Language of Material: English
Contributing Institution: Department of Special Collections and University Archives
Title: Donald E. Knuth papers
creator: Knuth, Donald Ervin, 1938-
source: Knuth, Donald Ervin, 1938-
Identifier/Call Number: SC0097
Physical Description: 39.25 Linear Feet
Date (inclusive): 1962-2015
Abstract: Papers reflect his work in the study and teaching of computer programming, computer systems for publishing, and mathematics. Included are correspondence, notes, manuscripts, computer printouts, logbooks, proofs, and galleys pertaining to the computer systems TeX, METAFONT, and Computer Modern; and to his books THE ART OF COMPUTER PROGRAMMING, COMPUTERS & TYPESETTING, CONCRETE MATHEMATICS, THE STANFORD GRAPHBASE, DIGITAL TYPOGRAPHY, SELECTED PAPERS ON ANALYSIS OF ALGORITHMS, MMIXWARE : A RISC COMPUTER FOR THE THIRD MILLENNIUM, and THINGS A COMPUTER SCIENTIST RARELY TALKS ABOUT.
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Immediate Source of Acquisition note
Information about Access
This collection is open for research.
Ownership & Copyright
Literary rights reside with Donald Knuth.
Cite As
Donald E. Knuth Papers (SC0097). Dept. of Special Collections and University Archives, Stanford University Libraries, Stanford, Calif.
Arrangement
Biographical/Historical Sketch
Donald Ervin Knuth has been called the "father" of the analysis of algorithms. He contributed to the development of the rigorous analysis of the computational complexity of algorithms and systematized formal mathematical techniques for it. In the process he also popularized the asymptotic notation.
In addition to fundamental contributions in several branches of theoretical computer science, Knuth is the creator of the TeX computer typesetting system, the related METAFONT font definition language and rendering system, and the Computer Modern family of typefaces.
As a writer and scholar, Knuth created the WEB/CWEB computer programming systems designed to encourage and facilitate literate programming, and designed the MIX/MMIX instruction set architectures.
Professor of computer science at Stanford University from 1968-1992, Knuth was born in January 10, 1938 in Milwaukee, Wisconsin. He received a B.S. from Case Institute of Technology in 1960 and a Ph.D. from the California Institute of Technology in 1963. That same year he began to work on The Art of Computer Programming. He had initially accepted a commission to write a book on compilers which would later become the multi-volume The Art of Computer Programming. Originally planned to be a single book, and then planned as a six- and then seven-volume series. In 1968, he published the first volume.
After producing the third volume of his series in 1976, he expressed such frustration with the nascent state of the then newly developed electronic publishing tools (especially those that provided input to phototypesetters) that he took time out to work on typesetting and created the TeX and METAFONT tools. At the TUG 2010 Conference, Knuth announced an XML-based successor to TeX, titled "iTEx", which would support features such as arbitrarily scaled irrational units, 3D printing, animation, and stereographic sound.
Knuth has won numerous awards for his work, including:
Foundation Frontiers of Knowledge Award, 2010 Stanford University School of Engineering Hero Award, 2011

He was elected to the National Academy of Sciences in 1975. In 1992, he became an associate of the French Academy of Sciences. Also that year, he retired from regular research and teaching at Stanford University in order to finish *The Art of Computer Programming*. In 2003, he was elected as a foreign member of the Royal Society. Knuth was elected as a Fellow (first class of Fellows) of the Society for Industrial and Applied Mathematics in 2009 for his outstanding contributions to mathematics. He is also a member of the Norwegian Academy of Science and Letters.


**Description of the Collection**

Papers reflect his work in the study and teaching of computer programming, computer systems for publishing, and mathematics. Included are correspondence, notes, manuscripts, computer printouts, logbooks, proofs, and galleys pertaining to the computer systems TeX, METAFONT, and Computer Modern; and to his books *THE ART OF COMPUTER PROGRAMMING, COMPUTERS & TYPESETTING, CONCRETE MATHEMATICS, THE STANFORD GRAPHBASE, DIGITAL TYPOGRAPHY, SELECTED PAPERS ON ANALYSIS OF ALGORITHMS, MMIXWARE : A RISC COMPUTER FOR THE THIRD MILLENNIUM*, and *THINGS A COMPUTER SCIENTIST RARELY TALKS ABOUT*.

**Subjects and Indexing Terms**

Computer programs.
Computer science.
Computer scientists.
TeX (Computer system).
College teachers.
METAFONT (Computer system).
Computerized typesetting.
Knuth, Donald Ervin, 1938-
Knuth, Donald Ervin, 1938-
Howe, Marion, ed.
Stanford University. Computer Science Department. Faculty
Notes on the second edition of Volume 2, by Donald Knuth, July 30, 1980:

I began to revise the first edition in November 1974, just after finishing revisions for the second printing of Volume 3. Worked steadily until October 1975, preparing hundreds of hand-written inserts. The intent was to preserve the existing page numbering. Marion Howe at Addison-Wesley unscrambled my manuscript using scissors, tape, etc. During 1976, Addison-Wesley found that the number of changes necessitated a complete resetting of the book. Cost of Monotype had skyrocketed; tried to match fonts on Linotron 505, no luck. I discussed the problem with Addison-Wesley chairman (Cummings) during a visit to Boston; decision was made to prepare new fonts for Linotron 505 by photographing the old ones. First results of this were awful; they tried to tune things up. Finally in the spring of 1977, I decided to work on typography myself, and I told them to stop trying as their method was not going to work. During the rest of 1977, I developed TeX and proto-METAfont; was ready to compose Volume 2 in spring of 1978. I mostly worked on METAFONT and refinements to TeX during 1979, then returned to Volume 2 in 1980, when I made further technical revisions during April-June to incorporate the research results accumulated since 1975.

I saved the following things for Archives: A. Original manuscript, as unscrambled by Marion Howe. B. Galley proofs from Universities Press, Belfast, showing why I got into typesetting. C. Galley proofs I made while recomposing the book in 1978. D. TeX form of Chapter 3 at the time I sent Addison-Wesley the first results of my work (June 1978). E. Marion Howe's comments on my initial try at Chapter 3. F. The state of the entire book as of the end of 1978: Chapter 3 revised, and Chapter 4 in its initial form. This copy also shows markings made by Marion Howe, and changes I made during 1980 (this was my source document for the final revision in 1980). G. The state of the entire book after 1980 revision but before proofreading by Aspvall and Liang, and before the final revision of the Computer Modern fonts. H. The state of the book just before final camera-ready copy made, showing last-minute refinements and the index. I. TeX form of the book as printed.

Boxes 31-36: Subsequent editions of Volumes 1, 2 and 3

Notes, by Donald Knuth, August 25, 1988

From February 1995 to February 1998, my major project was to produce new editions of the existing volumes of The Art of Computer Programming: Volume 1 (3rd edition), Volume 2 (3rd edition), and Volume 3 (2nd edition). These were the first new editions of Volumes 1 and 3 since 1975, and the first new edition of Volume 2 since 1981. My work on typesetting, and other projects such as Concrete Mathematics, 3:16 Bible Texts Illuminated, and The Stanford GraphBase, had occupied nearly all of my time since 1977; now I could best return to The Art of Computer Programming by applying the typesetting software I had constructed to the main task that had motivated it from the beginning.

The first major use of TeX had been to produce the second edition of Volume 2 in 1981. My secretary, Phyllis Winkler, then put the texts of Volumes 1 and 3 into the same form; but I never had time to use the results of her work, because the international use of TeX had become so great that I knew I would have to completely revise that system. Thus in 1995 all I had "online" was a set of approximations to Volumes 1, 2, and 3, expressed in an old version of the TeX language that had become obsolete in 1982.

I also had received many hundreds of letters from readers, and had made significant amendments to the text: I began to put those changes into electronic form, as a 350-page list of errata to the old editions. Silvio Levy volunteered to convert the old TeX files to modern TeX form, and to incorporate all of the new errata, while carefully proofreading everything; he began this work in 1996, while I was still gather the errata together. Finally in January of 1997, my errata lists were complete, and Silvio had also finished preparing the new electronic version of Volume 1. I began on January 11 to prepare the final version of that volume, and I had the first ten pages done on January 31.

Meanwhile another volunteer, Jeffrey Oldham, had begun to convert all of the illustrations to electronic form in the METAPOST language - a major undertaking involving more than 600 illustrations, many of which were quite complex. While I was working on Volume 1, Levy and
The Art of Computer Programming

Dedication and Introduction to The Art of Computer Programming

The Art of Computer Programming, changes to the first edition

The Art of Computer Programming, Chapter 1

The Art of Computer Programming, Chapter 2

The Art of Computer Programming, Chapter 3

The Art of Computer Programming, Chapter 4 outline, notes

The Art of Computer Programming, Chapter 4

The Art of Computer Programming, Chapter 4 and 5 brief drafts

The Art of Computer Programming, Chapter 5

The Art of Computer Programming, Chapter 6

Correspondence and notes on chapter 7

Chapter 9 and information on scanner

p. 11-138

p. 139-221

p. 222-272

p. 410-445

p. 610-634

Miscellaneous notes

A3 - A23 Algorithm

Algorithm, p. 507, 508, 540

Algorithm for inverse pennutuation

The analysis of radix exchange

Componological problem in group theory

Chapter organization

Combinational searching

Correspondence

distribution for cascade

Evaluation of polynomials

Example, the boy and the apple tree

Factor method tree

Finite state language

Formulas and readings

Generalized zero-one principle

A good scrambling function for hardware

Historical names and places

Historical roles

Index and glossary

Index entries

Index material

Information on integers

Information on quick sort

Introduction to the book

latin square

Maclaren's method/algorithm

MIX: Math Department subroutine 10/8/62

Names list

Non-isomorphic solutions to "queens" problem

Notes for class

Optimal search tree

Optinn.nn sorting

Organizational outline for the book
box 2, folder 34  Organization of book
box 2, folder 35  Page commentaries
box 2, folder 36  Pagination changes
box 2, folder 37  Permutations of a finite multi-set
box 2, folder 38  Polynomials
box 2, folder 39  Polynomial division
box 2, folder 40  The power tree
box 2, folder 41  Preface and index
box 2, folder 42  Preparing for polyphase merge
box 2, folder 43  Radix system
box 2, folder 44  Random numbers sorting
box 2, folder 45  Recurring series mod m
box 2, folder 46  References
box 2, folder 47  Run-distribution alternating directions
box 2, folder 48  SIAM Review 9 / 1967
box 2, folder 49  Sorting
box 2, folder 50  Sorting information
box 2, folder 51  Statistical study of published algorithms
box 2, folder 52  Subroutines p. 1-36, caltech, Fall 1963
box 2, folder 53  Summary for 1/29-30/72
box 2, folder 54  Tables I
box 2, folder 55  Tables II
box 2, folder 56  Tablet with book organization
box 2, folder 57  Theory and techniques for design of electronic digital computer
box 2, folder 58  38 exercises
box 2, folder 59  Three tran algorithm
box 2, folder 60  Traffic signal problem
box 2, folder 61  Unification problem
box 2, folder 62  Utility arithmetic subroutines
box 2, folder 63  Computer print-outs on experiments with sort routines, algorithms, cascade merge
programs, Morteson table, source listing
box 3, folder 1  Manuscript of *The Art of Computer Programming*, p. 1-49
box 3, folder 2  Manuscript of *The Art of Computer Programming*, p. 69-135
box 3, folder 3  Manuscript of *The Art of Computer Programming*, p. 136-191
box 3, folder 4  Manuscript of *The Art of Computer Programming*, p. 192-236
box 3, folder 5  Manuscript of *The Art of Computer Programming*, p. 237-316
box 3, folder 6  Manuscript of *The Art of Computer Programming*, p. 317-380
box 3, folder 7  Manuscript of *The Art of Computer Programming*, p. 381-435
box 3, folder 8  Manuscript of *The Art of Computer Programming*, p. 436-501
box 3, folder 9  Manuscript of *The Art of Computer Programming*, p. 502-545
box 4, folder 1  Manuscript of *The Art of Computer Programming*, Volume II, p. 546-595
box 4, folder 2  Manuscript of *The Art of Computer Programming*, Volume II, p. 596-635
box 4, folder 4  Manuscript of *The Art of Computer Programming*, Volume II, p. 685-734
box 4, folder 5  Manuscript of *The Art of Computer Programming*, Volume II, p. 735-776
box 4, folder 7  Manuscript of *The Art of Computer Programming*, Volume II, p. 809-843
box 4, folder 8  Manuscript of *The Art of Computer Programming*, Volume II, p. 844-851
box 4, folder 9  Manuscript of *The Art of Computer Programming*, Volume II, p. 7-30 miscellaneous information
box 5, folder 1  Manuscript of *The Art of Computer Programming*, Volume II, Galley proofs from universities press
box 5, folder 2  Chapter 3 and introduction
box 5, folder 3  Chapter 3
box 5, folder 4  Chapter 3 continued
box 5, folder 5  Chapter 4
box 5, folder 6  Answers to exercises, section 3, section 4
box 5, folder 7  TeX form of chapter 3
box 5, folder 8  Marion Howe's comments on the state of the book, 1978
The research introduced three major computer systems:
1) TeX, a system for typesetting
2) METAFONT, a system for typeface design
3) Computer Modern, a family of typefaces

Another important byproduct was the WEB system for structured documentation of computer programs.

Included are the original manuscripts, revised drafts, logbooks, commentary from other experts, research files, and correspondence pertaining to three major computer systems: TeX, a system for typesetting, METAFONT, a system for typeface design, and Computer Modern, a family of typefaces. Also included are keepsakes and specimens of early use of these systems.

The manuscripts were written by Knuth as these systems were being created, together with intermediate versions and log books that show how things developed and changed over the years. Critical comments by leading experts, who helped to refine the ideas, are included. Many of the "first" editions printed by these new methods, at Stanford and at many other places around the world, are also preserved here. The period 1977 - 1986 was one of dramatic change in the world of book publishing; numerous keepsakes and specimens from TeX and other systems have been collected.

Legal size documents

Volume A, The TeXbook
- First TeX manual: draft copy for making the index, Jul 31 1978
- First TeX manual: as it was stored in the computer, Aug 27 1978
- First TeX manual, Sep 1978
- The TeXbook: first printed drafts
- The TeXbook: second printed drafts
- The TeXbook: third printed drafts
- The TeXbook: one-of-a-kind edition used to make the index
- Experiments with TeX done while writing the TeXbook
- The TeXbook illustrations by Duane Bibby
- The TeXbook: comments from readers of pre-publication drafts
- The TeXbook: as marked by Addison-Wesley copy editor
- The TeXbook: book and cover design
The TeXbook: Permission letters

TeX milieu

BBR System, world's first computer controlled printing of text
Hershey's typographic systems
American Math Society research on composition
composition systems from commercial vendors
Typesetting research at universities
Typesetting research at Bell Laboratories
Typesetting research at other laboratories
Fancy word processing with math
TeX in the Bay Area
TeX elsewhere in the U.S.A.
TeX in other countries
Company business re: TeX
Supplementary work on hyphenation and pagination

TeX memorabilia and auxiliary systems

The "DOC" system (father of "WEB") Feb-Mar 1979
The WEB manual
TeXware"
Early use of WEB
Software for the Alphatype CRS
Samples from first interfaces between TeX or METAFDNT and devices
Examples of early TeX output: (A) Things I made myself or with Jill
Examples of early TeX output: (B) Things made by others
Examples of early TeX output: (C) Books
Miscellaneous correspondence, clippings, etc. relevant to TeX
Correspondence with American Math Society

Volume B, TeX: The Program

Prototype implementation of TeX, Aug 25 1977
Beginnings of first TeX implementation, Oct 14 1977
First implementation almost complete, Jan 29 1978
First implementation complete and ready for debugging, 1978 Feb 10
After initial debugging, Mar 29 1978
The first version released" for general use Aug 2 1978 
Fully debugged" version Aug 1979 
TeX78 as it was in Jul 1981
TeX in Pascal, written by Ignacio Zabala
TeX in MESA, written by Leo Guibas, Bob Sedgewick, and Doug Wyatt
First draft of TeX82, Sep 6 1981 (incomplete)
Early draft of TeX82 , Jan 2 1982
A more complete draft of TeX82, Mar 28 1982
"Nearly complete" draft Jun 14 1982 
The first complete draft of TeX82, Jun 29
TeX82 initial debugging, Jul 13 1982
Version -0.25" of TeX82 Jul 25 1982
Version 0 of TeX82, Sep 1982
Version 0.999 of TeX82, Jul 1983
Empirical runtime analysis of TeX
Version 1.0 of TeX82, Dec 3 1983
Version 1.3 of TeX82, Dec 1984
Version 2.0 of TeX82, Nov 11 1985
Copy editor's corrections to Volume B, Jan 1986
Profiles (timing information) for TeX82, 1984
TWILL (special variant of WEAVE for Volumes B and D)
Volume B, front matter
TeXHAX" messages among early users 
TUG (TeX Users Group)
First uses" of TeX continued 

Guide to the Donald E. Knuth Papers SC0097
Computers and Typesetting Series 2

Addison-Wesley publicity brochures

Other systems based on TeX

TeX addenda; Volume C, The METAFONTbook

Miscellaneous correspondence from users

A simple system that came before TeX, Jun 1976

Experiments with the first hyphenation algorithm, 1978

Hyphenation: TeX versus Webster's Collegiate, 1984

TeX, the name

Commercial software based on TeX

Computers and Typesetting: cover designs

Redesign of METAFONT logo, summer 1984

First draft copies of the METAFONTbook, Chapters 1--13

First draft copies of the METAFONTbook, Chapters 14--D

Readers' comments on METAFONTbook first draft

Penultimate draft of METAFONTbook

METAFONTbook: quotations

METAFONTbook: illustrations by Duane Bibby

METAFONTbook: illustrations by computer

METAFONTbook: copy editor's corrections

Proto-METAFONT, 1977

Initial design of METAFONT, summer 1978

Handwritten code for the first METAFONT

Complete logs for TeX, METAFONT, Computer Modern

Knuth, Donald E., The Errors of TEX 1989

Volume D, METAFONT: The Program

First draft of METAFONT interpreter, Dec 15 1978

First draft of METAFONT with raster routines, Jan 1 1979

First draft of testable METAFONT system, Apr 15 1979

First complete" METAFONT system

Released" METAFONT

Tom Spencer's original algorithms for drawing in linear time

Interim METAFONT manual, used from spring 1984 to fall 1985

State of METAFONT code on Mar 11 1984

The first complete draft of METAFONT84, Mar 18 1984

First working draft of METAFONT84

First version of METAFONT to pass the TRAP" test

Version 0.3 of METAFONT, Sep 27 1984

Version 0.7 of METAFONT, Jan 17 1985

Version 0.95 of METAFONT, Aug 12 1985

Volume D, continued; METAFONT milieu

Version 1.0 of METAFONT, Jan 4 1986

Profile (running time estimate) of METAFONT, Oct 1985

Profile gathering program

Typography course, spring 1984, with Bigelow and Southall

Typography course homework: El Palo Alto and border designs

Typography course homework: Font 1" "

Equipment brochures, manuals, and samples

Interfacing METAFONT84 to devices

Use of my own laser printer!

other letterform design systems

Legibility

Correspondence concerning fonts

METAFONT connuerary

Type specimens

Volume E, Computer Modern Typefaces

What preceded Computer Modern

Computer Modern, 1977

Computer Modern, 1978
Guide to the Donald E. Knuth Papers SC0097

Concrete Mathematics Series 3

Scope and Contents note

Archives from the development of Concrete Mathematics, a textbook by Ronald L. Graham, Donald E. Knuth and Oren Patashnik. This book, published in the sumner of 1988, is based on a Stanford course of the same name that I introduced in 1970 (and it has been taught ever since). It represents sort of a "manifesto" of the way I like to do mathematics, especially the mathematics associated with computer programmning. After nearly twenty years teaching the course, I knew that it was time to put this textbook together and export the ideas to other universities. My goal was to produce the best exposition of mathematical manipulations since, say, cauchy's famous Cours de Mathematigue of the 1820's and 1830's. Ron Graham was a visiting professor who taught the Stanford course twice during my sabbatical leaves, both times with great success. Oren Patashnik was a graduate student in Computer Science who served as teaching assistant in the class several times, under both Graham and me.

Drafts, proofs, and correspondence pertaining to the textbook by Ronald L. Graham, Donald E. Knuth and Oren Patashnik, which was based on a Stanford course taught by Knuth.
Original Drafts

Scope and Contents note
Patashnik created a draft of the entire book, which was used by Stanford students for two or three years. During the last half of 1987 and the first half of 1988, I rewrote this draft and the result was used as a trial text at Stanford, Princeton, Brown, Columbia, Rice and CUNY. My handwritten manuscripts appear here, together with marked-up copies of Oren's draft, together with high-level notes I made to Graham letting him know the thrust of what I was doing so that he could provide maximum input. Correspondence and preprints of unpublished papers I consulted during this time are also included.

This part of the archive consists of ten legal-size folders.

1.0 Preface, Graffiti and permissions (see below)
1.1 Chapter One, Recurrent Problems
1.2 Chapter Two, Sums
1.3 Chapter Three, Integer Functions
1.4 Chapter Four, Number Theory
1.5 Chapter Five, Binomial Coefficients
1.6 Chapter Six, Special Numbers
1.7 Chapter Seven, Generating Functions
1.8 Chapter Eight, Discrete Probability
1.9 Chapter Nine, Asymptotics

Each folder has comments written on the outside that were notes to myself about what sources to read as I was writing the material. These references are keyed to sixteen years worth of classnotes from the Stanford course; those classnotes are not part of the archive but they do exist in Stanford's Mathematical Sciences Library.

Our book introduces a novel feature called "graffiti," borrowed from the non-mathematical brochure called Approaching Stanford. We asked students to contribute their own comments so that we could print them in the margins of our book. These student contributions are included in folder I.O.

Preface, Graffiti, Permission
Chapter One: Recurrent Problems
Chapter Two: Sums
Chapter Three: Integer Functions
Chapter Four: Number Theory
Chapter Five: Binomial Coefficients
Chapter Six: Special Numbers
Chapter Seven: Generating Functions
Chapter Eight: Discrete Probability
Chapter Nine: Asymptotics

Correspondence with the publisher
Scope and Contents note
Here are relevant letters from the production editor and book designer. These are of some interest because we wrote this book at a time when the process of book production is changing dramatically. Instead of sending a manuscript to the publisher and letting them carry the ball, this book was typeset by its authors. Still, we did not want to lose the professional services of a book designer, so we received advice on suitable format before we did the typesetting.

Our book is interesting from another standpoint because it is the first book to be published with a new family of typefaces designed by Hermann Zapf, especially for mathematics, called AMS Euler. Part of my work on this book, was devoted to fine tuning of these fonts, so that they can be used in other mathematical publications. With the book designers help I was able to create a compatible text face (called Concrete Roman and Italic) to complement Zapf’s mathematical characters.
<table>
<thead>
<tr>
<th>Box, Folder</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>27, 5</td>
<td>Correspondence with Addison-Wesley</td>
</tr>
<tr>
<td>27, 6</td>
<td>Duplicate and erroneous pages from manuscript</td>
</tr>
<tr>
<td></td>
<td><strong>First Early Draft</strong></td>
</tr>
<tr>
<td></td>
<td>Scope and Contents note</td>
</tr>
<tr>
<td></td>
<td>Here are the pages used by students at Stanford, Princeton, 1987-1988, etc., together with corrections I noted in response to their feedback.</td>
</tr>
<tr>
<td>28, 1</td>
<td>Preface, Chapters One, Two and Three</td>
</tr>
<tr>
<td>28, 2</td>
<td>Chapters Four and Five</td>
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<tr>
<td>28, 3</td>
<td>Chapters six and Seven</td>
</tr>
<tr>
<td>28, 4</td>
<td>Chapters Eight, Nine and Exercises</td>
</tr>
<tr>
<td>28, 5</td>
<td>Ron Graham's Remarks</td>
</tr>
<tr>
<td></td>
<td>Scope and Contents note</td>
</tr>
<tr>
<td></td>
<td>Ron took the responsibility for preparing the index; he marked up a copy of (III) with index terms and made other comments.</td>
</tr>
<tr>
<td>28, 6</td>
<td>Preface, Chapters One, Two, Three and Four</td>
</tr>
<tr>
<td>29, 1</td>
<td>Chapters Five and six</td>
</tr>
<tr>
<td>29, 2</td>
<td>Chapters Seven, Eight, Nine and Exercises</td>
</tr>
<tr>
<td>29, 3</td>
<td>Copy editor's Remarks</td>
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<tr>
<td></td>
<td>Scope and Contents note</td>
</tr>
<tr>
<td></td>
<td>Another aspect of typesetting-by-author is shown here. We wanted the help of a professional copy editor as well as a book designer. In this case the copy editor could mark freely anything that needed to be double-checked, knowing that we would ignore all advice that we didn't like. The result, we think, is much better than in previous methods under which the copy editor would have supreme authority but would then be limited to making changes that would not upset the authors when page proofs appeared. This part of the archive also includes some correspondence I had with the copy editor.</td>
</tr>
<tr>
<td>29, 4</td>
<td>Preface, Style-sheet, Preface, Chapters One and Two</td>
</tr>
<tr>
<td>29, 5</td>
<td>Correspondence, Chapters Three and Four</td>
</tr>
<tr>
<td>29, 6</td>
<td>Chapters Five and Six</td>
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<td>29, 7</td>
<td>Chapters Seven and Eight</td>
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<td>29, 8</td>
<td>Chapter Nine</td>
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<tr>
<td>30, 1</td>
<td>Semi-final proofs</td>
</tr>
<tr>
<td>30, 2</td>
<td>Scope and Contents note</td>
</tr>
<tr>
<td>30, 3</td>
<td>The corrections to (III) based on (IV), (V) and other feedback are shown here in a special format that shows the first raw index we constructed. Final changes and graffiti are written on these laserprinted proofs.</td>
</tr>
<tr>
<td>30, 4</td>
<td>Preface, Chapters One and Two</td>
</tr>
<tr>
<td>30, 5</td>
<td>Chapters Three and Four</td>
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<tr>
<td>30, 6</td>
<td>Chapters Five and Six</td>
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<tr>
<td>30, 7</td>
<td>Chapters Seven, Eight and Nine</td>
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<tr>
<td>31, 1</td>
<td>Appendices A: Exercises, B: Bibliography, C: Credits</td>
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<td>31, 2</td>
<td>Index</td>
</tr>
<tr>
<td>2, 4</td>
<td>Galleys and proofs for <em>The Art of Programming</em> Accession ARCH-1989-278</td>
</tr>
<tr>
<td>4, 1</td>
<td><strong>Additional Material</strong> Accession ARCH-1996-147</td>
</tr>
<tr>
<td></td>
<td>Scope and Contents note</td>
</tr>
<tr>
<td></td>
<td>Addendum to the archives of the TeX-METAfont project drafts, proofs, articles, notes, and other records pertaining to the project, as well as keepsakes and published materials using TeX and/or METAfont.</td>
</tr>
<tr>
<td>Box 1, Folder 1</td>
<td>Galley proofs the second edition of <em>The Art of Computer Programming</em>, Volume 1, 1973</td>
</tr>
<tr>
<td>Box 1, Folder 2</td>
<td>Samples of repro copy used to make <em>Volume 1</em> with Monotype by Wolf Composition</td>
</tr>
<tr>
<td>Box 1, Folder 3</td>
<td>Samples of repro copy used to make <em>Surreal Numbers</em> with Monotype by Clowes</td>
</tr>
<tr>
<td>Box 1, Folder 4</td>
<td>Samples of repro copy used to make volume 2, second edition, with TeX and METAFLONT - Knuth’s first production output with the Alphatype</td>
</tr>
<tr>
<td>Box 1, Folder 5</td>
<td>The WEB system, preliminary pre-release version, November 1981 (one of the first documents of what has become known as Literate Programming)</td>
</tr>
<tr>
<td>Box 1, Folder 6</td>
<td>The GftoDVI processor: Version 0, April 1984</td>
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<td>Box 1, Folder 7</td>
<td>The GftoDVI processor: Version 1.6, September 1985</td>
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<td>Box 1, Folder 8</td>
<td>Complete listing of TeX with frequency counts of actual usage, 22 October 1986</td>
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<td>Box 1, Folder 9</td>
<td>Keepsakes from the early days of TeX: Scope and Contents note System uptime report for the SAIL computer on which Knuth worked The first proofs of proto-Computer Modern type, July 1977; Cover art for the first TeX user manual. American Math Society, 1978; Cover design by Scott Kim for Stanford Computer Forum, using an early draft of the AMS Euler lowercase, Fall 1981; Handouts for TeX mini-courses, Spring 1981; Photo of California vanity plate ”DON TEX”, n.d.; Formal invitation to TeX’s “coming of age” party, December 9, 1983</td>
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<tr>
<td>Box 10, Folder 10</td>
<td>Notes made by Knuth while preparing revision of METAFLONT, December 21, 1982 - January 18, 1984</td>
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<tr>
<td>Box 2, Folder 1</td>
<td>Technical notes related to the inner workings of TeX and METAFLONT:</td>
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<tr>
<td>Box 2, Folder 1</td>
<td>Computer-aided footwear design by J.R. Manning, December 1972</td>
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<td>Box 2, Folder 1</td>
<td>Scribe: A document specification language by Brian Reid, October 1980</td>
</tr>
<tr>
<td>Box 2, Folder 1</td>
<td>Geometric construction of Bernstein poly curves by G.M. Chaikin, Fall 1980</td>
</tr>
<tr>
<td>Box 2, Folder 2</td>
<td>Choosing spline directions at knots by John Hobby, Spring 1983</td>
</tr>
<tr>
<td>Box 2, Folder 2</td>
<td>Choosing velocity parameters for cubic splines by John Hobby, Spring 1983</td>
</tr>
<tr>
<td>Box 2, Folder 2</td>
<td>Correcting outlines for pen width by John Hobby March 1983</td>
</tr>
<tr>
<td>Box 2, Folder 2</td>
<td>A Chinese meta-font by John Hobby and Gu Guoan, ICTP83 proceedings, October 1983</td>
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<tr>
<td>Box 2, Folder 2</td>
<td>Ideas for the new METAFLONT by John Hobby, Fall 1983</td>
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<td>Box 2, Folder 2</td>
<td>METAFLONT programming style by Per Bothner, December 12, 1983</td>
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<tr>
<td>Box 2, Folder 2</td>
<td>The 6-register method for plotting cubic spines by John Hobby, December 14, 1983</td>
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<td>Box 2, Folder 2</td>
<td>Tension and mock curvature by John Hobby, December 15, 1983</td>
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<td>Box 2, Folder 2</td>
<td>Adjustment to the raster by John Hobby, December 15, 1983</td>
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<td>Joints between Bezier curves by Lyle Ramshaw, December 15, 1983</td>
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<td>Convolving graph paper tracings by Lyle Ramshaw, December 16, 1983</td>
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<td>Alternatives to the splines of Manning by John Hobby, December 31, 1983-January 1, 1984</td>
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<td>Box 2, Folder 2</td>
<td>Comments on curves by Leo Guibas and Knuth, January 1, 1984</td>
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<td>Box 2, Folder 2</td>
<td>Reparameterization and other things by Lyle Ramshaw, January 3, 1984</td>
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<td>Box 2, Folder 2</td>
<td>Compromise values of r and s by John Hobby, January 3 1984</td>
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<td>Box 2, Folder 2</td>
<td>Nifty labeling of Bezier intermediate points by Lyle Ramshaw, February 8, 1985</td>
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<td>Box 2, Folder 3</td>
<td>Proposed raster image processor by Victor Ostromoukhov, Spring 1988</td>
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<td>Box 2, Folder 3</td>
<td>Adaptation of Liang’s hyphenation to Russian by Dimitri Vulis 1988</td>
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<tr>
<td>Box 2, Folder 4</td>
<td>Proposed changes to TeX by Jan Rynning, August 16, 1989</td>
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<td>Box 2, Folder 4</td>
<td>ISO standards for extended 8-bit codes, August 1989</td>
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<tr>
<td>Box 2, Folder 5</td>
<td>Subtle bugs in METAFLONT, October 1989</td>
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<td>Box 2, Folder 5</td>
<td>Samples of AMS Euler before re-tuning of Fraktur and script, March 1991</td>
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<td>Box 2, Folder 5</td>
<td>Demillo and Mathur, Applying grammar-based fault classification to TeX, 1995</td>
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<tr>
<td>Box 2, Folder 6</td>
<td>Samples of repro copy used to make Computers &amp; Typesetting: Volume A - The TeXbook (includes all chapter openers with Duane Bibby art) 1983</td>
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<td>Box 2, Folder 6</td>
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<td>Volume E - Computer Modern Typefaces 1986</td>
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</table>

Guide to the Donald E. Knuth Papers SC0097 SC0097 14
Samples of repro copy for Concrete Mathematics (the first major use of the AMS Euler typeface; 1988 sheets on Autologic 720dpi; 1990 on Linotron 1270dpi) 1988-1990

Miscellaneous publications of the TeX Users Group:
Membership list September 26, 1986
Errata and changes for Computers & Typesetting, June 15, 1987
Keepsakes from the later days of TeX and METAFONT
Duane Bibby's announcement of his new home n.d.
TeX Christmas from Irene Hyna, December 1986
METAFONT Christmas card from Georgia Tobin, December 1986
METAFONT Valentine for Jill, February 1987
Wedding program for Diana Barnes and Robert Nicholus, August 29, 1987
(one of the first uses of Computer Modern Sans Serif)
Example DVIRGB output, IBM colorjet printer by Norman Naugle, November 1987
"A dragon for you" text and picture by Norman Naugle n.d.
Announcement of Knuth's lecture to Stanford Library Associates, December 1987
Poster with Computer Modern, received from Oc\'e in Netherlands, April 1988
Registration form when Knuth joined cyrTUG, the Russian TeX users group, May 1994
Examples of TeX and METAFONT as used by Josef Gerbrich in Brno 1995
Examples of TeX output for posted tram schedules in Brno and Prague 1995
Early examples of TeX and METAFONT used in non-English languages:
Irish
Icelandic
Russian (includes Cyrillic fonts to match Computer Modern Concrete Russian)
Old Church Slavonic
Polish (includes Samizdat literature for Solidarity!)
Turkish
Arabic
Farsi
Greek, Gothic, Hebrew, Sanskrit, etc.
ScholarTeX by Yannis Haralambous, 1991
TeX et las Langues Orientales by M. Fanton and Y. Haralambous, 1992
Amharic
Chinese
Japanese
Conference publications and handouts from TeX/METAFONT user groups:
America -
Delaware and Washington 1987
Stanford 1989
College Station, Texas 1990
Boston 1991
Santa Barbara 1994 (preprints)
Florida 1995 (preprints and handouts)
Europe -
First European TeX Conference, Cork, Ireland 1990
Cahiers GUTenberg no 8 (1991)
Nordic TeX Users Group, Stockholm 1991
Asia -
cyrTUG publications and fonts
Proceedings of the 7th UNICODE conference, September 1995
Part 1
Part 2
Miscellaneous typographic keepsakes given to Knuth by Mell Hall and Bob McCann (former employees of Stanford News and Publications)

Miscellaneous typography - related keepsakes that Knuth acquired over the years:
Demo page by leader of Lisa software at Apple Computer 1983
Peter Koch, printer 1995
box 5, folder 3  Printing at the Wittington Press, 1972-1994
box 5, folder 3  Sample of Scripps College Oldstyle type (Goudy)
box 5, folder 3  Typography: Basic principles and applications--Oc\'e, Netherlands
box 5, folder 3  Character language resources: International software buyer's guide 1995
box 5, folder 3  Sample graphics from 1991 Stanford Art Directors Invitational
box 5, folder 3  Samples of David Kindersley's SuperVision spacing method 1985 & 1987
box 5, folder 3  Samples of Chinese fonts by Gu Guoan, Shanghai IKARUS Limited 1989
box 5, folder 3  Early example of Dave Siegel's Tekton font, used in PhoneNET poster 1991
box 5, folder 3  Poster made at Donnelley research laboratory 1988 (poor typesetting!)
box 5, folder 3  Fonts from Judith Sutcliffe of Santa Barbara
box 5, folder 3  INRIA poster that mixes Computer Modern Sans with Univers
box 5, folder 3  Correspondence and samples from Sumner Stone's type foundry
box 5, folder 3  Font coding system used in Beijing, November 1991
box 5, folder 3  SERIF: A typography magazine produced with TeX 1994
box 5, folder 4  Keepsake from Andrew Hoyem using types of Rudolph Koch
box 5, folder 4  Specimens of ITC Bodoni type
box 5, folder 4  ITC font brochure 1994
box 5, folder 4  Fundacion Tipografica Neufville font brochure 1994
box 5, folder 4  Linotype font brochure 1994
box 5, folder 4  Bitstream GX fonts 1994
box 5, folder 4  ATypI Congress 1994, San Francisco, brochure and program
box 5, folder 4  D\"urer: So will I be perfect; keepsake by Jeff Level, Robert Kobodaishi
box 5, folder 4  Miscellaneous handouts from ATypI Congress 94: TypeLab, etc.
box 5, folder 4  Decorated Hebrew alphabet from Jerusalem
box 5, folder 4  Erich Wronker, Picture portfolio of printing medals 1993
box 5, folder 4  Bigelow and Holmes, examples of new Lucida mathematics fonts 1992
box 5, folder 4  A "meta-painting" (printed 1977 in Munich, but probably from 19th century)
box 5, folder 5  Samples from correspondence from Sumner Stone's type foundry
box 5, folder 5  Samples of Gunnlaugur Briem
box 5, folder 6  Christmas and New Year's Cards:
box 5, folder 6  Andrea Grimes, Susie Taylor; Sheila and Julian Waters; Friedrich and Edith Neugebauer; Gunnlaugur Briem; Christine and Friedrich Peter; Gudrun and Hermann Zapf
box 5, folder 7  Brochures and Publications of TeX and/or METAFONT Vendors:
box 5, folder 7  Preliminary user guide to Micro-Tex 1986
box 5, folder 7  Donald E. Knuth und MicroTeX im Gutenbergmuseum zu Mainz, September 17, 1987
box 5, folder 7  Handouts from Jonathan Fine 1993
box 5, folder 7  Alex Warman's letter describing TeXworks publishing in Australia
box 5, folder 7  St"urtz typesetting of TeX documents
box 5, folder 7  TeX-to-type at Cambridge University Press
box 5, folder 7  Looking to Springer for the latest in TeXnology
box 6, folder 1  Talaris Systems Newsletters: The Laser Line 1986-1988
box 6, folder 1  Kinch Computer Company: TurboTeX buyer's guide
box 6, folder 1  Mimi Lafrenz's letter about ETP composition services in Portland
box 6, folder 1  Oc\'e's new 508dpi laserprinter with Computer Modern samples 1988
box 6, folder 1  Lance Carnes' letter about his typesetting services for DVI files 1988
box 6, folder 1  Brochure from FTL systems 1987
box 6, folder 1  Paul M. Muller's letter and proposal for Chinese typesetting 1987
box 6, folder 1  FaSTeX flip card by Norman Paul 1986
box 6, folder 1  ST-TeX and ST-METAFONT from TOOLS GMBH, Bonn 1986
box 6, folder 1  The Publisher from ArborText, Inc. 1987
box 6, folder 2  Georgia Tobin's fonts (1980-1987):
box 6, folder 2  Hebrew and Decorative
box 6, folder 2  Roman
box 6, folder 2  Chel
box 6, folder 2  Slavic
box 6, folder 3  M. D. Spivak, Mathtime fonts (PostScript Times Roman and Italic for mathematics)
box 6, folder 4  Douglas Henderson, pcMF manual (for the METAFONT system to accompany pcTeX)
Additional Material Accession ARCH-1996-147

Guide to the Donald E. Knuth Papers SC0097

Box 6, Folder 6
Scientific Word and Scientific WorkPlace, from TCI Software Research

NAR Associates: Mathematical, scientific, and historical typesetting


Projective Solutions on converting bitmap fonts to outline fonts

Books and publications using TeX and/or METAFONT

Robert Messer. Introduction to Topology 1981 (first TeX use at Vanderbilt University)


Philosophie de la recherche pedagogique en Suede (first TeX book in Sweden)

Lecture Notes in Physics 189, 1983 (first book in TeX in Mexico)

Arthur Keller. Programmare in PASCAL 1984 (first book in TeX in Italy)

Middle East Studies Association Bulletin 18, 1984 (their switch to TeX)

The Political Economy of Saudi Arabia 1984 (early use of Computer Modern)


D’esarm’enien. La division par ordinateur des noms francais 1986

TeX in Osnabrück 1986

Tsuneoshi Hayashi. Guide to TeX implementation at Hokkaido University 1986

Tsuneoshi Hayashi. Improvement of DVIwrite for Japanese text

NRL Memo 6044. TeXing the Formulary 1987 (shows TeX input, formulas output)

Spivak’s T2D4: Tables to Die For 1987 (with illustrations by Duane Bibby)

Borde. An absolute beginner’s guide to using TeX 1987

Miguel Navarro Saad. Aztec calendar formatted with TeX macros 1987

ABC om TeX og LaTeX n.d. (from computer center at Oslo University)

Lokale utvidelser i TeX ved USEs VAX-cluster 1988 (Oslo University)

Peter Bruun. PiTeX: A graphical editor for pictures in LaTeX 1988

Maarten van Emden. SiTeX-sized poems for font freaks 1989

Sherry P. Ketterer. Bibliography of publications related to TeX and METAFONT 1990

User manual for Japanese TeX 1990

Sandra Wimbish. Introduction to Pagu 1991 (interlinear texts done with TeX)

Charles Bortle. Poetry books done on his PC 1991

Kai Borre. Mindste Kvadraters Princip 1992 (Danish book using AMS Euler)

ASCII Corporation PC software for TeX 1992 (for Japanese texts)

Vzgliahi na dom svoi, Pytnik! (one of several Russian novels published in New York)

Programmiovanie 1992 (Russian technical journal typeset in TeX)

Mnogoiazychnyi LaTeX 1993 (one of many Czech publications in TeX/METAFONT)

Magicke rostliny 1994 (“Multilingual LaTeX”)

Shinsaku Fujita. Examples of chemical formulas typeset with XuMTeX 1992-1995

Yannis Haralambous. METAFONT improves on multiple master fonts. Preprint, 1995

GraphBase project records Accession ARCH-1996-148

Scope and Contents note

Material from the making of The Stanford GraphBase, a book published by ACM Press and Addison-Wesley Publishing Company in 1993. It includes the notes I made to myself and to Stanford students during the 20-year period I was compiling material for that book. The book is based on a series of interesting computer programs and interesting data from which many experiments in computer science have been made; I expect many additional researches to be based on this system in the years to come, because experimental computer science is expanding rapidly. The book itself was named the Best New Book in Computer Science by the Association of American Publishers in 1994.

Notes from student meetings of the GraphBase Project

GB_BOOKS: Novels and when their characters meet

GB_ECON: Input-output data for the US economy
box 1  GB_GAMES: College football scores
box 1  GB_LISA: Pixels of Mona Lisa
box 1  GB_MILES: Highway distances between US cities
box 1  GB_ROGET: Thesaurus cross-reference
box 1  GB_WORDS: Five-letter words of English
box 1  Pencil draft of the book manuscript, except for the programs
box 1  First typeset draft of the GraphBase programs (August 1992)
box 1  Second typeset draft of the entire book (March 1993)
box 1  Copy editor's remarks (June 1993)

Computer Science 209, Mathematical Writing, lectures [videorecordings]
Accession ARCH-1998-154 1987

box 1  174.1 1987 Sep 30
  Physical Description: videotape (VHS)
box 1  174.2 1987 Oct 2
  Physical Description: videotape (VHS)
box 1  174.3 1987 Oct 5
  Physical Description: videotape (VHS)
box 1  174.4 1987 Oct 7
  Physical Description: videotape (VHS)
box 1  174.5 1987 Oct 9
  Physical Description: videotape (VHS)
box 1  174.6 1987 Oct 12
  Physical Description: videotape (VHS)
box 1  174.7 1987 Oct 14
  Physical Description: videotape (VHS)
box 1  174.8 1987 Oct 16
  Physical Description: videotape (VHS)
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  Physical Description: videotape (VHS)
box 2  174.12 1987 Oct 26
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box 2  174.13 1987 Oct 28
  Physical Description: videotape (VHS)
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  Herbert Wilf, guest lecturer
box 2  174.14 1987 Oct 30
  Physical Description: videotape (VHS)
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Physical Description: videotape (VHS)

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Physical Description: videotape (VHS)

box 2 174.18 1987 Nov 9  
Physical Description: videotape (VHS)

box 2 174.19 1987 Nov 11  
Physical Description: videotape (VHS)

box 2 174.2 1987 Nov 13  
Physical Description: videotape (VHS)

box 2 174.21 1987 Nov 16  
Physical Description: videotape (VHS)

box 2 174.22 1987 Nov 18  
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Jeff Ullman, guest lecturer

box 3 174.23 1987 Nov 20  
Scope and Contents note  
Leslie Lamport, guest lecturer

box 3 174.24 1987 Nov 23  
Scope and Contents note  
Nils Nilsson, guest lecturer

box 3 174.25 1987 Nov 25  
Scope and Contents note  
Mary-Claire van Leunen, guest lecturer

box 3 174.26 1987 Nov 30  
Scope and Contents note

box 3 174.27 1987 Dec 2  
Scope and Contents note  
Mary-Claire van Leunen, guest lecturer

box 3 174.28 1987 Dec 4  
Scope and Contents note
Burroughs Corporation. Lectures on Software Design by Donald E. Knuth (photocopy),
along with a computer printout: Q & D Version of Classroom Assembly Program
Accession ARCH-1999-102 1964 Fall

Additional Material Accession ARCH-2001-078
Scope and Contents note
Correspondence, drafts, galleys, and other materials pertaining to the following publications:
Selected Papers in Computer Science, Digital Typography, Analysis of Algorithms, and
MMIXware.

Selected Papers in Computer Science
  Correspondence 1995-2000

Digital Typography
  Correspondence, 1994-2000
  
  Chapter 1: Digital Typography - drafts
  
  Chapter 2: Mathematical Typography - galleys and draft of addendum
  
  Chapter 3: Breaking Paragraphs into Lines - galleys
  
  Chapter 4: Mixing Right-to-Left Texts with Left-To-Right Texts - galleys and proofs of illustrations
  
  Chapter 5: Recipes and Fractions - galleys and proofs of a "holly" font not used
  
  Chapter 6: The TeX Logo in Various Fonts - galleys
  
  Chapter 7: Printing Out Selected Pages - galleys and draft of addendum
  
  Chapter 8: Macros for Jill - galleys
  
  Chapter 9: Problem for a Saturday Morning - galleys
  
  Chapter 10: Exercises for TeX: The program - galleys
  
  Chapter 11: Mini-Indexes for Literate Programs - galleys
  
  Chapter 12: Virtual Fonts - galleys
  
  Chapter 13: The Letter S - galleys and draft of addendum
Chapter 14: My First Experience with Indian Scripts – galleys and initial proof of Figure 1
Chapter 15: The Concept of a Meta-Font – galleys and initial proofs of two fonts
Chapter 16: Lessons Learned from METAFONT – galleys
Chapter 17: AMS Euler - A New Typeface for Mathematics – galleys, proofs of illustrations, and first proof of the typeface sample
Chapter 18: Typesetting Concrete Mathematics – galley proof
Chapter 19: A Course on METAFONT Programming – galleys and first proofs of illustrations
Chapter 20: A Punk Meta-Font – galleys
Chapter 21: Fonts for Digital Halftones – galleys and some test pages supplied by the printer
Chapter 22: Digital Halftones by Dot Diffusion - galleys
Chapter 23: A Note on Digitized Angles – galleys
Chapter 24: TEXDR.AFT - Knuth's trial proof dated 14 June 1998
Chapter 26: TeX Incunabula – galleys
Chapter 27: Icons for TeX and METAFONT - galleys
Chapter 28: Computers and Typesetting - galleys and draft of new material
Chapter 29: The New Versions of TeX and METAFONT - galleys
Chapter 30: The Future of TeX and METAFONT - galleys
Chapter 31: Questions and Answers, I – galleys
Chapter 32: Questions and Answers, II – galleys
Chapter 33: Questions and Answers, III – galleys
Working copy of the entire book: pp. vii-65
Working copy of the entire book: pp. 67-155
Working copy of the entire book: pp. 315-414
Working copy of the entire book: pp. 415-545
Working copy of the entire book: pp. 547-end

Analysis of Algorithms
Correspondence, 1997-2000
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<td>Chapter 1: Mathematical Analysis of Algorithms - copy of original article, galleys, copy of a bibliographic item</td>
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<td>Chapter 2: The Dangers of Computer Science Theory - copy of original article, galleys</td>
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<td>Chapter 3: The Analysis of Algorithms - copy of original article, galleys</td>
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<td>Chapter 5: Optimal Measurement Points for Program Frequency Counts - copy of original article, galleys</td>
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<td>Chapter 6: Estimating the Efficiency of Backtrack Programs - copy of letter to I. J. Good, 1975, copy of original article, galleys, proofs of new illustrations</td>
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<td>Chapter 7: Ordered Hash Tables - notes, copy of original article, galleys</td>
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<td>Chapter 8: Activity in an Interleaved Memory - copy of original article, galleys</td>
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<td>Chapter 9: An Analysis of Alpha-Beta Pruning - copy of relevant correspondence, copy of original article, galleys, first proofs of illustrations, draft of addendum</td>
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<td>Chapter 10: Notes on Generalized Dedekind Sums - notes, copy of original article, galleys</td>
</tr>
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<td>Chapter 11: The Distribution of Continued Fraction Approximations - copy of original article, galleys</td>
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<tr>
<td>1, 56</td>
<td>Chapter 12: Evaluation of Porter's Constant - copy of original article, correspondence from John Wrench, galleys, draft of addendum</td>
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<td>1, 57</td>
<td>Chapter 13: The Subtractive Algorithm for Greatest Common Divisors - copy of correspondence with co-author A. C. Yao, galleys, draft of addendum</td>
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<td>1, 58</td>
<td>Chapter 14: Length of Strings for a Merge sort - copy of original article, galleys, draft of addendum</td>
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<td>1, 59</td>
<td>Chapter 15: The Average Height of Planted Plane Trees - corrections, copy of original article, galleys, proofs of illustrations</td>
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<td>1, 60</td>
<td>Chapter 16: The Toilet Paper Problem - copy of original article and one of its sequels, galleys, proofs of illustrations</td>
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<td>Chapter 17: An Analysis of Optimum Caching - letter from H. S. Wilf, copy of original and related articles, galleys</td>
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<td>1, 62</td>
<td>Chapter 18: A Trivial Algorithm Whose Analysis Isn't - copies of related correspondence, copy of original article, galleys</td>
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<td>1, 63</td>
<td>Chapter 19: Deletions That Preserve Randomness - copy of original article, galleys, references used in preparing addendum</td>
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<td>1, 64</td>
<td>Chapter 20: Analysis of a Simple Factorization Algorithm - notes, copy of original article, galleys</td>
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<td>1, 65</td>
<td>Chapter 21: The Expected Linearity of a Simple Equivalence Algorithm - notes, copy of original article, galleys, draft of addendum</td>
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<td>1, 66</td>
<td>Chapter 22: Textbook Examples of Recursion - copies of related correspondence, 1990-96, galleys, correspondence 2000 regarding error and its correction</td>
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<td>1, 67</td>
<td>Chapter 23: An Exact Analysis of Stable Allocation - correspondence re the bibliography, galleys</td>
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<td>Chapter 24: Stable Husbands - galleys</td>
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<td>1, 69</td>
<td>Chapter 25: Shellsort With Three Increments - copy of original article, galleys</td>
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<td>1, 70</td>
<td>Chapter 26: The Average Time for Carry Propagation - copy of original article, galleys</td>
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<td>1, 71</td>
<td>Chapter 27: Linear Probing and Graphs - related correspondence, copy of original article, galleys</td>
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<td>1, 72</td>
<td>Chapter 28: A Terminological Proposal - copy of original article, galleys</td>
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Chapter 29: Postscript about NP-Hard Problems – copy of original article, galleys
Chapter 30: An Experiment in Optimal Sorting – copy of original article, galleys
Chapter 31: Duality in Addition Chains – copy of original article, galleys
Chapter 32: Complexity Results for Bandwidth Minimization – correspondence with co-author David Johnson, copy of original article, galleys, citations used in preparing the addendum
Chapter 33: The Problem of Compatible Representatives – copy of original article, galleys
Chapter 34: The Complexity of Nonuniform Random Number Generation – copy of original article, galleys, proofs of illustrations
Working copy of the entire book: pp. vii-75
Working copy of the entire book: pp. 77-148
Working copy of the entire book: pp. 149-256
Working copy of the entire book: pp. 257-390
Working copy of the entire book: pp. 391-492
Working copy of the entire book: pp. 493-end

**MMIXware**

MMIX in 1991 and 1992 - first and second draft of the program, presentation letter to John Hennessy, and his comments
MMIX-PIPE, 17 January 1999 - earliest printed draft with handwritten corrections
MMIX-PIPE, 5 February 1999 - draft
MMIX-PIPE, 16 February 1999 - draft with documentation of the MMIX hardware as it existed at the time
MMIXware, 13 April 1999 - earliest surviving drafts of MMIX-ARITH and MMIX-SIM
MMIXware, 19 April 1999 - earliest surviving drafts of MMIX-IO and MNOtype with current versions of MMIX-SIM and the MMIX documentation
Fascicle 1, 8 May 1999 - first galley proofs of new expository material for The Art of Computer Programming (section 1.3.1’)
Fascicle 1, 26 May 1999 - galley proofs, including section 1.3.2'
Fascicle 1, 8 June 1999 - galley proofs, now including section 1.4.1'
Fascicle 1, 21 June 1999 - galley proofs, including sections 1.4.2’ and 1.4.3’, and first draft of index and glossary
Fascicle 1, 27 June 1999 - galley proofs of first complete "clean" version
Fascicle 1, 23 August 1999 - Knuth’s working reference copy
CTWILL – text for CTWILL program (version 3.43) and companion programs REFSORT and TWINX
MMIX-ARITH - proofmode output of program MMIX-ARITH dated 27 September 1999, with handwritten corrections, and book pages dated 2 October 1999
MMIX-CONFIG - proofmode and book pages
MMIX-PIPE - proofmode and book pages
MMIX-SIM - proofmode and book pages
MMIXAL - proofmode and book pages
MMIX - proofmode and book pages
MMIXware front matter and short chapters
MMIXware correspondence with publisher Springer-Verlag, 1998-99
Scope and Contents note

This accession pertains to the lecture series on the general topic of faith and science delivered at MIT in the fall of 1999, which resulted in the book *Things a Computer Scientist Rarely Talks About*. Included are correspondence, notes, transcripts of the taped lectures, drafts, and illustrations.

"Materials from a unique episode in my life, when I was asked to give a series of six public lectures at the Massachusetts Institute of Technology (MIT) on the general topic of faith and science. The lectures, delivered in the fall of 1999, were broadcast live on the Internet, and I'm told that tens of thousands of people watched them. Each 90-minute lecture consisted of a prepared talk followed by an impromptu question-and-answer session, with about 45 minutes devoted to each portion. Transcripts were made from the videotapes and I edited them during the summer of 2000, adding notes and references to the literature. They were published in 2001 by Stanford's Center for the Study of Linguistics and Information (CSLI), with the title "Things a Computer Scientist Rarely Talks About"--which was also the general title of the lectures when I gave them originally. A complete archive of that book appears here."

**box 1, folder 1**

**Correspondence regarding lectures, including email announcements of the lectures and some of the typical feedback 1998-1999**

Scope and Contents note

Includes the original letters of invitation, letters about practical details of moving to Massachusetts, email announcements of the lectures themselves, and some of the typical feedback received from the audience.

**box 1, folder 2**

**Lecture 1: Introduction– notes and brochure 1999 Oct 6**

Scope and Contents note

The page of handwritten notes I used while preparing the first lecture, followed by the notes I used during the Lecture itself. Also the widely distributed brochure that had been used to announce the series.

**box 1, folder 3**

**Lecture 2: Randomization and Religion–notes 1999 Oct 13**

Scope and Contents note

The notes I used to prepare and deliver the second lecture.

**box 1, folder 4**

**Lecture 3: Language Translation– notes and overhead transparencies 1999 Oct 27**

Scope and Contents note

The notes I used to prepare and deliver the third lecture, together with overhead transparencies used to illustrate it. (Included are several dozen additional transparencies that I had made just in case they might be needed when I was answering questions from the audience.)

**box 1, folder 5**

**Lecture 4: Aesthetics– notes 1999 Nov 3**

Scope and Contents note

The notes I used to prepare and deliver the fourth lecture. This lecture was illustrated by 35mm slides, see Folder 17 below.
box 1, folder 6  
Lecture 5: Glimpses of God – notes and copy of Raymond Smullyan's story "Planet without Laughter," statistics about "key verses" of the Bible, and an email from Douglas Hofstadter re "laughter yoga" 1999 Dec 1

Scope and Contents note
The notes I used to prepare and deliver the fifth lecture. Also includes a xerox copy of Raymond Smullyan's short story "Planet Without Laughter"; statistics about so-called "key verses" of the Bible and some materials collected subsequent to the lecture: an obituary of Raymond E. Brown; email from Douglas Hofstadter re "laughter yoga"; and an excerpt from George Buttrick's lectures on Biblical Thought and the Secular University.

box 1, folder 7  
Lecture 6: God and Computer Science - notes and relevant sources 1999 Dec 8

Scope and Contents note
The notes I used to prepare and deliver the sixth lecture, including several magazine articles and other relevant materials found on the Internet (e.g., Einstein's remarks on Science, Philosophy and Religion).

box 1, folder 8  
Panel discussion: Creativity, Spirituality, and Computer Science, 17 - notes 1999 Nov

Scope and Contents note
The single page of notes I used during that session.

box 1, folder 9  
Raw transcripts (from videotapes of the lectures)

Scope and Contents note
The videotapes of all six lectures and the panel discussion were transcribed by staff members of Dr. Dobb's Journal, the company that did the webcasts. These transcriptions, though riddled with errors, provided a good basis from which I could attempt to recreate the feeling of the original lectures (while watching the videotapes several times myself).

box 1, folder 10  
Half-baked transcripts

Scope and Contents note
This is how the transcripts looked after I had converted them to simple ASCII text format and inserted time coordinates to correlate them with the videotapes. My editing of the lectures essentially began here.

box 1, folder 11  
Illustrations - includes original proofs of TV frames, poster illustration, and 35mm slides; and first proofs after conversion to black-and-white

Scope and Contents note
One of the interesting tasks I faced was to convert videotape frames to illustrations that could be used in the book. The quality of video data is insufficient for large pictures, so I decided to render each image at the largest size that would retain reasonably sharp details. This limited me to slightly more than 1 inch in each dimension, so it strongly affected the design of the book. The original pictures shown here in black and white were actually in color when viewed by computer, but color did not add anything important. Indeed, when I edited the pictures later, converting them to black and white, the lack of color made it possible for me to enhance many details that would have looked strange if I had distorted the colors in a similar fashion.

This folder contains: Original proofs of captured TV frames; An experiment with TV frames printed in color (from the panel discussion); Original proofs of the Poster illustration (scanned in parts); Original proofs of images taken from 35mm slides; First proofs after conversion to black-and-white.
First drafts for lectures 1-6
Scope and Contents note
The result after initial editing of the "half-baked transcripts", showing many handwritten editorial changes and the places where illustrations are to be inserted. (These drafts cover Lectures 1-6 only. The first draft of the panel discussion was emailed to other panelists on 15 April 2000; see folder 16 below.)

Second drafts, with illustrations
Scope and Contents note
The result after inserting all illustrations (early July 2000); this was shown to several readers asking for comments.

Comments from the copy editors
Scope and Contents note
After a few changes to the drafts in Box 2, Folder 1, the copy editors made numerous further suggestions.

Near-final copy
Scope and Contents note
Most of the copy editors, suggestions, and further corrections noticed on rereading, led to these pages, which were used to prepare the index.

Correspondence re publication 2000-2001
Scope and Contents note
The bumpy road to publication of a complex book such as this is well documented by this sequence of more than 100 letters.

Slides used in lecture 4
Physical Description: 48 computer file(s) (pcd)
Scope and Contents note
The 35mm slides used in Lecture 4, converted to digital form, appear on this compact disk in several sizes.

Scope and Contents note
A xerox-copy mockup of the book, several copies of which were sent to potential reviewers. Also contains a few last-minute changes, especially to the index.

Additional Material

Selected Papers on Computer Languages

CL1, Chapter 1: The Early Development of Programming Languages
Scope and Contents note
Copy of original article; correspondence and additional references used to prepare the addendum; marked galleys; edited version

CL 2, Chapter 2: Backus Normal Form versus Backus Naur Form
Scope and Contents note
Copy of original article; edited version

CL3, Chapter 3: Teaching ALGOL 60
Scope and Contents note
Copy of original article; marked galleys; edited version
box 1, folder 4  CL4, Chapter 4: ALGOL 60 confidential
Scope and Contents note
Copy of original article; marked galleys; edited version

box 1, folder 5  CL5, Chapter 5: SMALGOL-61
Scope and Contents note
Copy of original article; marked galleys; edited version

box 1, folder 6  CL6, Chapter 6: Man or Boy?
Scope and Contents note
Copy of original article; marked galleys; edited version

box 1, folder 7  CL7, Chapter 7: A Proposal for Input-Output Conventions in ALGOL 60
Scope and Contents note
Copy of original article; subsequent correspondence; marked galleys; edited version

box 1, folder 8  CL8, Chapter 8: The Remaining Trouble Spots in ALGOL 60
Scope and Contents note
Copy of original article; correspondence; marked galleys; edited version

box 1, folder 9  CL 9, Chapter 9: SOL – A Symbolic Language for Systems Simulation
Scope and Contents note
Copy of original article; marked galleys; edited version

box 1, folder 10  CL10, Chapter 10: A Formal Definition of SOL
Scope and Contents note
Copy of original article; marked galleys; edited version

box 1, folder 11  CH11, Chapter 11: The Science of Programming Languages
Scope and Contents note
Copy of old manuscript notes; manuscripts for newly added material, including computer programs to check the examples; edited version

box 2, folder 1  CL12, Chapter 12: Programming Languages for Automata
Scope and Contents note
Copy of original article; marked galleys; edited version

box 2, folder 2  CL13, Chapter 13: A Characterization of Parenthesis Languages
Scope and Contents note
Copy of original article; marked galleys; edited version

box 2, folder 3  CL14, Chapter 14: Top-Down Syntax Analysis
Scope and Contents note
Copy of original article; marked galleys; edited version

box 2, folder 4  CL15, Chapter 15: On the Translation of Languages from Left to Right
Scope and Contents note
Copy of original article; marked galleys; edited version

box 2, folder 5  CL16, Chapter 16: Context-Free Multilanguages
Scope and Contents note
Copy of original article; marked galleys; edited version
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| 2, 6       | CL17, Chapter 17: Semantics of Context-Free Languages  
Scope and Contents note  
Copy of original article and errata; marked galleys; edited version |
| 2, 7       | CL18, Chapter 18: Examples of Formal Semantics  
Scope and Contents note  
Copy of original article; marked galleys; edited version |
| 2, 8       | CL19, Chapter 19: The Genesis of Attribute Grammars  
Scope and Contents note  
Copy of original article; marked galleys; edited version |
| 2, 9       | CL20, Chapter 20: A History of Writing Compilers  
Scope and Contents note  
Copy of original article; errata; marked galleys; edited version |
| 2, 10      | CL21, Chapter 21: RUNCIBLE - Algebraic Translation on a Limited Computer  
Scope and Contents note  
Copy of original article; worksheets to make the illustrations; marked galleys; manuscript for supplementary material; edited version |
| 2, 11      | CL22, Chapter 22: Computer-Drawn Flowcharts  
Scope and Contents note  
Copy of original article; marked galleys; edited version |
| 3, 1       | CL23, Chapter 23: Notes on Avoiding ‘go to’ Statements  
Scope and Contents note  
Copy of original article; errata and correspondence; marked galleys; edited version |
| 3, 2       | CL24, Chapter 24: An Empirical Study of FORTRAN Programs  
Scope and Contents note  
Copy of original article; marked galleys; edited version |
| 3, 3       | CL25, Chapter 25: Efficient Coroutine Generation  
Scope and Contents note  
Edited version (This article was composed for a festscrift publication that actually didn’t appear until 2004.) |
| 3, 4       | CL26, Miscellaneous scraps:  
Scope and Contents note  
Proof of frontispiece; first draft of the index; correspondence re index |
| 3, 5       | CL27, First printout of entire book, chapters 1-8 |
| 3, 6       | CL27, First printout of entire book, chapters 9-14 |
| 3, 7       | CL27, First printout of entire book, chapters 15-21 |
| 3, 8       | CL27, First printout of entire book, chapters 22-end |
| 4, 1       | Selected Papers on Discrete Mathematics  
DM01, Chapter 1: Combinatorial Analysis and Computer  
Scope and Contents note  
Copy of original article; marked galleys; edited version |
box 4, folder 2  DM02, Chapter 2: Two Notes on Notation  
Scope and Contents note  
Copy of original article; correspondence; marked galleys; edited version

box 4, folder 3  DM03, Chapter 3: Bracket Notation for the ‘Coefficient of’ Operator  
Scope and Contents note  
Copy of original article; correspondence; marked galleys; edited version

box 4, folder 4  DM04, Chapter 4: Johann Faulhaber and Sums of Powers  
Scope and Contents note  
Copy of original article; correspondence; marked galleys; edited version

box 4, folder 5  DM05, Chapter 5: Notes on Thomas Harriot  
Scope and Contents note  
Copy of original article; marked galleys; edited version

box 4, folder 6  DM06, Chapter 6: A Permanent Inequality  
Scope and Contents note  
Copy of original article; marked galleys; edited version

box 4, folder 7  DM07, Chapter 7: Overlapping Pfaffians  
Scope and Contents note  
Copy of original electronic publication; marked galleys; edited version

box 4, folder 8  DM08, Chapter 8: The Sandwich Theorem  
Scope and Contents note  
Copy of original electronic publication; correspondence; marked galleys; edited version

box 4, folder 9  DM09, Chapter 9: Combinatorial Matrices  
Scope and Contents note  
Copy of original electronic preprint; correspondence; marked galleys; edited version

box 4, folder 10  DM10, Chapter: Aztec Diamonds, Checkerboard Graphs, Spanning Trees  
Scope and Contents note  
Copy of original article; correspondence; marked galleys; edited version

box 4, folder 11  DM11, Chapter: Partitioned Tensor Products and Their Spectra  
Scope and Contents note  
Copy of original article; marked galleys; edited version

box 4, folder 12  DM12, Chapter: Oriented Subtrees of an Arc Digraph  
Scope and Contents note  
Copy of original article; marked galleys; edited version

box 5, folder 1  DM13, Chapter 13: Another Enumeration of Trees  
Scope and Contents note  
Copy of original article; marked galleys; edited version

box 5, folder 2  DM14, Chapter 14: Abel Identities and Inverse Relations  
Scope and Contents note  
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<td><strong>DM16, Chapter 16: Polynomials Involving the Floor Function</strong></td>
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<td><strong>DM17, Chapter 17: Construction of a Random Sequence</strong></td>
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<td>box 5, folder 6</td>
<td><strong>DM18, Chapter 18: An Imaginary Number System</strong></td>
<td>Copy of original article and errata; marked galleys; edited version</td>
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<td><strong>DM19, Chapter 19: Tables of Finite Fields</strong></td>
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<td>box 5, folder 8</td>
<td><strong>DM20, Chapter 20: Finite Semifields and Projective Planes</strong></td>
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<td><strong>DM21, Chapter 21: A Class of Projective Planes</strong></td>
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<td><strong>DM23, Chapter 23: Huffman's Algorithm via Algebra</strong></td>
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<td>box 5, folder 13</td>
<td><strong>DM25, Chapter 25: Complements and Transitive Closures</strong></td>
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<td>box 5, folder 14</td>
<td><strong>DM26, Chapter 26: Random Matroids</strong></td>
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<td><strong>DM27, Chapter 27: The Asymptotic Number of Geometries</strong></td>
<td>marked galleys; edited version</td>
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box 6, folder 3  DM29, Chapter 29: Efficient Balanced Codes
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Copy of original article; reprint of paper used to prepare addendum; marked galleys; edited version

box 6, folder 4  DM30, Chapter 30: The Knowlton Graham Partition Problem
Scope and Contents note
Copy of original article; marked galleys; edited version

box 6, folder 5  DM31, Chapter 31: Permutations, Matrices, Generalized Young Tableaux
Scope and Contents note
Copy of original article; marked galleys; edited version

box 6, folder 6  DM32, Chapter 32: Enumeration of Plane Partitions
Scope and Contents note
Copy of original article; correspondence; marked galleys; edited version

box 6, folder 7  DM33, Chapter 33: A Note on Solid Partitions
Scope and Contents note
Copy of original article; computer program used to check the algorithm; marked galleys; edited version

box 6, folder 8  DM34, Chapter 34: Identities from Partition Involutions
Scope and Contents note
Correspondence; computer program; marked galleys; edited version

box 6, folder 9  DM35, Chapter 35: Subspaces, Subsets, and Partitions
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Copy of original article; marked galleys; edited version

box 6, folder 10  DM36, Chapter 36: The Power of a Prime...
Scope and Contents note
Copy of original article; marked galleys; edited version

box 6, folder 11  DM37, Chapter 37: An Almost Linear Recurrence
Scope and Contents note
Copy of original article; edited version

box 6, folder 12  DM38, Chapter 38: Recurrence Relations Based on Minimization
Scope and Contents note
Copy of original article; reprint of related article; marked galleys; edited version

box 6, folder 13  DM39, Chapter 39: A Recurrence Related to Trees
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Copy of original article; marked galleys; edited version
box 6, folder 14  
**DM4, Chapter 40: The First Cycles in an Evolving Graph**

Scope and Contents note
Copy of original article; marked galleys; edited version

box 7, folder 1  
**DM41, Chapter 41: The Birth of the Giant Component**

Scope and Contents note
Copy of original article; correspondence; computer programs and results used to correct the originally reported data; marked galleys; edited version

box 7, folder 2  
**DM42, Miscellaneous scraps**

Scope and Contents note
List of chapters and number of errors caught by spell-checker; proofs of some illustrations; list of names to complete for the index; first draft of the index

box 8  
**DM43, First Printout of Entire Book**

Additional Material Accession ARCH 2011-200 1977-2010

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**Selected papers**

Scope and Contents note

Also included are relevant letters written back and forth since 2003, relating not only to the creation of the final three volumes but also to reprints of the first six, and translations into other languages.

box 1, folder 1  
**DA02: The Bose–Nelson Sorting Problem P55**

Scope and Contents note
Copy of original article; marked proofs; test of illustrations

box 1, folder 2  
**DA03: A One-Way, Stackless Quicksort Algorithm P115**

Scope and Contents note
Copy of original article; marked proofs

box 1, folder 3  
**DA04: Optimum Binary Search Trees P41**

Scope and Contents note
Copy of original article; marked proofs

box 1, folder 4  
**DA05: Dynamic Huffman Coding P103**

Scope and Contents note
Copy of original article; marked proofs

box 1, folder 5  
**DA06: Inhomogeneous Sorting P92**

Scope and Contents note
Copy of original article; marked proofs

box 1, folder 6  
**DA07: Lexicographic Permutations with Restrictions P93**

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<td>DA28: Minimizing Drum Latency Time P5 Scope and Contents note copy of original article; marked proofs; appendix on modern solution</td>
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<td><em>words tests done while composing this puzzle</em></td>
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<td><em>marked proofs, before and after major changes</em></td>
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<td><strong>FG40: Uncrossed Knight’s Tours Q23</strong></td>
<td><em>samples of marked proofs and illustration tests as I was writing this chapter</em></td>
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<td><em>index to files re dragon curves; tests of illustrations; marked proofs, before and after major changes</em></td>
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<td><em>samples of proof pages and other tests as I was writing this chapter</em></td>
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| box 2, folder 7 | **FG49: An Earthshaking Announcement Q227**  
Scope and Contents note  
handwritten MS, test illustrations, marked proofs, correspondence |
| box 2, folder 8 | **FG50: index**  
Scope and Contents note  
ideas for the index (noted while writing the material); first draft pages |
| box 2, folder 9 | **FG51: early copy of many chapters, used to index them**  
Scope and Contents note  
(before the final order of chapters was decided, and before many of the chapters were written) [I brought these with me to work on in odd moments, during a long trip East] |
| box 2, folder 10 | **FG52: first copy of the entire book, sent to proofreading team**  
Scope and Contents note  
(and also used to index several chapters) |
| box 2, folder 11 | **FG53: feedback from the proofreaders** |
| box 2, folder 12 | **CP00: miscellaneous notes and trial pages saved while making the CPbook** |
| box 2, folder 13 | **CP01: rough transcriptions of the taped luncheon conversations between Dikran Karagueuzian and Don Knuth in 1996 (these became Chapters 7--17)** |
| box 2, folder 14 | **CP02: first working copy of the entire CPbook as sent to proofreaders** |
| box 2, folder 15 | **CP03: extensive files of correspondence relating to all nine volumes of the series**  
Scope and Contents note  
a few of these are from the 1990s, but the vast majority are from the period 2004--2011 |
The Art of Computer Programming

Scope and Contents note
Volume 4A of The Art of Computer Programming was published in January 2011; it represents the culmination of a project that Knuth had begun to write in 1973, when the first edition of Volume 3 was completed. More precisely, Volume 4A represents the "first part of the culmination" of this project, because it's only the first part of a "Volume 4", Combinatorial Algorithms.

Table of contents of Volume 4A:
7. Introduction to combinatorial searching
   7.1. Zeros and ones
       7.1.1. Boolean basics
       7.1.2. Boolean evaluation
       7.1.3. Bitwise tricks and techniques
       7.1.4. Binary decision diagrams
   7.2. Generating all possibilities
       7.2.1. Generating basic combinatorial patterns
           7.2.1.1. Generating all \(n\)-tuples
           7.2.1.2. Generating all permutations
           7.2.1.3. Generating all combinations
           7.2.1.4. Generating all partitions
           7.2.1.5. Generating all set partitions
           7.2.1.6. Generating all trees
           7.2.1.7. History and further references

Biographical/Historical note
Background notes from Knuth:
I began to collect material already in 1962, but began to work on Volume 4 in earnest in 1973, while visiting the University of Oslo on leave of absence from Stanford. For many years I made scribbled notes and continued to follow the literature as new techniques were discovered. However, I also took time out for other projects (notably typography) and other books (notably Concrete Mathematics and 3:16); then I spent a few years bringing Volumes 1--3 up to date in the 1990s. During 1999 I prepared "Volume 1 Fascicle 1", a paperback booklet about the MMIX computer; MMIX is a new computer intended for use in Volume 4 as well as in future editions of Volumes 1, 2, and 3. (All archives for that fascicle are included in the "MMIX archives" that were donated to Stanford in 2001, except that I recently found a few additional page proofs that I've included here.)

I began to write the final copy of Volume 4A in the spring of 2001, in longhand as usual. My diary shows that I began to enter it into the computer on 22 July 2001: "happiness as I resume typing Volume 4 for the first time since 1977". (I had spent four months at the beginning of 1977 preparing what I thought would be Section 7.1; it was an 83-page typewritten manuscript, plus 22 pages of answers to exercises. About 100 copies were made and circulated at that time to interested computer scientists in various universities. The original of that MS is included below. Fate was, however, to intervene, because 1977 was the year that I realized I should drop everything else and work "temporarily" on typography. The TeX project began in the spring of that year and ran for roughly ten years.)

In 2001 I actually began to work on Section 7.2.1.1, because I wasn't ready yet to write the opening parts of Chapter 7 (and Volume 4). I needed to flesh out the "middle" of the volume first, so that I'd have a better idea of what tone ought to be set in the opening pages. I continued with the next subsections, 7.2.1.2 through 7.2.1.7, which took several years because they cover a substantial amount of material. These drafts were first made available online as "prefascicles", beginning with prefascicle 2A --- which first went on the Web at 1am on 17 September 2001 [a few days after a somewhat more memorable event in the history of the USA]. Prefascicle 2B went online just before midnight on 31 December of that year.

Guide to the Donald E. Knuth Papers SC0097

In 2002 I posted prefascicle 2C SC0097 on 13 June, and began to work on prefascicle 2D. Those two were however subsequently renamed 3A and 3B; prefascicle 3B went online on 14 February 2004. The prefascicles became true "fascicles", printed in paperback by Addison-Wesley, in 2005 when Volume 4 Fascicle 2 and (later) Volume 4 Fascicle 3 were ready.

The same pattern was repeated as I continued to write: Prefascicles 4A and 4B went...
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<td>3, 2</td>
<td>Changes to my working copy of Volume 1 Fascicle 1 (MMIX) Apr 2000- Jun 2002</td>
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<td>Section 7.2.1.1, the first hardcopy proofs of all pages, 1-Aug-2001</td>
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<td>Section 7.2.1.1, page proofs to make the index of prefascicle 2A, 4-Aug-2001</td>
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<td>Sections 7.2.1.1 and 7.2.1.2, drafts after November 2002</td>
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<td>Section 7.2.1.3, proof copy used to make index 11-Jun-2002</td>
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<td>Section 7.2.1.7 as marked by Robin Wilson, given to me early 2005</td>
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<td>3, 18</td>
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<td>Section 7.1.4, early drafts Oct 2007-Nov 2008</td>
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<td>3, 22</td>
<td>Miscellaneous notes and pages saved while writing Volume 4A; 2001-2010</td>
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**Scope and Contents note**

often shows tests of illustrations, or samples of computer program output, or sketches of ideas that didn’t go into the main manuscript

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**Course materials**

- **Box 1, Folder 1**: Computer Science 144 Course Materials Master Compilation 1969
- **Box 1, Folder 2**: Computer Science 144A Course Materials Winter 1977 1977
- **Box 1, Folder 3**: Computer Science 144B Course Materials Spring 1975 1975
- **Box 1, Folder 4**: Computer Science 150 Course Materials Master Compilation 1970-1971
- **Box 2, Folder 1**: Computer Science 155 Course Materials Master Compilation 1971-1975
- **Box 2, Folder 2**: Computer Science 155 Course Materials Master Compilation 1976-1979
- **Box 2, Folder 3**: Computer Science 255 Course Materials Master Compilation 1974-1978
- **Box 3, Folder 1**: Computer Science 155 Course Materials Master Compilation 1980-1981
- **Box 3, Folder 2**: Computer Science 155 Course Materials Master Compilation 1982-1984
- **Box 3, Folder 3**: Computer Science 204 Course Materials Master Compilation 1975-1979

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**Handouts**

- **Box 4, Folder 1**: Computer Science 279 Spring ’84 Profs. Chuck Bigelow, Donald Knuth & Richard Southall Handouts 1984
- **Box 4, Folder 2**: Computer Science 204 Winter 85' Handouts 1985
- **Box 4, Folder 3**: Computer Science 260 Autumn ’86 Handouts 1986
- **Box 4, Folder 4**: Computer Science 204 Autumn 82’ Handouts 1982
- **Box 4, Folder 5**: Computer Science 304 Winter ’87 Handouts 1987
Handouts

box 4, folder 6  Computer Science 349 Spring 87' Handouts 1987
box 4, folder 7  Computer Science 209 Autumn 87' Handouts 1987
box 5, folder 1  Computer Science 260 Autumn 88' Handouts 1988
box 5, folder 2  Computer Science 304 1989
box 5, folder 3  Computer Science 260 Autumn 89' Handouts 1989

Examinations

box 6, folder 1  Computer Science 144 Examinations Master Compilation 1969-1977
box 6, folder 2  Computer Science 155 Examinations Master Compilation 1971-1980
box 6, folder 3  Computer Science 255 Examinations Master Compilation 1974-1976
box 6, folder 4  Computer Science 150 Examinations Master Compilation 1974-1978
box 6, folder 5  Computer Science 144A Examinations Winter 1977 1977
box 6, folder 6  Computer Science 360 Examinnations Winter 1988 1988

Additional Material (The Art of Computer Programming) Accession ARCH-2016-14

box 1, folder 1  Volume 1 MSS undated
box 1, folder 2  Volume 2 MSS undated
box 1, folder 3  Volume 3 MSS undated
box 1, folder 4  Misc. notes (references, first analysis of algorithm, list of "complete names") 1963-1972
box 1, folder 5  Errata and addenda for publisher undated
box 1, folder 6  Computer programs written while preparing the manuscripts (mostly volume 2) undated
box 1, folder 7  Volume 4A MSS drafts 2012 Feb 2
box 1, folder 8  Volume 4A MSS drafts 2012 Apr 21
box 1, folder 9  Volume 4A MSS drafts 2012 May 16
box 1, folder 10  Volume 4A MSS drafts 2013 Jan 10
box 1, folder 11  Volume 4A MSS drafts 2014 Feb 10
box 1, folder 12  Volume 4A MSS drafts 2014 Dec 18
box 1, folder 13  Volume 4A MSS drafts 2015 Apr 7
box 1, folder 14  Volume 4A MSS drafts (first draft of index) 2015 Apr 15
box 1, folder 15  Volume 4A MSS drafts (first draft of index) 2015 Apr 22

Additional Material Accession ARCH-2017-128

box 1  Japan by Jill Carter Knuth 1996