Documentation Related to
The Icon Programming Language

Department of Computer Science, The University of Arizona

Since development of the Icon programming language began in 1977, many documents concerning Icon have been written. Some of these documents now are obsolete and out of print but many are still available.

A list of available documents follows. It is divided into five categories: books, reprints of journal papers, technical reports, Icon Project documents, and newsletters.

Many of the older documents are, of course, somewhat dated by now. Some are of historical interest only.

Similar technical material sometimes appears in several different documents. For example, technical reports often are precursors of journal papers. Some articles from *The Icon Newsletter* also appear as Icon Project documents to facilitate the distribution of information.

Please note that some of these documents describe programming languages and applications that themselves are not available.

See the end of this list for prices and ordering information.

Except for books, the prices for documents are based on copying and domestic shipping costs. A few recent documents contain color plates that are produced on a color PostScript printer. This is an expensive process and adds to the cost accordingly. Overseas shipping is extra.

Books

Three books have been published on the Icon programming language.

BK1. *The Icon Programming Language*, second edition. Ralph E. Griswold and Madge T. Griswold. Prentice-Hall, 1990. ISBN 0-13-447889-4. Version 8 language features and programming techniques. 367 pages.

BK2. *The Implementation of the Icon Programming Language*. Ralph E. Griswold and Madge T. Griswold. Princeton University Press, 1986. ISBN 0-691-08431-9. The implementation of Version 6 of Icon. 336 pages.

BK3. *Icon Programming for Humanists*. Alan D. Corré. Prentice-Hall, 1990. ISBN 0-13-450180-2. Icon programming oriented toward the Humanities. 157 pages + program diskette.

Reprints

The reprints listed below are papers published in professional journals. The content is more focused and technical than the material in the reports listed in the next section.

RP1. "A Portable Storage Management System for the Icon Programming Language". David R. Hanson. *Software—Practice and Experience*, 10 (1980). pp. 489-500. The implementation of storage allocation and garbage collection in the first implementation of Icon.

RP2. "An Alternative to the Use of Patterns in String Processing". Ralph E. Griswold and David R. Hanson. *ACM Transactions on Programming Languages and Systems*, 2, 2 (April 1980), pp. 153-172. A critique of pattern matching in SNOBOL4 and the motivation for string scanning in Icon.

RP3. "The Use of Character Sets and Character Mappings in Icon". Ralph E. Griswold. *The Computer Journal*, 23, 2 (1980). pp. 107-114. Icon programming techniques using csets and mapping. Includes some material not available elsewhere.

RP4. "Generators in Icon". Ralph E. Griswold, David R. Hanson, and John T. Korb. *ACM Transactions on Programming Languages and Systems*, 3, 2 (April 1981). pp. 144-161. The first published description of expression evaluation in Icon. Now a bit dated.

RP5. "The Icon Programming Language; An Alternative to SNOBOL4 for Computing in the Humanities". Ralph E. Griswold. *Proceedings of the Fifth International Conference on Computing in the Humanities*, 1981. pp. 7-17. Early overview of Icon with comparison to SNOBOL4.

RP6. "An Implementation of Generators in C", Timothy A. Budd. *Computer Languages*, 7 (1982). pp. 69-87. An experimental version of the C programming language with generators in the style of Icon.

RP7. "The Evaluation of Expressions in Icon". Ralph E. Griswold. *ACM Transactions on Programming Languages and Systems*, 4, 4 (October 1982). pp. 563-584. Exposition of expression evaluation in Icon with the semantics modeled by an Icon program.

RP8. "Measuring the Performance and Behavior of Icon Programs". Cary A. Coutant, Ralph E. Griswold, and David R. Hanson. *IEEE Transactions on Software Engineering*, SE-9, 1 (January 1983). pp. 93-103. Instrumentation of an early implementation of Icon to

produce measurement information.

RP9. "Result Sequences". Stephen B. Wampler and Ralph E. Griswold. *Computer Languages*, 8, 1 (1983). pp. 1-13. Formal treatment of sequences of results as characterized by generators in Icon.

RP10. "Co-Expressions in Icon". Stephen B. Wampler and Ralph E. Griswold. *The Computer Journal*, 25, 1 (1983). pp. 72-78. Early exposition of co-expressions. Now a bit dated.

RP11. "Programmer-Defined Control Operations". Ralph E. Griswold and Michael Novak. *The Computer Journal*, 26, 2 (1983). pp. 175-183. The use of co-expressions to add control structures to Icon programs. Contains some material not available elsewhere.

RP12. "Implementing SNOBOL4 Pattern Matching in Icon". Ralph E. Griswold. *Computer Languages*, 8, 2 (1983). pp. 77-92. Pattern matching in SNOBOL4 and how it can be modeled using Icon string scanning.

RP13. "The Implementation of Generators and Goal-Directed Evaluation in Icon". Stephen B. Wampler and Ralph E. Griswold. *Software—Practice and Experience*, 13 (1983). pp. 495-518. Early exposition of the implementation of expression evaluation in Icon. Now a bit dated, but it provides a somewhat different view than other descriptions.

RP14. "Expression Evaluation in the Icon Programming Language". Ralph E. Griswold. *Conference Record of the 1984 ACM Symposium on LISP and Functional Programming* (August 1984). pp. 177-183. Brief overview of expression evaluation in Icon.

RP15. "A Recursive Interpreter for the Icon Programming Language". Janalee O'Bagy and Ralph E. Griswold. *Proceedings of the SIGPLAN '87 Symposium on Interpreters and Interpretive Techniques* (June 1987). pp. 138-149. Implementing expression evaluation using recursion for generators.

RP16. "Seque: A Programming Language for Manipulating Sequences". Ralph E. Griswold and Janalee O'Bagy. *Computer Languages*, 13, 1 (1988). pp. 13-22. A programming language for manipulating sequences of results as data objects.

RP17. "Programming with Generators". Ralph E. Griswold. *The Computer Journal*, 31, 3 (1988). pp. 220-228. Techniques for using generators and goal-directed evaluation. Contains some material not found elsewhere.

RP18. "Garbage Collection of Strings and Linked Data Structures in Real Time". Kelvin Nilsen. *Software—Practice and Experience*, 18, 7 (July 1988). pp. 613-640. Algorithms for garbage collecting strings and structures in constant time. Used in an experimental version of Icon for real-time applications.

RP19. "First-Class Patterns for Icon". Kenneth W. Walker. *Computer Languages*, 14, 3 (1989). pp. 153-163. An experimental extension to Icon to provide patterns.

RP20. "A Stream Data Type that Supports Goal-Directed Pattern Matching on Unbounded Sequences of Values". Kelvin Nilsen. *Computer Languages*, 15, 1 (1990). pp. 41-54. As the title says.

RP21. "Data Structures in the Icon Programming Language". Ralph E. Griswold. *Computing Systems*, 2, 4 (Fall 1989). pp. 339-365. Description of Icon's data structures with particular reference to pointer semantics and heterogeneity.

RP22. "String Scanning in the Icon Programming Language". Ralph E. Griswold. *The Computer Journal*, 33, 2 (April 1990). pp. 98-106. Description of Icon's string scanning facility.

RP23. "High-Level Goal-Directed Concurrent Processing In Icon". Kelvin Nilsen. *Software—Practice and Experience*, 20, 12 (December 1990). pp. 1273-1290. A dialect of Icon, called Conicon, that supports concurrency.

RP24. "Icon Programming Language". Ralph E. Griswold. *Marcel Dekker Encyclopedia of Computers*, 9 (1992). pp. 1-16. Overview.

RP25. "Denotational Semantics of a Goal-Directed Language". David A. Gudeman. *ACM Transactions on Programming Languages and Systems*, 14, 1 (January 1992). pp. 107-125. Formal characterization of expression evaluation.

RP26. "An Optimizing Compiler for Icon". Kenneth Walker and Ralph E. Griswold. *Software—Practice and Experience*, 22, 7 (1992). pp. 637-657. An overview of the compiler with emphasis on structure and organization.

RP27. "Garbage Collection Alternatives for Icon". Mary F. Fernandez and David R. Hanson. *Software—Practice and Experience*, 22 (1992). pp. 659-672. An exploration of the possible advantages of replacing Icon's mark-and-sweep garbage collection scheme with a copying one.

RP28. "An Operational Semantics for Icon: Implementation of a Procedural Goal-Directed Language". Janalee O'Bagy, Kenneth Walker, and Ralph E. Griswold. *Computer Languages*, 18, 4 (1993). pp. 217-239. A description of how to generate code for generators and goal-directed evaluation in a conventional programming language.

RP29 "The Design and Implementation of Dynamic Hashing for Sets and Tables in Icon". William G. Griswold and Gregg M. Townsend. *Software—Practice and Experience*, 23, 4 (1993). pp. 351-367. A description of how sets and tables are organized to provide quick look-up.

Technical Reports

The technical reports that follow are from the technical report series published by the Department of Computer Science at the University of Arizona.

Some technical reports are designed for distribution only with Icon programming material. Those are not included here.

Since technical reports are not confined by page limits in the way journal papers are, technical reports often contain more details and examples than papers.

The first two digits of a technical report number give the year in which it was published. Some technical reports have been updated since their first date of publication.

TR 78-3. *The Icon Programming Language; An Overview.* Ralph E. Griswold, David R. Hanson, and John T. Korb. The first published description. 11 pages.

TR 78-4. *An Alternative to the Concept of "Pattern" in String Processing.* Ralph E. Griswold. Early thoughts on string scanning; the ideas that started it all. Historical interest only. 18 pages.

TR 78-5. *Backtracking with Generators.* John T. Korb. Early description of expression evaluation in Icon. Historical interest only. 18 pages.

TR 78-8. *A List Scanning Facility for Icon.* Rodney A. Norden. Early ideas about a high-level list scanning facility. 18 pages.

TR 78-14. *User's Manual for the Icon Programming Language.* Ralph E. Griswold. Version 1 of Icon. 106 pages.

TR 78-15. *Programming Techniques Using Character Mappings in Icon.* Ralph E. Griswold. Programming techniques using csets and mapping. 25 pages.

TR 78-16. *A Portable Storage Management System for the Icon Programming Language.* David R. Hanson. Storage management in the first version of Icon. 16 pages.

TR 79-1. *Reference Manual for the Icon Programming Language.* Ralph E. Griswold and David R. Hanson. Version 2 of the language. 92 pages.

TR 79-2. *Transporting the Icon Programming Language.* Ralph E. Griswold, David R. Hanson, and Stephen B. Wampler. Instructions for installing the Ratfor implementation of Icon on a new system. 25 pages.

TR 79-9. *Instrumentation of Icon for Performance Measurement.* Cary A. Coutant and Ralph E. Griswold. Additions to the implementation of the first version of Icon to measure program activity. 15 pages.

TR 79-10. *Tools for the Measurement of Icon Programs.* Cary A. Coutant and Ralph E. Griswold. Postprocessing programs to display the results of measurement. 12 pages.

TR 79-11. *The Design and Implementation of a Goal-Directed Programming Language.* John Timothy Korb. The implementation of generators and goal-directed evaluation in the first implementation of Icon. Now a bit dated, but it gives insight into the original thinking. Doctoral dissertation. 64 pages.

TR 79-12. *Icon Implementation Notes.* David R. Hanson and Walter J. Hansen. Details of the Ratfor implementation of Icon. 53 pages.

TR 80-2. *Reference Manual for the Icon Programming Language.* Cary A. Coutant, Ralph E. Griswold, and Stephen B. Wampler. Version 3 of Icon. 106 pages.

TR 80-9. *A Tour through the C Implementation of Icon.* Cary A. Coutant and Stephen B. Wampler. Details of the implementation of Version 3 of Icon. 36 pages.

TR 80-20. *Measuring the Performance and Behavior of the Icon Programming Language.* Cary A. Coutant and Ralph E. Griswold. Instrumentation and postprocessors. 6 pages.

TR 80-21. *Expression Evaluation In Icon.* Ralph E. Griswold. Early description of generators and goal-directed evaluation. 25 pages.

TR 80-25. *Pattern Matching in Icon.* Ralph E. Griswold. SNOBOL4-style pattern matching using string scanning. 19 pages.

TR 81-1. *New Control Structures in Icon.* Stephen B. Wampler. Early work on co-expressions. 11 pages.

TR 81-2. *Sequences and Expression Evaluation in Icon.* Stephen B. Wampler. A formal view of sequences and expression evaluation. 17 pages.

TR 81-4. *Reference Manual for the Icon Programming Language.* Cary A. Coutant, Ralph E. Griswold, and Stephen B. Wampler. Version 4. 90 pages.

TR 81-5. *An Implementation of Generators in C.* Timothy A. Budd. An experimental extension to C to add Icon-style generators. 18 pages.

TR 81-6. *Models of String Pattern Matching.* Ralph E. Griswold. Further work on pattern matching. 32 pages.

TR 81-9. *The Implementation of Goal-Directed Evaluation and Co-Expressions.* Stephen B. Wampler. Early work on the implementation of expression evaluation. 28 pages.

TR 81-11. *A Tour through the C Implementation of Icon; Version 4.* Cary A. Coutant and Stephen B. Wampler. Implementation details. 38 pages.

TR 81-18. *Control Mechanisms for Generators in Icon.* Stephen B. Wampler. The concepts underlying generators, goal-directed evaluation, co-expressions, and their implementation. Doctoral dissertation. 106 pages.

TR 82-4. *Co-Expressions in Icon.* Stephen B. Wampler. First complete description of co-expressions. 8 pages.

TR 82-8. *Programmer-Defined Control Operations in Icon.* Ralph E. Griswold and Michael Novak. The use of co-expressions to provide new control structures. 21 pages.

TR 82-16. *Programmer-Defined Evaluation Regimes.* Michael Novak and Ralph E. Griswold. The use of co-expressions to provide new argument evaluation methods. 18 pages.

TR 82-20. *The Control of Searching and Backtracking in String Pattern Matching.* Ralph E. Griswold. Critique of control mechanisms for limited backtracking. 11 pages.

TR 83-4. *Unifying List and String Processing in Icon.* Allan J. Anderson and Ralph E. Griswold. An approach to combining string and list processing in a common framework, including list scanning. 16 pages.

TR 83-10. *Porting the UNIX Implementation of Icon.* William H. Mitchell. Guide to installing Version 5 of Icon on a new UNIX system. 46 pages.

TR 83-11. *The C Implementation of Icon; A Tour Through Version 5.* Ralph E. Griswold, William H. Mitchell, and Stephen B. Wampler. Implementation details. 44 pages.

TR 83-14. *Understanding Pattern Matching — A Cinematic Display of String Scanning.* Ralph E. Griswold. SNOBOL4-style pattern matching, cast in Icon, with a display of the pattern-matching process. 24 pages.

TR 83-15. *The Description and Manipulation of Sequences.* Ralph E. Griswold. An abstract characterization of sequences of results. 9 pages.

TR 83-16. *Seque: An Experimental Language for Manipulating Sequences.* Ralph E. Griswold. A language with sequences as first-class values. 12 pages.

TR 83-20. *The Implementation of an Experimental Language for Manipulating Sequences.* Ralph E. Griswold. Use of a variant translator and co-expressions. 27 pages.

TR 84-8. *An Icon Subsystem for UNIX Emacs.* William H. Mitchell. An experimental version of Icon for use in the Emacs editor. 17 pages.

TR 84-9. *Rebus — A SNOBOL4/Icon Hybrid.* Ralph E. Griswold. SNOBOL4 translated into an Icon-style syntax. 15 pages.

TR 84-16. *Tables in Icon.* Ralph E. Griswold. The use and implementation of tables in Icon. Now a bit dated. 17 pages.

TR 84-21. *A Tool for Interactive Observation of the Icon Interpreter.* William H. Mitchell. Observation of compiled Icon programs and their execution in the style of a debugger. 12 pages.

TR 85-2. *Seque: A Language for Programming with Sequences.* Ralph E. Griswold and Janalee O'Bagy. An experimental programming language for manipulating sequences of results. 9 pages.

TR 85-4. *Reference Manual for the Seque Programming Language.* Ralph E. Griswold and Janalee O'Bagy.

Catalog of operations. 14 pages.

TR 85-13. *Bibliography of Documents Related to SNOBOL, SL5, and Icon Programming Languages.* Listing of documents related to Icon and its predecessors. Not annotated. 50 pages.

TR 85-25. *Programming in Icon; Part I — Programming with Generators.* Ralph E. Griswold. Programming techniques using generators. Includes exercises. 18 pages.

TR 86-1. *A Pattern-Matching Laboratory; Part I — An Animated Display of String Pattern Matching.* Kenneth Walker and Ralph E. Griswold. A tool for displaying string scanning interactively. Includes screen snapshots. 24 pages.

TR 86-7. *Dynamic Environments — A Generalization of Icon String Scanning.* Kenneth Walker. Experimental extension to Icon to provide persistent environments for string scanning. 16 pages

TR 86-10. *Version 6.0 of Icon.* Ralph E. Griswold, William H. Mitchell, and Janalee O'Bagy. Further language refinements. 9 pages.

TR 86-15. *A Continuation Semantics for Icon Expressions.* David Gudeman. Formal semantics of Icon expression evaluation. 23 pages.

TR 86-20. *An Expression Type for Icon.* Kenneth Walker. Experimental extension to Icon along the lines of co-expressions. 12 pages.

TR 87-2. *A Recursive Interpreter for Icon.* Janalee O'Bagy. The implementation of generators and goal-directed evaluation using recursion. 19 pages.

TR 87-5. *Real-Time Garbage Collection of Strings and Linked Data Structures.* Kelvin Nilsen. An algorithm for allocating and garbage collecting in constant time. 27 pages.

TR 87-6. *Programming in Icon; Part II — Programming with Co-Expressions.* Ralph E. Griswold. Programming techniques using co-expressions. Includes exercises. 18 pages.

TR 88-5. *Version 7 of Icon.* Ralph E. Griswold, Gregg M. Townsend, and Kenneth Walker. Further language refinements. 18 pages.

TR 88-10. *A Stream Data Type for Icon.* Kelvin Nilsen. A generalization of string scanning to handle streams of objects. 7 pages.

TR 88-11. *Concurrent Processes for Icon.* Kelvin Nilsen. Experimental facilities to support concurrency in Icon. 11 pages.

TR 88-25. *A Type Inference System for Icon.* Kenneth Walker. A system for inferring the types produced by operations and assigned to variables. 31 pages.

TR 88-30. *The Design and Implementation of High-Level Programming Language Features for Pattern Matching in*

Real Time. Kelvin Nilsen. An experimental version of Icon for real-time applications. Doctoral dissertation. 126 pages.

TR 88-31. *The Implementations of Generators and Goal-Directed Evaluation in Icon.* Janalee O'Bagy. A model for implementing expression evaluation in Icon using recursion, including optimizations. Doctoral dissertation. 93 pages.

TR 88-41. *Version 7.5 of Icon.* Ralph E. Griswold, Gregg M. Townsend, and Kenneth Walker. Further language refinements. 18 pages.

TR 89-30. *The Visualization of Dynamic Memory Management in the Icon Programming Language.* Ralph E. Griswold and Gregg M. Townsend. The instrumentation of storage management in Icon and programs for visualizing the results of allocation and garbage collection. Includes 3 color plates. 15 pages.

TR 90-1. *Version 8 of Icon.* Ralph E. Griswold. List of changes to Icon since Version 5.9. 19 pages.

TR 90-2. *Installation Guide for Version 8 of Icon on UNIX Systems.* Ralph E. Griswold. Instructions for installing Icon on UNIX systems, including configuring systems not previously supported. 22 pages.

TR 90-3. *Personalized Interpreters for Version 8 of Icon.* Ralph E. Griswold. Instructions for building tailored versions of the Icon executor under UNIX. 5 pages.

TR 90-4. *Variant Translators for Version 8 of Icon.* Ralph E. Griswold and Kenneth Walker. A system for building preprocessors based on Icon syntax. 25 pages.

TR 90-5. *Transporting Version 8 of Icon.* Ralph E. Griswold. Instructions for installing Icon on a new computer or operating system. 19 pages.

TR 90-6. *An Overview of Version 8 of the Icon Programming Language.* Ralph E. Griswold. Highlights. 8 pages.

TR 90-7. *The Icon Program Library.* Installation and use of Version 8 of the Icon program library, including a catalog of programs and procedures. 7 pages.

TR 90-8. *Icon-C Interfaces.* Ralph E. Griswold. Calling C functions from Icon and vice versa. 10 pages.

TR 90-10. *Programming in Idol: An Object Primer.* Clinton L. Jeffery. An object-oriented version of Icon, written in Icon. 21 pages.

TR 91-1. *X-Icon: An Icon Windows Interface.* Clinton L. Jeffery. Extensions to Icon to support X-Window facilities. 45 pages.

TR 91-16. *The Implementation of an Optimizing Compiler for Icon.* Kenneth Walker. All the details. Doctoral dissertation. 118 pages.

TR 92-18. *The Run-Time Implementation Language for Version 8.7 of Icon.* Kenneth Walker. A description of the superset of C used to implement Icon's run-time system. 40 pages.

TR 92-26. *X-Icon: An Icon Windows Interface; Version 2.* Clinton L. Jeffery. Extensions to Icon to support X-Window facilities. 51 pages.

TR 92-32. *Window Interface Tools for X-Icon.* Jon Lipp. The "vidget" library for X-Icon. 40 pages.

TR 92-34. *XIB: X-Icon Interface Builder.* Mary Cameron. An interactive, direct-manipulation tool for building X-Icon applications using the window interface tools. 14 pages.

TR 93-9. *X-Icon: An Icon Windows Interface; Version 8.10.* Clinton L. Jeffery and Gregg M. Townsend. Changes and additions to Icon's graphic facilities. 58 pages.

Icon Project Documents

Most Icon Project documents are less formal and more specialized than technical reports. Some Icon Project documents are designed to accompany program material for specific computer systems and are not listed here. Many Icon Project documents are updated periodically. The dates given are for the most recent version.

IPD18. *Benchmarking Icon Expressions.* Ralph E. Griswold. A system for running and timing individual Icon expressions. Includes listings of programs used. 1987. 6 pages.

IPD39. *Icon Address List.* Ralph E. Griswold. Names and addresses of subscribers to *The Icon Newsletter.* 1989. 168 pages.

IPD41. *Tabulating Expression Activity in Icon Programs.* Ralph E. Griswold. Description of a tool, using a variant translator, for tabulating expression activity in Icon programs. Includes listings of programs used and the specification for the variant translator. 1987. 14 pages.

IPD61. *A Workshop on the Icon Programming Language.* Ralph E. Griswold. Report from a workshop on Icon held in July 1988 at Northern Arizona University. Includes photographs of participants. 1988. 7 pages.

IPD65. *A Stand-Alone C Preprocessor.* Kenneth Walker. A public-domain ANSI C preprocessor with extensions. Used in the construction of an Icon compiler. 1989. 7 pages.

IPD72. *Style Conventions for Icon Source Code.* Ralph E. Griswold. Guidelines for writing C code for Icon. 1989. 1 page.

IPD73. *Communicating with the Icon Project.* Ralph E. Griswold. Instructions for contacting the Icon Project, including electronic communication. 1989. 2 pages.

IPD74. *Benchmarks for Version 7.5 of Icon.* Ralph E. Griswold. Comparative timings of Icon programs for many different computers and C compilers. 1989. 3 pages.

IPD75. *Illustrations from the Icon Newsletter.* Ralph E.

Griswold and Madge T. Griswold. All the graphics that have appeared in *Icon Newsletters*, with a brief description of the origins and production techniques. 1993. 48 pages.

IPD77. *A Brief History of Icon*. Ralph E. Griswold. As the title says. 1989. 3 pages.

IPD79. *An Implementation Language for Icon Run-Time Routines*. Kenneth Walker. The language used to write run-time support routines an Icon compiler. 1992. 33 pages.

IPD82. *Object Icon*. William G. Griswold. Object-oriented extensions to Icon using a variant translator. 1989. 3 pages.

IPD85. *Improving the Performance of Sets and Tables in Icon*. William G. Griswold. Dynamic hashing techniques for efficient lookup in large sets and tables. 1989. 3 pages.

IPD88. *The Words of Icon*. Ralph E. Griswold. A list of the many words in the English language that contain the substring "icon", as well as the few that contain "noci" (which is a prefix meaning pain). Whimsy. 1989. 9 pages.

IPD89. *Programming Problems and Solutions from the Icon Newsletter; Part I*. Ralph E. Griswold. Compilation of material in "programming corners" from *Icon Newsletters 5* through *14*. 1989. 23 pages.

IPD90. *Programming Problems and Solutions from the Icon Newsletter; Part II*. Ralph E. Griswold. Compilation of material in "programming corners" from *Icon Newsletters 15* through *26*. 1989. 33 pages.

IPD91. *Programming Problems and Solutions from the Icon Newsletter; Part III*. Ralph E. Griswold. Compilation of material in "programming corners" from *Icon Newsletters 29* through *40*. 1993. 9 pages.

IPD94. *About the Icon Project*. Ralph E. Griswold. What the Icon Project is and does. 1989. 2 pages.

IPD96. *Notes on the Icon Programming Language*. Ralph E. Griswold. Articles from *The Icon Newsletter* about various aspects of Icon. 1990. 7 pages.

IPD97. *Notes on MemMon Internals*. Gregg M. Townsend. Information about the implementation of Icon's memory monitoring system. 1989. 4 pages.

IPD105. *Bibliography of the Icon Programming Language*. Ralph E. Griswold and Madge T. Griswold. Listing of all known Icon-related documents, including internal reports. Not annotated. 1989. 22 pages.

IPD107. *Icon Programming Language Reference Sheet*. Ralph E. Griswold. Summary of Icon operations, functions, and keywords in a compact format. 1990. 2 pages.

IPD108. *UNIX Implementations of Icon*. Ralph E.

Griswold. List of the UNIX systems on which Icon has been installed. 1989. 2 pages.

IPD112. *Supplementary Information for the Implementation of Version 8 of Icon*. Ralph E. Griswold. Description of recent changes to the implementation of Icon. 1990. 13 pages.

IPD113. *The Icon Memory Monitory System*. Gregg M. Townsend. Description of the instrumentation of memory management in Icon and programs for using it. 1990. 7 pages.

IPD115. *Benchmarking Version 8 of Icon*. Ralph E. Griswold. Instructions for benchmarking. 1990. 17 pages.

IPD116. *Version 8 Icon Benchmark Report*. Ralph E. Griswold. Form for reporting benchmark results. 1990. 1 page.

IPD118. *Icon Technical Reports*. Ralph E. Griswold. Listing of all Icon technical reports, including those that are out of print. 1990. 3 pages.

IPD144. *Second Workshop on the Icon Programming Language*. Ralph E. Griswold. Report of the second Icon workshop, held in July 1990 at Northern Arizona University. 1990. 8 pages.

IPD145. *Ordering Icon Material*. Ralph E. Griswold. List of Icon program material available from the Icon Project. Includes order form. 1990. 3 pages.

IPD150. *An Experimental Icon Windows Interface*. Clinton L. Jeffery. Experimental X-Windows features for Icon. 1990. 12 pages.

IPD151. *Icon Program Library Submissions*. Ralph E. Griswold. Description of the Icon program library and guidelines for submitting material to it. 1992. 2 pages.

IPD152. *Monitoring Events in Icon Programs*. Ralph E. Griswold. Description of instrumentation in Icon for capturing a detailed record of events that occur during program execution, as well as ways of using the information. 1990. 12 pages.

IPD153. *Shrub — A Tool for Visualizing Procedure Activity in Icon*. Nick Kline. Description of a visualization tool that produces animated displays of the tree of procedure activations during program execution. Includes two color plates. 1990. 6 pages.

IPD154. *Examples of Variant Translators*. Ralph E. Griswold. Sample specifications with input and output. 1990. 4 pages.

IPD155. *Some Tools for Visualizing Icon Programs*. Gregg M. Townsend. Descriptions of several visualization tools. Includes three color plates. 1990. 7 pages.

IPD156. *Corrections to the Second Edition of the Icon Programming Language Book*. Ralph E. Griswold. 1990. 2 pages.

IPD157. *Using the Icon Compiler*. Kenneth Walker. 1991.

5 pages.

IPD169. *The MT Icon Interpreter.* Clinton L. Jeffery. A description of an experimental "multi-thread" interpreter for Icon that allows several Icon programs to run and communicate under control of a single interpreter. 1991. 9 pages.

IPD170. *Caterpillar — A Tool for Visualizing Procedure Calls and Expression Flow in Icon.* Nick Kline. Includes three color plates. 1991. 7 pages.

IPD179. *Eve: An Icon Monitor Coordinator.* Clinton L. Jeffery. An MT Icon program that allows multiple monitors to monitor the same program. 1992. 6 pages.

IPD180. *Supplementary Information for the Implementation of Version 8.5 of Icon.* Ralph E. Griswold. Supplements IPD112. 1992. 4 pages.

IPD188. *Version 8.7 of the Icon Programming Language.* Ralph E. Griswold, Clinton L. Jeffery, Gregg M. Townsend, and Kenneth Walker. New features. 1992. 6 pages.

IPD190. *Supplementary Information for the Implementation of Version 8.7 of Icon.* Ralph E. Griswold. Supplements IPD112 and IPD180. 1992. 4 pages.

IPD192. *Writing Execution Monitors for Icon Programs.* Clinton L. Jeffery and Ralph E. Griswold. Instrumentation and support for MT Icon program monitors. 1992. 7 pages.

IPD197. *Views of Storage Allocation in Icon.* Ralph E. Griswold. Different ways of visualizing storage allocation in Icon. Includes one color plate. 1992. 2 pages.

IPD206. *Third Workshop on the Icon Programming Langauge.* Ralph E. Griswold and Madge T. Griswold. Report from the third Icon workshop, held in September 1992 at La Jolla, California. 1992. 8 pages.

IPD210. *Version 8.8 of the Icon Programming Langauge.* Ralph E. Griswold, Clinton L. Jeffery, Gregg M. Townsend, and Kenneth Walker. Same features as Version 8.7. 1992. 6 pages.

IPD212. *Version 8.10 of the Icon Programming Langauge.* Ralph E. Griswold, Clinton L. Jeffery, Gregg M. Townsend, and Kenneth Walker. Addition of a built-in preprocessor. 7 pages.

IPD215. *Supplementary Information for the Implementation of Version 8.10 of Icon.* Ralph E. Griswold. Supplements IPD112. 1993. 4 pages.

Newsletters

There two newsletters related to the Icon programming language: *The Icon Newsletter* and *The Icon Analyst.*

The first issue of *The Icon Newsletter* appeared in 1978. It since has been published irregularly, recently three times a year. Early issues of the *Newsletter* now are primarily of historical interest. All back issues are available, singly or as a complete set.

The descriptions below are cursory and only indicate the highlights of individual issues. Recent issues contain more varied material, most of which is not listed below.

INL1. Announcement of the existence of Icon and the beginning of the *Newsletter.* 3 pages. 1978.

INL2. Portability, implementation information. 10 pages. 1979.

INL3. Version 2 of Icon, programming information. 10 pages. 1980.

INL4. Version 3 of Icon, programming information. 6 pages. 1980.

INL5. Research in progress, programming information. 13 pages. 1980.

INL6. Portability, UNIX Icon, programming information. 8 pages. 1981.

INL7. Version 4 of Icon, programming information. 4 pages. 1981.

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