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American National Standard for Information Systems

Programming Languages

Forth

Secretariat
Computer and Business Equipment Manufacturers Association
Approved: March 24, 1994
American National Standards Institute, Inc.

Foreword

(This foreword is not a part of American National Standard X3.215-1994)

Forth is a language for direct communication between human beings and machines. Using natural-language diction and machine-oriented syntax, Forth provides an economical, productive environment for interactive compilation and execution of programs. Forth also provides low-level access to computer-controlled hardware, and the ability to extend the language itself. This extensibility allows the language to be quickly expanded and adapted to special needs and different hardware systems.

Forth was invented by Mr. Charles Moore to increase programmer productivity without sacrificing machine efficiency. Forth is a layered environment containing the elements of a computer language as well as those of an operating system and a machine monitor. This extensible, layered environment provides for highly interactive program development and testing.

In the interests of transportability of application software written in Forth, standardization efforts began in the mid-1970s by an international group of users and implementors who adopted the name **Forth Standards Team**. This effort resulted in the Forth-77 Standard. As the language continued to evolve, an interim Forth-78 Standard was published by the Forth Standards Team. Following Forth Standards Team meetings in 1979, the Forth-79 Standard was published in 1980. Major changes were made by the Forth Standards Team in the Forth-83 Standard, which was published in 1983.

The first meeting of the Technical Committee on Forth Programming Systems was convened by the Organizing Committee of the X3J14 Forth Technical Committee on August 3, 1987, and has met subsequently on November 11-12, 1987, February 10-12, 1988, May 25-28, 1988, August 10-13, 1988, October 26-29, 1988, January 25-28, 1989, May

3-6, 1989, July 26-29, 1989, October 25-28, 1989, January 24-27, 1990, May 22-26, 1990, August 21-25, 1990, November 6-10,1990, January 29-February 2, 1991, May 3-4, 1991, June 16-19, 1991, July 30-August 3, 1991, March 17-21, 1992, October 13-17, 1992, January 26-30, 1993, June 28-30, 1993, and June 21, 1994.

Requests for interpretation, suggestions for improvement or addenda, or defect reports are welcome. They should be sent to the X3 Secretariat, Computer and Business Equipment Manufacturers Association, 1250 Eye Street, NW, Suite 200, Washington, DC 20005.

X3 Membership

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Information Processing Systems, X3. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the X3 Committee had the following members:

James D. Converse, Chair Donald C. Loughry, Vice-Chair Joanne Flanagan, Secretary

Producer Group	Name of Representative
AMP Incorporated	Edward Kelly Charles Brill (Alt.)
AT&T/NCR Corporation	Thomas W. Kern Thomas F. Frost (Alt.)
Apple Computer, Inc.	Karen Higginbottom
Compaq Computers	James Barnes
Digital Equipment Corporation	Delbert Shoemaker Kevin Lewis
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Nat'l Institute of Standards and Technology	Robert E. Rountree Michael Hogan (Alt.)
Neville & Associates	Carlton Neville

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* Abstain ** Non-Response

X3J14 Membership

At the time it approved this draft of the proposed American National Standard, the Technical Committee X3J14 on the Forth Programming Language had the following members:

Elizabeth Rather, Chair
Mitch Bradley, acting Vice-Chair
Don Colburn, Secretary
John Rible, Technical Editor
Len Zettel, Vocabulary Representative
Greg Bailey, Technical Subcommittee Chair

Organization Represented	Name of Representative
ATHENA Programming, Inc.	Greg Bailey Howe Fong (Alt.)

Bradley Forthware	Mitch Bradley
Creative Solutions, Inc.	Don Colburn
Ford Motor Company	Leonard F. Zettel, Jr.
FORTH, Inc.	Elizabeth Rather Dennis Ruffer (Alt.)
Institute for Applied Forth Research	Lawrence Forsley Horace Simmons (Alt.)
Johns Hopkins University, Applied Physics Lab.	John Hayes
Mephistopheles Systems	Dave Harralson
NASA/Goddard Space Flight Center	James Rash
Nomadic Software	John K. Stevenson
Unisyn, Inc.	Gary Betts Stephen Egbert (Alt.)
Up and Running	Martin Tracy
Vesta Technology	Jack Woehr
Individual Members	Loring Craymer John Rible E. (Jet) Thomas
X3 Liasons	Clyde R. Camp Kathleen McMillan

The following organizations and individuals have also participated in this project as Technical Committee members, alternates, or observers. The Technical Committee recognizes and respects their contributions:

Organizations

British Columbia Inst. of Tech.	MCI Telecommunications Corp.
Computer Cowboys	Micromotion
Computer Sciences Corp.	MicroProcessor Engineering Ltd.
Computer Strategies, Inc.	National Institute of Standards & Technology
Digalog Corp.	NCR Medical Systems Group
Embedded Sys. Programming Mag.	Performance Packages, Inc.
Forth Interest Group (FIG)	Purdue University
H.B. Pascal & Co., Inc.	Robert Berkey Services
Harris Semiconductor	Shaw Laboratories
IBM Corporation	Social Security Administration
IEEE	Software Engineering
Kelly Enterprises	Texas Instruments
Laboratory Microsystems, Inc.	The Dickens Company
Maxtor Corp.	

Individuals

David J. Angel	Ray Duncan	Charles Moore	Dean Sanderson
Wil Baden	Douglas Fishman	Mike Nemeth	George Shaw
Robert Berkey	Tom Hand	Harry Pascal	Gerald Shifrin
Ron Braithwaite	Gregory Ilg	Stephen Pelc	Robert Smith
Jack Brown	Charles Keane	Dean Perrine	Tyler Sperry
Chris Colburn	Guy M. Kelly	David C. Petty	Tom Zimmer
Ted Dickens	Andrew Kobziar	Bill Ragsdale	James Ryland
John Dorband	Martin Lascelles		

AMERICAN NATIONAL STANDARD ANSI X3.215-1994 American National Standard for Information Systems

Programming Language

Forth

1. Introduction

1.1 Purpose

The purpose of this Standard is to promote the portability of Forth programs for use on a wide variety of computing systems, to facilitate the communication of programs, programming techniques, and ideas among Forth programmers, and to serve as a basis for the future evolution of the Forth language.

1.2 Scope

This Standard specifies an interface between a Forth System and a Forth Program by defining the words provided by a Standard System.

See: A.1.2 Scope

1.2.1 Inclusions

This Standard specifies:

- the forms that a program written in the Forth language may take;
- the rules for interpreting the meaning of a program and its data.

1.2.2 Exclusions

This Standard does not specify:

- the mechanism by which programs are transformed for use on computing systems;
- the operations required for setup and control of the use of programs on computing systems;
- the method of transcription of programs or their input or output data to or from a storage medium;
- the program and Forth system behavior when the rules of this Standard fail to establish an interpretation;
- the size or complexity of a program and its data that will exceed the capacity of any specific computing system or the capability of a particular Forth system;
- the physical properties of input/output records, files, and units;
- the physical properties and implementation of storage.

1.3 Document organization

1.3.1 Word sets

This Standard groups Forth words and capabilities into word sets under a name indicating some shared aspect, typically their common functional area. Each word set may have an extension, containing words that offer additional

functionality. These words are not required in an implementation of the word set.

The **Core** word set, defined in sections 1 through 6, contains the required words and capabilities of a Standard System. The other word sets, defined in sections 7 through 17, are optional, making it possible to provide Standard Systems with tailored levels of functionality.

See: A.1.3.1 Word sets

1.3.1.1 Text sections

Within each word set, section 1 contains introductory and explanatory material and section 2 introduces terms and notation used throughout the Standard. There are no requirements in these sections.

Sections 3 and 4 contain the usage and documentation requirements, respectively, for Standard Systems and Programs, while section 5 specifies their labeling.

1.3.1.2 Glossary sections

Section 6 of each word set specifies the required behavior of the definitions in the word set and the extensions word set.

1.3.2 Annexes

The annexes do not contain any required material.

Annex A provides some of the rationale behind the committee's decisions in creating this Standard, as well as implementation examples. It has the same section numbering as the body of the Standard to make it easy to relate each requirements section to its rationale section.

Annex B is a short bibliography on Forth.

Annex C provides an introduction to Forth.

Annex D discusses the compatibility of ANS Forth with earlier Forths, emphasizing the differences from Forth-83.

Annex E presents some techniques for writing portable programs in ANS Forth.

Annex F includes the words from all word sets in a single list, and serves as an index of ANS Forth words.

1.4 Future directions

1.4.1 New technology

This Standard adopts certain words and practices that are increasingly found in common practice. New words have also been adopted to ease creation of portable programs.

1.4.2 Obsolescent features

This Standard adopts certain words and practices that cause some previously used words to become obsolescent. Although retained here because of their widespread use, their use in new implementations or new programs is discouraged, because they may be withdrawn from future revisions of the Standard.

This Standard designates the following words as obsolescent:

6.2.0060	#TIB
15.6.2.1580	FORGET
6.2.2240	SPAN
6.2.0970	CONVERT
6.2.2040	QUERY
6.2.2290	TIB
6.2.1390	EXPECT


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