109/ICWS.2004.64

[21] Markus Kirschmer and John Voight. 2010. Algorithmic Enumeration of Ideal Classes for Quaternion Orders. *SIAM J. Comput.* 39, 5 (Jan. 2010), 1714–1747. https://doi.org/10.1137/080734467

[22] Donald E. Knuth. 1997. *The Art of Computer Programming, Vol. 1: Fundamental Algorithms (3rd. ed.).* Addison Wesley Longman Publishing Co., Inc.

[23] David Kosiur. 2001. *Understanding Policy-Based Networking* (2nd. ed.). Wiley, New York, NY.

[24] Leslie Lamport. 1986. *LaTeX: A Document Preparation System.* Addison-Wesley, Reading, MA.

[25] Newton Lee. 2005. Interview with Bill Kinder: January 13, 2005. Video. *Comput. Entertain.* 3, 1, Article 4 (Jan.-March 2005). https://doi.org/10.1145/1057270.1057278

[26] Dave Novak. 2003. Solder man. Video. In *ACM SIGGRAPH 2003 Video Review on Animation theater Program: Part I - Vol. 145 (July 27–27, 2003)*. ACM Press, New York, NY, 4. https://doi.org/99.9999/woot07-S422

[27] Barack Obama. 2008. A more perfect union. Video. (5 March 2008). Retrieved March 21, 2008 from http://video.google.com/videoplay?docid=6528042696351994555

[28] Poker-Edge.Com. 2006. Stats and Analysis. (March 2006). Retrieved June 7, 2006 from http://www.poker-edge.com/stats.php

[29] Bernard Rous. 2008. The Enabling of Digital Libraries. *Digital Libraries* 12, 3, Article 5 (July 2008). To appear.

[30] Mehdi Saeedi, Morteza Saheb Zamani, and Mehdi Sedighi. 2010. A library-based synthesis methodology for reversible logic. *Microelectron. J.* 41, 4 (April 2010), 185–194.

[31] Mehdi Saeedi, Morteza Saheb Zamani, Mehdi Sedighi, and Zahra Sasanian. 2010. Synthesis of Reversible Circuit Using Cycle-Based Approach. *J. Emerg. Technol. Comput. Syst.* 6, 4 (Dec. 2010).

[32] S.L. Salas and Einar Hille. 1978. *Calculus: One and Several Variable.* John Wiley and Sons, New York.

[33] Joseph Scientist. 2009. The fountain of youth. (Aug. 2009). Patent No. 12345, Filed July 1st., 2008, Issued Aug. 9th., 2009.

[34] Stan W. Smith. 2010. An experiment in bibliographic mark-up: Parsing metadata for XML export. In *Proceedings of the 3rd. annual workshop on Librarians and Computers (LAC '10)*, Reginald N. Smythe and Alexander Noble (Eds.), Vol. 3. Paparazzi Press, Milan Italy, 422–431. https://doi.org/99.9999/woot07-S422

[35] Asad Z. Spector. 1990. Achieving application requirements. In *Distributed Systems* (2nd. ed.), Sape Mullender (Ed.). ACM Press, New York, NY, 19–33. https://doi.org/10.1145/90417.90738

[36] Harry Thornburg. 2001. Introduction to Bayesian Statistics. (March 2001). Retrieved March 2, 2005 from http://ccrma.stanford.edu/~jos/bayes/bayes.html

[37] TUG 2017. Institutional members of the TeX Users Group. (2017). Retrieved May 27, 2017 from http://wwtug.org/instmem.html

[38] Boris Veytsman. [n. d.]. acmart—Class for typesetting publications of ACM. ([n. d.]). Retrieved May 27, 2017 from http://www.ctan.org/pkg/acmart

[39] Ziyang. 2007. The patent holder's dilemma: Buy, sell, or troll? *Commun. ACM* 50, 1 (Jan. 2007), 36–44. https://doi.org/10.1145/1188913.1188915