X TECHNICAL BIBLIOGRAPHY

Persented by

The X Journal

This is the latest bibliography of good, publically available X Window System technical material. There may be other good papers in unpublished conference proceedings and tutorial notes, but these are difficult to find, so they are not listed here. There are lots of other works out there, but we think these are the best references. If you know of any other good ones, please be sure to let us know. There are two journals dedicated to material on X. As they should be pretty well indexed, the bibliography will only include selected papers. These journals are:

The X Journal
1097 Eastbrook Road
Martinsville, N.J. 08836
phone +1-908-563-9033

The X Resource: A Practical Journal of the X Window System
O'Reilly & Associates
103 Morris Street
Sebastapol, CA 95472
phone +1-707-829-0515

The X Consortium hold an annual conference including paper presentations. The proceedings from the 7th conference (January, 1993) are included in Winter issue of *The X Resource* (see above). Papers from earlier conferences were distributed to attendees only and were not formally published.

While the primary purpose of this bibliography is to help people find useful technical papers, a secondary purpose is to guide readers of technical books who don't have the time or money to buy more than one or two. The book reviews come from a wide variety of sources. We do encourage and appreciate your comments on published books, especially reviews comparing two or more books covering similar subjects.

Many people have been asking questions about the bibliography. This bibliography is available in FrameMaker MIF format or PostScript. The sample code from most of the books listed herein is available on-line, usually by anonymous *ftp* to export.lcs.mit.edu, uunet.uu.net, or gatekeeper.dec.com. We do accept (and appreciate) review copies of material. You may put copies of this bibliography in your books (see the permission notice below), but please let us know and include the date and contact info from the header. Approximately once every other month, updates to this bibliography will be distributed through the comp.windows.x USENET group, the xpert Internet mailing list, and anonymous FTP:

landru.unx.com:/pub/TXJ/Xbibliography.PS.gz
ftp.x.org:/contrib/docs/Xbibliography.PS.gz
gatekeeper.dec.com:/pub/X11/contrib/docs/Xbibliography.PS.gz

Due to popular demand, we have recently published the PostScript version that can be viewed from Mosaic on the World Wide Web at the following URL:

http://landru.unx.com/SIGS/TXJ/docs/bib/Xbibliography.PS

The bibliography is also currently undergoing transformation into an HTML document that will be accessible soon, and will feature extensive cross indexed hypertext links. Look for an announcement posted to the usual X news groups on USENET.

This bibliography was originally created and maintained by **Kenton Lee**, who has donated it to the public domain and has asked The X Journal to assume its maintenance and distribution, so long as all of the copyright and other recognition notices remain intact. We would like to thank Ken for his contribution and will endeavour to honor his requests.

Steven Mikes - Editor, The X Journal

X TECHNICAL BIBLIOGRAPHY

please send updates to:

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Internet: smikes@unx.com, WWW URL: http://landru.unx.com/SIGS/TXJ/docs/bib/incoming

Author(s): Adobe Systems Inc.,
Title: Programming the Display PostScript System with X,
Publisher: Addison-Wesley, 1992.
Description: A tutorial on the DPS extension to X, by its developers.

Not yet reviewed.

Author(s): Angebranndt, Susan and et al
Title: "Integrating Audio and Telephony in a Distributed Workstation Environment,"
Publisher: Proceedings of the Summer, 1991 USENIX Conference, pp. 419-435.
Description: Describes a client-server audio toolkit whose architecture is very similar to that of the X Window System.

Author(s): Angebranndt, Susan, Raymond Drewry, Philip Karlton, Todd Newman, Bob Scheifler, and Keith Packard
Title: "Definition of the Porting Layer for the X11 Sample Server, 1988-1991"
Publisher: MIT X Consortium, R5 Distribution
Description: A detailed reference to the modules of the sample server.

This is a companion to "Strategies for Porting the X v11 Sample Server" by the same authors. Both are included in the MIT X11R5 distribution (X11R5/mit/doc/Server).

Author(s): Angebranndt, Susan, Raymond Drewry, Philip Karlton, Todd Newman, Bob Scheifler, and Keith Packard
Title: "Strategies for Porting the X v11 Sample Server, 1988-1991"
Publisher: MIT X Consortium
Description: A guide to strategies for porting the sample server.

This is a companion to "Definition of the Porting Layer for the X v11 Sample Server" by the same authors. Both are included in the MIT X11R5 distribution (X11R5/mit/doc/Server).

Author(s): Angebranndt, Susan, Phil Karlton, Raymond Drewry, and Todd Newman
Title: "Writing Tailorable Software: The X11 Sample Server"
Publisher: Software Practice and Experience, vol. 20, no. S2, October, 1990
Description: Portability was a major goal for the X11 sample server.

This article discusses design and implementation issues that helped achieve portability.

Author(s): Angebranndt, Susan and Todd Newman
Title: "The Sample X11 Server Architecture"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 16-23, Summer, 1990
Description: An overview of the sample server, including goals, problem areas, modules, and porting guidelines.

Author(s): Asente, Paul
Title: "Simplicity and Productivity"
Publisher: UNIX Review, vol. 6, no. 9, pp. 57-63
Description: A discussion on the classing mechanism in the X Toolkit.

Author(s): Asente, Paul J. and Ralph R. Swick
Title: "X Window System Toolkit"
Publisher: Digital Press, 1990. ISBN 1-55558-051-3.
Description: The X Toolkit bible, a companion to Sheifler & Gettys book on Xlib and the X protocol

It includes both a tutorial on programming with the X Toolkit and a formal specification of the toolkit. The tutorial, which covers both using and writing widgets, is comprehensive and excellent. The specification is an enhancement of the MIT Xt intrinsics manual, by the same authors.

Author(s): Baldwin, Howard
Title: "What Gives An X Terminal X Appeal?"
Publisher: UNIX World, vol. 8, no. 5, pp. 89-94, May, 1991
Description: A look at the popular features of X terminals.

Author(s): Barkakati, Nabajyoti
Title: "X Window System Programming"
Publisher: SAMS, 1991. ISBN 0-672-22750-9.
Description: Another tutorial on X programming.

The Xlib section is not as good as Jones' book. There's a short section at the end on mixing Xlib with the X Toolkit, but the programming style used there is poor.

Author(s): Barkakati, Nabajyoti
Title: "UNIX Desktop Guide to X/MOTIF"
Publisher: Hayden Books, 1992, ISBN 0-672-22836.
Description: A Motif user tutorial.

Not yet reviewed.

Author(s): Bartlett, Joel F.
Title: "Don't Fidget with Widgets, Draw!"
Publisher: DEC Western Research Laboratory Research Report 91/6, May, 1991.
Description: Describes EZD, a high level graphics server that simplifies the development of interactive graphical user interfaces.

EZD is based on X. For information on obtaining free copies of this report, send electronic mail to ''wrltechreports@decwrl.dec.com''. Your message should contain the single word ''help''.

Author(s): Bass, Len, Erik Hardy, Reed Little, and Robert Seacord
Title: "Serpent Overview,"
Publisher: CMU/SEI-89-UG-2, Software Engineering Institute, Carnegie Mellon University, Pittsburgh, PA.
Description: An overview and tutorial of the Serpent User Interface Management System.

Serpent is a UIMS implemented on top of several X toolkits. This paper, as well as the Serpent source code, is included in the MIT X11R4 distribution.

Author(s): Bass, Len and et al
Title: "Serpent: A User Interface Management System"
Publisher: Proceedings of the Winter, 1990 USENIX Conference, pp. 245-258.
Description: An introduction to the Serpent UIMS from Carnegie Mellon University.

Author(s): Berlage, Thomas
Title: "OSF/Motif: Concepts and Programming"
Publisher: Addison-Wesley, 1991, ISBN 0-201-55792-4.
Description: A good tutorial on Motif programming.

It doesn't include lots of toy examples like some of the other books, but there are good practical examples and the descriptions of the widget functionality (especially the constraint widgets) are excellent. The section on subclassing Motif (mostly XmPrimitive) widget classes is not real complete, but still is far better than those in other Motif books. There is an introductory section on UIL, which is easier to understand, though not as complete as the section in the Motif programmer's guide. This book does not contain a tutorial on the X Toolkit intrinsics, so you will probably want Asente & Swick's book for that.

Author(s): Blewett, Doug
Title: "X Widget Based Software Tools for UNIX"
Publisher: Proceedings of the Winter, 1992 USENIX Conference, pp. 111-123.
Description: Describes small language and IPC protocol for creating small X-based software utilities and filters.

Author(s): Borenstein, Nathaniel S.
Title: "Multimedia Applications Development with the Andrew Toolkit"
Publisher: Prentice Hall, 1990. ISBN 0-13-036633-1.
Description: A tutorial and reference manual for the Andrew toolkit.

Andrew is an applications toolkit implemented on several window systems, including X. It is included in the MIT X11R4 distribution.

Author(s): Bourne, Philip E. and Lawrence S. Shapiro
Title: "Developing with DECwindows"
Publisher: DEC Professional, vol. 9, no. 2, pp. 36-44, February, 1990.
Description: A description of DECwindows programming, focusing on the User Interface Language (UIL). UIL is used by both DECwindows and OSF/Motif.

Author(s): Braca, Mike
Title: "X Display Management"
Publisher: UNIX World, vol. 8, no. 4, pp. 107-112, April, 1991.
Description: An introduction to the X Display Manager Control Protocol (XDMCP).

Author(s): Braca, Mike
Title: "Configuring X Display Management"
Publisher: UNIX World, vol. 8, no. 5, pp. 113-123, May, 1991.
Description: A guide to using the "xdm" client.

Author(s): Brain, Marshall
Title: "Motif Programming: The Essentials ..."
Publisher: Digital Press, 1992. ISBN 0-13-489378-6.
Description: A tutorial on Motif programming.

This book has received mixed reviews.

Author(s): Brunhoff, Todd
Title: "Pleasing The Eye"
Publisher: UNIX Review, vol. 7, no. 10, pp. 64-72.
Description: An introduction to VEX, a proposed (and since withdrawn) video extensions to X.

Author(s): Burgard, Mike
Title: "Serving Up X From a PC"
Publisher: UNIX World, vol. 8, no. 11, pp. 99-108, November, 1991.
Description: A review of three products that allow you to run X under Microsoft Windows on IBM PCs.

Author(s): Calder, Paul R. and Mark Linton
Title: "Glyphs: Flyweight Objects for User Interfaces,"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software and Technology, October, 1990.
Description: Some new user interface objects for InterViews, a C++ based toolkit for X.

Author(s): Champine, George, Bob Scheifler, Jim Gettys, Georges Grinstein, and Bertram Herzog
Title: "Panel discussion on the X Window System"
Publisher: SIGGRAPH'88 Panel Proceedings, August, 1988.
Description: This is the transcript of an interesting panel discussion on X.

George Champine was moderator. Panelists were Bob Scheifler, Jim Gettys, Georges Grinstein, and Bertram Herzog. The panelists discussed the history of X and current work at/on the X Consortium, PEX, and national and international standards for X. This was followed by a lively question and answer session on the present and future of X.

Author(s): Champine, George
Title: "MIT Project Athena: A Model for Distributed Campus Computing"
Publisher: Digital Press, 1991.
Description: A review of Project Athena, which generated lots of fun toys, including the X Window System.

Author(s): Clifford, William, John McConnell, and Jeffrey Friedberg
Title: "The Development of PEX, A Three-dimensional Graphics Extension to X11"
Publisher: Proceedings of Eurographics'88, September, 1988.
Description: An overview PEX, an extension to the X protocol to support PHIGS+.

Author(s): Cox, Kevin and David Walker
Title: "User Interface Design"
Publisher: Prentice Hall, 1993. ISBN 0-13-952888-1
Description: Second Edition of their book on computer user interface design; applicable to many graphical windowing environments.

This is a good book for introduction to GUI design fundamentals.

Author(s): Dardailler, D.
Title: "Tips for Writing Motif-based Graphical Applications"
Publisher: Xhibition'92 Conference Proceedings, pp. 207-216.
Description: Some Motif programming hints, mostly for the drawing area and scrolled window widgets.

Author(s): Davison, Allan, Kieron Drake, William Roberts, and Mel Slater
Title: "Distributed Window Systems: A Practical Guide to X11 and Open Windows"
Publisher: Addison- Wesley, 1992. ISBN: 0-201-41637-9.
Description: An introduction to distributed window systems, focusing on X and Open Windows.

Not yet reviewed.

Author(s): Dolan, Michael A. and Larry Hare
Title: "X Window System Servers in Embedded Systems"
Publisher: Proceedings of COMPCON Spring 1990, pp. 314-319, February, 1990.
Description: A discussion of X server architectures for embedded systems, such as accelerator boards and stand-alone terminals.

Author(s): Droms, Ralph and Wayne Dyksen
Title: "Performance Measurements of the X Window System Protocol"
Publisher: Software Practice and Experience, vol. 20, no. S2, October, 1990.
Description: A analysis of the performance of the X protocol over TCP/IP networks.

Author(s): Epstein, Jeremy and Marvin Shugerman
Title: "A Trusted X Window System Server for Trusted Mach"
Publisher: Proceedings of the First USENIX Mach Workshop, October, 1990.
Description: Describes the prototype of a B3-level Trusted X.

Author(s): Flowers, Ken
Title: "Using Motif's User Interface Language"
Publisher: UNIX World, vol. 7, no. 12, pp. 119-131, December, 1990.
Description: A basic tutorial the Motif User Interface Language (UIL).

UIL is a meta-language for specifying Motif widget resources and hierarchies. It allows much of a program's user interface to be developed independently of the rest of the program's functionality.

Author(s): Flowers, Ken
Title: "Programming with the Motif Toolkit"
Publisher: UNIX World, vol. 7, no. 11, pp. 135-144, November, 1990.
Description: A basic tutorial on X Toolkit programming using the Motif widget set.

The article focuses on the various Motif widgets, assuming that the reader understands the basics of using the X Toolkit.

Author(s): Gajewska, Hania, Mark Manasse, and Joel McCormack
Title: "Why X is Not Our Ideal Window System"
Publisher: Software Practice and Experience, vol. 20, no. S2, October, 1990.
Description: Some comments on problems with the design of the X Window System.

Author(s): Gaskins, Tom
Title: "PEXlib Programming Manual"
Publisher: O'Reilly & Associates, 1992. ISBN 1-56592-028-7
Description: A complete programming tutorial on PEXlib, the low level API for the PEX 3D graphics extension to X; lives up to O'Reilly's usual thorough standards. Companion to O'Reilly's "PEXlib Reference Manual"

Not yet reviewed. Over 1000 pages.

Author(s): Gettys, Jim
Title: "Problems Implementing Window Systems in UNIX"
Publisher: Proceedings of the Winter, 1986 USENIX Conference, pp. 89-97.
Description: Describes some of the early work on X, especially technical issues in implementing server-based window systems on UNIX systems.

Author(s): Gettys, Jim
Title: "Network Windowing using the X Window System"
Publisher: Dr. Dobb's Journal, pp. 42-53, March, 1989.
Description: A discussion on the importance of networking for window systems.

Author(s): Gettys, Jim, Phil Karlton, and Scott McGregor
Title: "The X Window System, Version 11"
Publisher: Software Practice and Experience, vol. 20, no. S2, October, 1990.
Description: A technical overview of the X11 functionality.

This is an update of the X10 TOG paper by Scheifler & Gettys.

Author(s): Good, Michael
Title: "User Interface Consistency in the DECwindows Program"
Publisher: Proceedings of the Human Factors Society, Vol. 1, 1988.
Description: A discussion of user interface design techniques used in developing the DECwindows toolkit.

Author(s): Graff, Mark
Title: "PEXlib: A Reference Manual"
Publisher: Prentice Hall, 1993. ISBN 0-13-176066-1
Description: Programmer's reference manual for PEXlib 6.0. Companion to the book by Paula Womack.

Not yet reviewed.

Author(s): Greenwood, Stephen
Title: "The DECwindows User Interface Language"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 34-43, Summer, 1990.
Description: An overview of the DECwindows user interface language (UIL).

UIL allows programmers to specify and configure the X Toolkit widget hierarchy at run-time. This is very useful for rapid prototyping and internationalization. UIL is used by both DECwindows and Motif.

Author(s): Gregory, K. D.
Title: "Programming with Motif"
Publisher: O'Reilly & Associates, 1992. ISBN 0-387-97877-1.
Description: A basic tutorial on using Motif widgets.

Not yet reviewed.

Author(s): Hayes, Frank
Title: "X Terminals vs. Diskless Workstations"
Publisher: UNIX World, vol. 7, no. 10, pp. 83-86, October, 1990.
Description: A look at some of the tradeoffs between using X terminals and diskless workstations.

Author(s): Heller, Dan
Title: "The XView Toolkit (2 parts)"
Publisher: UNIX World, vol. 7, no. 6-7, June-July, 1990.
Description: A two part tutorial on XView, based on Volume 7 of the O'Reilly series.

XView, from Sun, is a user interface toolkit for X. It is similar to, but not compatible with (at either the end-user or the programmer levels), MIT's X Toolkit. It supports Open Look, but not Motif.

Author(s): Heller, Dan
Title: "Handling UNIX Signals in X Applications"
Publisher: The X Journal, vol. 1, no. 4, pp. 17-22, March, 1991.
Description: A tutorial on safely using UNIX signals within X clients.

This article has been somewhat controversial. See the letters to the editor in the next issue of this magazine before trying any of these techniques.

Author(s): Heller, Dan
Title: "Multimedia Applications Under the X Window System"
Publisher: The X Journal, vol. 2, no. 1, pp. 12-19, September, 1992.
Description: A look at possible combinations of multimedia and X.

Author(s): Hesketh, Richard
Title: "Perly --- UNIX with Buttons"
Publisher: Software Practice and Experience, vol. 21, no. 11, November, 1991.
Description: Another buttons toolkit for UNIX and X. See also the Robertson paper.

Author(s): Hix, Deborah and H. Rex Hartson
Title: "Developing User Interfaces"
Publisher: John Wiley & Sons, 1993. ISBN 0-471-57813-4
Description: Very good tutorial on user interface design; X developers will find this useful.

Not yet reviewed.

Author(s): Hodges, Matthew E. and Russell M. Sasnett
Title: "Multimedia Computing: Case Studies From MIT Project Athena"
Publisher: Addison-Wesley, 1993. ISBN 0-201-52029-X
Description: Provides a concise introduction to multimedia computing, including the combination of audio, graphics, video, text and other I/O mediums.

Not yet reviewed.

Author(s): Holzgang, David A.
Title: "Display PostScript Programming"
Publisher: Addison-Wesley, 1990. ISBN 0-201-51814-7.
Description: A tutorial on Display PostScript.

Many commercial X implementations include DPS as an extension to the core X protocol. DPS can be used in conjunction with or instead of the core X graphics requests.

Author(s): Hopgood, F. R. A.
Title: "Methodology of Window Management"
Publisher: Springer-Verlag, New York, 1986. ISBN 0-387-16116-3.
Description: The proceedings of the important 1985 Alvey Workshop on Window Management.

It includes interesting material on problems with UNIX window systems and proposed solutions. It also includes descriptions of early versions of current UNIX window systems, such as X and Sun's NeWS.

Author(s): Israel, Elias and Erik Fortune
Title: "The X Window System Server"
Publisher: Digital Press, 1992. ISBN 1-55558-096-3.
Description: A technical reference on the internals of the X11R5 sample server, including the core architecture, porting and tuning techniques, and extension techniques.

This is the only publically available book on the X server.

Author(s): Johnson, Eric and Kevin Reichard
Title: "Advanced X Window Applications Programming"
Publisher: MIS: Press, 1990. ISBN 1-55828-016-2.
Description: An "advanced" version of the authors' previous book, although it is equally mundane, mostly stating the obvious.

Author(s): Johnson, Eric and Kevin Reichard
Title: "Power Programming with Motif"
Publisher: MIS: Press, 1991. ISBN 1-55828-059-6.
Description: Another tutorial on Motif application programming.

It does not cover subclassing widgets or using the UIL interface. Coverage is generally poorer than similar books, especially Berlage's book. Catchy title, but it doesn't meet expectations.

Author(s): Johnson, Eric and Kevin Reichard
Title: "X Window Applications Programming, second edition"
Publisher: MIS: Press, 1992. ISBN 1-55828-178-9.
Description: The first edition of this book had several significant flaws.

The second edition is supposedly improved, but has not yet been reviewed.

Author(s): Jones, Oliver
Title: "Introduction to the X Window System"
Publisher: Prentice-Hall, 1989. ISBN 0-13-499997-5.
Description: An excellent introduction to programming with Xlib.

Written with the serious programmer in mind, this book includes many practical tips that are not found anywhere else. While the others simply regurgitate that material in the MIT manuals, this book explains key Xlib concepts much more clearly and gives examples of using X to solve real world problems. The seventh printing is updated to X11R4. Many consider this book to be a "must have" as part of your X literature library.

Author(s): Kasper, Joseph E. and David Arns
Title: "Graphics Programming with PHIGS and PHIGS PLUS"
Publisher: Addison-Wesley, 1993. ISBN 0-201-56343-6
Description: An excellent programming tutorial for PHIGS and PHIGS +.

Not yet reviewed.

Author(s): Kataoka, Yutaka and et al
Title: "A Model for Input and Output of Multilingual Text in a Windowing Environment"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software and Technology, pp. 175-183, November, 1991.

Author(s): Keller, Brian J.
Title: "A Practical Guide to X Window Programming"
Publisher: CRC Press, 1990. ISBN 0-8493-7406-5.
Description: Another tutorial on X application writing.

This one claims to use the X Toolkit and Motif, though the Motif material is not very good.

Author(s): Kent, Christopher
Title: "XDPS: A Display PostScript System Extension for DECwindows"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 64-73, Summer, 1990.
Description: An overview of Display PostScript, an extension to the X protocol allowing PostScript graphics in X windows.

Author(s): Kimball, Paul
Title: "The X Toolkit Cookbook"
Publisher: Prentice-Hall, 1991.
Description: Reportedly a practical guide to X Toolkit programming, including use of the Motif, Open Look, and Athena widget sets.

Not yet reviewed.

Author(s): Kobara, Shiz
Title: "Visual Design With OSF/Motif"
Publisher: Addison-Wesley, 1991. ISBN 0-201-56320-7.
Description: A guide to using Motif to create visually appealing and consistent user interfaces, by one of the user interface designers who helped create the Motif look.

Author(s): Labs, UNIX System
Title: "Open Look Release 4 Graphical User Interface: Programmer's Guide"
Publisher: Prentice-Hall, 1991.
Description: A programmer's guide for the Open Look Intrinsics Toolkit (OLIT).

OLIT is a widget set for the X Toolkit intrinsics. OLIT is not compatible with XView.

Author(s): LaStrange, Tom E.
Title: "swm: An X Window Manager Shell"
Publisher: Proceedings of the Summer, 1990 USENIX Conference, pp. 299-306.
Description: Describes the swm window manager, supporting a configurable user interface and a virtual root window.

Author(s): Lee, Geoff
Title: "Object-Oriented GUI Application Development"
Publisher: Prentice Hall, 1993. ISBN 0-13-363086-2
Description: Presents an object-oriented life-cycle approach to GUI development for X and other windowing environments. Useful to X developers.

Not yet reviewed.

Author(s): Lee, Kenton
Title: "Behind Curtain X"
Publisher: UNIX Review, vol. 9, no. 6, pp. 22-28, June, 1991.
Description: Despite the title, this article really describes (most of) the most common X programming errors and ways to avoid them.

Author(s): Lee, Kenton
Title: "Twenty Quesions with Paul Asente"
Publisher: The X Journal, vol. 1, no. 2, pp. 12-17, November, 1991.
Description: An interview with one of the X Toolkit's designers.

He discusses its history and his vision for its future.

Author(s): Lee, Kenton
Title: "Graphics Effects by X Colormap Manipulation"
Publisher: The X Journal, vol. 1, no. 5, May, 1992.
Description: Most X applications generate graphics through X raster drawing functions.

This paper discusses some powerful techniques for generating graphics by manipulating the colormap in addition to or in place of raster drawing. Detailed examples include overlay planes and double buffer animation.

Author(s): Leffler, Samuel J.
Title: "A Window On The Future?"
Publisher: UNIX Review, vol. 6, no. 6, pp. 62-69.
Description: This article compares Sun's NeWS with other window systems, such as X, and concludes that, despite its problems, NeWS is the window system of the future.

See Robin Schaufler's paper for a more technical comparison of the X and NeWS.

Author(s): Lemke, David and David S. H. Rosenthal
Title: "Visualizing X11 Clients" Proceedings of the Summer, 1988 USENIX Conference, pp. 125-138.
Title: A tutorial on "visuals", the X abstraction of display hardware capabilities.
Publisher: Proper use of visuals is necessary for an X client to work with and take advantage of a variety of different display devices. An updated version is included in the MIT X11R5 distribution (X11R5/mit/doc/tutorials/visuals).

Author(s): Levitt, Jason
Title: "Spotlight on Serial X Terminals"
Publisher: UNIX Today, pp. 46-52, May 13, 1991.
Description: A review of some X terminals that support serial protocols.

This type of terminal can be used with a modem over a telephone line.

Author(s): Levitt, Jason
Title: "Windows, X Servers Collide"
Publisher: Open Systems Today, March 2, 1992.
Description: A comparison of the functionality and performance of six X servers for PCs running Microsoft Windows.

Author(s): Linton, Mark and Paul Calder
Title: "The Design and Implementation of InterViews"
Publisher: Proceedings of the 1987 USENIX C++ Workshop, 1987.
Description: Describes the InterViews user interface toolkit, written in C++ and based on the X Window System.

Even if you don't plan to use InterViews as a toolkit, it provides a good C++ binding to the X protocol.

Author(s): Linton, Mark A., John M. Vlissides, and Paul R. Calder
Title: "Composing User Interfaces with InterViews"
Publisher: IEEE Computer, vol. 22, no. 8, pp. 8-22, February, 1989.
Description: Describes the InterViews user interface toolkit, written in C++ and based on the X Window System.

Author(s): Mansfield, Niall
Title: "The X Window System: A User's Guide"
Publisher: Addison-Wesley, Amsterdam A tutorial on X for end-users, not programmers.
Description: The second edition is based on X11R4., 1991.

Author(s): Mansfield, Niall
Title: "The Joy of X"
Publisher: Addison-Wesley, 1992. ISBN 0-201-56512-9
Description: An overview of the X Window System in simplistic and understandable terms

No review available; not a programming tutorial, more for managers, novices, etc.

Author(s): Mayer, Niels P.
Title: "The WINTERP Widget INTERpreter"
Publisher: LISP Pointers, vol. 4, no. 1, pp. 45-60, July, 1990.
Description: Discusses WINTERP, a Lisp prototyping environment for Motif applications.

Author(s): McCormack, Joel and Paul Asente
Title: "Using the X Toolkit or How to Write a Widget"
Publisher: Proceedings of the Summer, 1988 USENIX Conference, pp. 1-13.
Description: An excellent tutorial on writing basic X Toolkit widgets.

Potential widget writers (and maybe users, too) should probably start by reading this paper. Unfortunately, it's based on X11R2, so some of it is out of date.

Author(s): McCormack, Joel and Paul Asente
Title: "An Overview of the X Toolkit"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software, pp. 46-55, October, 1988.
Description: An excellent architectural overview of the X Toolkit, including its goals, how it accomplished them, and possible future directions.

Author(s): McCormack, Joel
Title: "Writing Fast X Servers for Dumb Color Frame Buffers"
Publisher: DEC Western Research Laboratory Research Report 91/1, February, 1991.
Description: Describes the implementation of one of the best X servers currently available, that of the color DECstation 3100.

Algorithms as well as performance measurements are discussed. For information on obtaining free copies of this report, send electronic mail to "wrltechreports@decwrl.dec.com". Your message should contain the single word "help". Note that this paper supersedes DECWRL TN-9. This paper also appears in the Software Practice and Experience Volume 20, Special Issue S2.

Author(s): McGregor, Scott
Title: "An Overview of the DECwindows Architecture"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 9-15, Summer, 1990.
Description: An overview of DECwindows, a superset of X for DEC workstations.

Author(s): McLoughlin, Lee
Title: "A Simple Guide to Porting the X Window System"
Publisher: Proceedings of EUUG Spring 1989, pp. 283-291, Brussels, April 3-7, 1989.
Description: A brief, but good, discussion of the interface between the X server and the underlying operating system.

The EUUG conference is sponsored by the European Unix Users' Group.

Author(s): McMinds, Donald L.
Title: "Mastering OSF/Motif Widgets"
Publisher: Second Edition, Addison-Wesley, 1992. ISBN 0-201-63335-3. A tutorial on using existing Motif widgets. The second edition is much improved from the first and covers Motif 1.2.

Author(s): McNutt, Dinah
Title: "Administering X Sites"
Publisher: UNIX Review, vol. 10, no. 7, pp. 45-48, July, 1992.
Description: A review of some X configuration and administration issues.

Author(s): Mehta, Sunil
Title: "User Interfaces and the IEEE P1201 Committee"
Publisher: UNIX Review, vol. 8, no. 1, pp. 14-20.
Description: A review of the activities of the IEEE P1201 standards committee, by its chairman.

P1201 is trying to develop international standards for the X Window System client side (Xlib and above). Lower levels of X (servers and protocol) are being standardized by ANSI Task Group X3H3.6.

Author(s): Mikes, Steve
Title: "Fast Track To Motif Applications"
Publisher: UNIX World, vol. 8, no. 3, pp. 101-106, March, 1991.
Description: This article reviews a couple of products that help programmers to quickly port dumb terminal applications to X and Motif.

Some would call this approach a hack, but it is easy and does provide some functionality beyond dumb terminal emulators.

Author(s): Mikes, Steven
Title: "X Window System Technical Reference"
Publisher: Addison-Wesley, 1990. ISBN 0-201-52370-1.
Description: A quick reference manual for X11R3, including Xlib, Xt, fonts, bitmaps, keysyms, Motif, and OPEN LOOK.

Author(s): Mikes, Steven
Title: "New Ways to Program in Object-Oriented X"
Publisher: UNIX World, vol. 8, no. 8, pp. 103-108, August, 1991.
Description: Reviews the Saber and Solbourne object-oriented user interface toolkits.

Both are based on C++ and support X.

Author(s): Mikes, Steven
Title: "X Window System Program Design and Development"
Publisher: Addison-Wesley, 1992. ISBN 0-201-55077-6.
Description: Not yet reviewed.

Author(s): Miller, John David
Title: "An OPEN LOOK at UNIX: A Developer's Guide to X"
Publisher: M&T Books, 1990. ISBN 1-55-851057-5.
Description: A tutorial on the Open Look widget set from AT&T.

Contact M&T Books at 1-800-533-4372.

Author(s): Mirchandani, Dinesh and Prabuddha Biswas
Title: "Ethernet Performance of Remote DECwindows Applications"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 84-94, Summer, 1990.
Description: Describes a methodology for analyzing the performance of networked X applications.

Author(s): Morisaki, Masato and et al
Title: "XJp System: An Internationalized Language Interface for the X Window System"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software and

Technology, pp. 185-193, November, 1991.
Description: **An overview of the XJp system, a multi-byte input system for X. Multi-byte input is especially important for Asian character sets, such as Kanji.**

Author(s): **Myers, Brad A.**
Title: **"Window Interfaces: A Taxonomy of Window Manager User Interfaces"**
Publisher: **IEEE Computer Graphics & Applications, vol. 8, no. 5, pp. 65-84, September, 1988.**
Description: **A taxonomy of current window system user interfaces, including the UWM window manager for X.**

Discusses and compares the features of each user interface. Contrast this with Rob Pike's window system user interface guidelines. Myers is a well known user interface researcher.

Author(s): **Nadeau, David R.**
Title: **"High-Performance 3-D Graphics In A Window Environment"**
Publisher: **Computer Technology Review, pp. 89-93, Fall, 1988.**
Description: **A discussion on integrating Megatek's high-performance 3D graphics hardware/ software with X.**

Author(s): **Newmarch, Jan**
Title: **"The X Window System and Motif - A Fast Track Approach"**
Publisher: **Addison-Wesley, 1992. ISBN: 0-201-53931-4.**
Description: **A tutorial on X and Motif programming.**

Not yet reviewed.

Author(s): **Norman, Donald A.**
Title: **"Things That Make Us Smart"**
Publisher: **Addison-Wesley, 1993. ISBN 0-201-58129-9**
Description: **A book on human factors topics that user interface designers will find useful for creating advanced smart interfaces.**

Not yet reviewed.

Author(s): **Nye, Adrian**
Title: **"The X Window System Protocol"**
Publisher: **UNIX World, vol. 6, no. 9, pp. 105-113, September, 1989.**
Description: **An introduction to the X protocol.**

This is a short version of Nye's introduction to Volume 0 of O'Reilly's X series.

Author(s): **O'Reilly and Associates**
Title: **"Definitive Guides to the X Window System"**
Publisher: **O'Reilly and Associates, 1988-1992.**
Description: **There are three main types of books in this series: "programmers manuals" (programmer tutorials), "reference manuals" (man pages), and "user guides" (end-user tutorisls).**

The volumes in this series are: Vol. 0: X Protocol Reference Manual, Vol. 1: Xlib Programming Manual, Vol. 2: Xlib Reference Manual, Vol. 3: X Window System User's Guide, Vol. 3M: X Window System User's Guide (Motif Edition), Vol. 4: X Toolkit Intrinsics Programmers Manual, Vol. 4M: X Toolkit Intrinsics Programmers Manual (Motif Edition), Vol. 5: X Toolkit Intrinsics Reference Manual, Vol. 6: Motif Programming Manual, Vol. 7: XView Programming Manual, Vol. 7 Companion: XView Reference Manual, Vol. 8: X Window System Administrator's Guide, and Vol. R5 Update: Programmer's Supplement for X11R5.

Some like these books' broad coverage: most interfaces are covered, usually with examples. Others dislike the sometimes shallow coverage of complex subjects. Some of the material is biased towards the programming styles of authors, though this is apparently changing. These books are quickly updated to cover new MIT releases and recent editions are much improved over older ones.

Author(s): O'Reilly & Associates
Title: "PEXlib Reference Manual"
Publisher: O'Reilly & Associates, 1992. ISBN 1-56592-029-5
Description: Man pages PEXlib, the low-level API for the PEX 3D graphics extension to X. Companion to "PEXlib Programming Manual" by Tom Gaskins

No review available.

Author(s): O'Reilly and Associates
Title: "The X Window System in a Nutshell"
Publisher: O'Reilly and Associates, 1992. ISBN ISBN 1-56592-017-1.
Description: A quick reference guide to Xlib and Xt and some associated configuration files.

It has separate sections on events, data structures, and other frequently needed material. It leaves out a lot of detail in order to achieve a small, convenient size. The second edition, based on X11R5, is much improved over the first edition.

Author(s): Open Software Foundation
Title: "OSF/Motif Series (5 volumes)"
Publisher: Prentice Hall, 1992.
Description: Motif is a popular user interface programming environment for X. It was designed and developed by members of the Open Software Foundation, including DEC, HP, and IBM.

These companies have committed to using Motif as their standard user interface. The volumes in this series include the Motif Style Guide, Programmer's Guide, Programmer's Reference, User's Guide, and Application Environment Specification (AES) User Environment Volume. The latest editions of these books are for Motif Release 1.2. The original 1.0 versions of some of these left something to be desired, but they were significantly improved for 1.1 and again for 1.2.

Author(s): Ousterhout, John K.
Title: "An X11 Toolkit Based on the Tcl Language"
Publisher: Proceedings of the Winter, 1991 USENIX Conference, pp. 105-115.
Description: Describes a high level toolkit based on the Tcl programming language.

Since Tcl is interpreted, this toolkit allows for some interesting run-time dynamics. Unfortunately, it is not compatible with the X Toolkit and popular widget sets.

Author(s): Parrette, William A.
Title: "MOTIF Programming in the X Window System Environment"
Publisher: McGraw-Hill, 1993. ISBN 0-07-031723-2
Description: Yet another programmers tutorial to Motif. This one seems to be a rather shallow treatement of the subject matter and appears to be an advertisement for a training center where the author works.

Not yet reviewed.

Author(s): Pausch, Randy and et al
Title: "SUIT: The Pascal of User Interface Toolkits"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software and Technology, November, 1991.
Description: Describes SUIT, a simple user interface toolkit.

It's primary motivation is to be easy for student programmers to learn. Versions run on X, Macintosh, DOS, and

Silicon Graphics window systems.

Author(s): Pedneault, Michel
Title: "A High-Level User Interface Toolkit for the X Window System and Character Terminals"
Publisher: Proceedings of the Summer, 1990 USENIX Conference, pp. 307-313.
Description: Describes the NTUI toolkit, which supports a single programming interface for both graphical (using the X Toolkit) and character user interfaces.

Author(s): Peterson, C. and S. S. Chang
Title: "Improving the Performance of X Applications"
Publisher: Xhibition'92 Conference Proceedings, pp. 93-100.
Description: Some programming techniques to improve client performance.

Author(s): Pike, Rob
Title: "Window Systems Should Be Transparent"
Publisher: USENIX Computing Systems, vol. 1, no. 3, pp. 279-296, Summer, 1988.
Description: Some window system user interface guidelines, based on MUX window system for the BLIT terminal, with some comparisons to X.

Contrast this to Myers' paper. Pike is the developer of the BLIT.

Author(s): Pike, Rob
Title: "A Concurrent Window System"
Publisher: USENIX Computing Systems, vol. 2, no. 2, pp. 133-153, Spring, 1989.
Description: A description of a multi-threaded window system written using a concurrent programming language.

The design is shown to be simpler than the single threaded design of X.

Author(s): Probst, Richard
Title: "OPEN LOOK Toolkits"
Publisher: SunTechnology, vol. 1, no. 4, pp. 76-86, Autumn, 1988.
Description: OPEN LOOK is a user interface specification designed by AT&T and Sun.

This paper discusses toolkits supporting OPEN LOOK including two for the X Window System.

Author(s): Raney, Scott
Title: "Pick a GUI, Any GUI"
Publisher: UNIX World, vol. 8, no. 5, pp. 103-107, May, 1991.
Description: A review of the XVT product.

XVT claims to provide a single API to generate user interfaces for Motif, Macintosh, Presentation Manager, Open Look, and ASCII terminals. This article says XVT is appropriate for in-house tools, but not for product quality applications.

Author(s): Rao, R. and S. Wallace
Title: "The X Toolkit"
Publisher: Proceedings of the Summer, 1987 USENIX Conference.
Description: Describes an early version of the X Toolkit.

Author(s): Raymond, Darrell R.
Title: "Flexible Text Display with Lector"
Publisher: IEEE Computer, vol. 25, no. 8, pp. 49-60, August, 1992.
Description: Describes Lector, a flexible, interactive text input/output system for X.

Author(s): Reichard, Kevin and Eric Johnson
Title: "Drop Dead Programming"
Publisher: UNIX Review, vol. 9, no. 11, pp. 111-114, November, 1991.
Description: A brief overview of some X debugging techniques.

Author(s): Robertson, George G., D. Austin Henderson, Jr., and Stuart K. Card
Title: "Buttons as First Class Objects on an X Desktop"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software and Technology, pp. 35-44, November, 1991.
Description: An overview of the XButtons toolkit, which implements a button-oriented user interface paradigm for X and UNIX. See also the Hesketh paper.

Author(s): Rochkind, Marc J.
Title: "XVT: A Virtual Toolkit for Portability Between Window Systems"
Publisher: Proceedings of the Winter, 1989 USENIX Conference, pp. 151-163.
Description: Describes the Extensible Virtual Toolkit (XVT).

XVT is a user interface toolkit that claims to provide a uniform application programming interface to several different window systems, while providing the "look and feel" appropriate for the window system. Supported window systems include X11, Microsoft Windows, OS/2 Presentation Manager, and the Macintosh.

Author(s): Rosenberg, Jarrett, Paul Asente, Mark Linton, and Andrew Palay
Title: "X Toolkits: The Lessons Learned"
Publisher: Proceedings of the ACM SIGGRAPH Symposium on User Interface Software and Technology, pp. 108-111, October, 1990.
Description: The proceedings include the prepared statements of panelists at a panel discussion.

Jarrett Rosenberg was moderator. Paul Asente spoke on the X Toolkit. Mark Linton spoke on InterViews. Andrew Palay spoke on the Andrew Toolkit.

Author(s): Rosenthal, David
Title: "Inter-Client Communication Conventions Manual (ICCCM), 1988-1991"
Publisher: MIT X Consortium, X11R4, 1990
Description: Describes nteroperability between multiple clients running simultaneously, a major feature of the X Window System.

Several standard conventions are needed to maintain this interoperability. These conventions are documented in the ICCCM. Some have said that when experts answer RTFM to X questions, the 'M' is usually the ICCCM. A copy of the latest ICCCM is in the MIT X11R5 distribution (X11R5/mit/doc/ICCCM).

Author(s): Rosenthal, David S. H.
Title: "A Simple X11 Client Program"
Publisher: Proceedings of the Winter, 1988 USENIX Conference, pp. 229-235.
Description: A version of the "hello, world" paper, presenting and comparing the basics of the X library and the X Toolkit.

All potential X programmers (Xlib or X toolkit) should understand everything in this paper before they attempt to write any X programs. Included in the MIT X distribution (X11R5/doc/tutorials/HelloWorld) and reprinted as "Going for Baroque" in the June or July, 1988 (vol. 6, no. 6) issue of UNIX Review magazine.

Author(s): Rosenthal, David S. H. and Adam R. de Boor
Title: "Godzilla's Guide to Porting the X V11 Sample Server, 1987, 1990"
Publisher: MIT X Consortium, 1992, X11R5 Distribution
Description: A hackers guide to quick-and-dirty porting of the sample server to memory-mapped

monochrome and color frame buffers.

This document is included in the MIT X11R5 distribution (X11R5/mit/doc/Server).

Author(s): **Rosenthal, David S. H.**
Title: **"Window Exchange"**
Publisher: **UNIX Review, vol. 7, no. 12, pp. 58-64, January, 1990.**
Description: **An excellent review of X client interoperability problems, by the author of the X Inter-Client Communication Conventions Manual (ICCCM).**

About half the paper discusses differences among servers that an application writer must understand. The other half discusses (ICCCM) issues such as selections and dealing with the window manager.

Author(s): **Rost, Randi**
Title: **"Adding A Dimension to X"**
Publisher: **UNIX Review, vol. 6, no. 10, pp. 51-59.**
Description: **An overview of PEX.**

Author(s): **Rost, Randi, Jeffrey Friedberg, and Peter Nishimoto**
Title: **"PEX: A Network-Transparent 3D Graphics System"**
Publisher: **IEEE Computer Graphics & Applications, pp. 14-26, July, 1989.**
Description: **A good overview of PEX, the PHIGS/PHIGS+ 3D extension to X.**

Author(s): **Rost, Randi J.**
Title: **"X and Motif Quick Reference Guide"**
Publisher: **Digital Press, 1990. ISBN 1-55558-052-1.**
Description: **A quick reference guide to Xlib, the X Toolkit, and Motif.**

It's a little bulkier than the O'Reilly quick reference, but the cross referencing is much better. An X11R5 version will be available shortly.

Author(s): **Ryan, Michael and James VanGilder**
Title: **"The Development of DECwindows VMS Mail"**
Publisher: **Digital Technical Journal, vol. 2, no. 3, pp. 74-83, Summer, 1990.**
Description: **Describes the engineering and development of a moderate sized X application.**

Author(s): **Schaufler, Robin**
Title: **"X11/NeWS Design Overview"**
Publisher: **Proceedings of the Summer, 1988 USENIX Conference, pp. 23-35.**
Description: **Discusses Sun's X/NeWS window system.**

Compares the functionality of X and NeWS and describes a server that merges the two.

Author(s): **Scheifler, Bob**
Title: **"What's New In Release 5"**
Publisher: **The X Resource, vol. 0, pp. 7- 15, Fall, 1991.**
Description: **An overview of the new features in X11R5.**

Author(s): **Scheifler, Robert and Jim Gettys**
Title: **"The X Window System"**
Publisher: **ACM Transactions on Graphics, vol. 5, no. 2, pp. 79-109, April, 1986.**
Description: **The first published description of X, describing X10.**

This paper, along with an updated version describing X11, also appears in the Software Practice and Experience Volume 20, Special Issue S2.

Author(s): Scheifler, Robert and James Gettys
Title: "X Window System, Third Edition"
Publisher: Digital Press, 1992. ISBN 1-555558-088-2.
Description: The Xlib and X protocol bible by the authors of X11. The third edition is a superset of the MIT documentation on X11R5 Xlib, X protocol, XLFD, ICCCM, BDF, and the compound text encoding.

This is THE specification of the core of X and is required for all serious X programmers, though it may be rough going for those with little experience in interactive computer graphics. See also Asente & Swick's companion book on the X Toolkit.

Author(s): Schmandt, Chris, Mark Ackerman, and Debby Hindus
Title: "Augmenting a Window System with Speech Input"
Publisher: IEEE Computer, vol. 23, no. 8, pp. 50-56, August, 1990.
Description: Describes Xspeak, an experimental speech recognition client that allows voice access to X windows.

Author(s): Schmidtmann, Chris, M. Tao, and S. Watt"
Title: Design and Implementation of a Multi-Threaded Xlib"
Publisher: Xhibition'92 Conference Proceedings, pp. 65- 74.
Description: The sample Xlib from MIT is thread safe, but not multi-threaded.

This paper describes a true multi-threaded implementation.

Author(s): Shein, Barry
Title: "What Light Through Yonder Window Breaks?"
Publisher: Sun Expert, vol. 1, no. 6, pp. 44-51, April, 1990.
Description: A review of OpenWindows, Sun's product version of X.

Author(s): Shein, Barry
Title: "Primal Screens"
Publisher: Sun Expert, vol. 1, no. 3, pp. 56-69, January, 1990.
Description: An interesting, though somewhat religious, comparison of X and Sun's NeWS window system.

It concludes, "even Scott McNealy has spoken of NeWS as a failure as a standard, although he hastens to add that it was a technological success."

Author(s): Sheldrick, Dennis
Title: "Security and the X Window System"
Publisher: UNIX World, vol. 9, no. 1, pp. 103-110, January, 1992.
Description: A tutorial on X access control and authorization.

Author(s): Smith, Jerry D.
Title: "Object-oriented Programming with the X Window System Toolkits"
Publisher: John Wiley & Sons, 1991. ISBN 0-471-53259-2.
Description: A tutorial on X programming, emphasizing object-oriented encapsulation.

Author(s): Smith, Jerry D., Designing X Clients with Xt/Motif, Morgan Kaufmann Publishers, 1992. ISBN 1-55860-255-0. A book on X Toolkit and Motif application software

engineering. Not yet reviewed.

Author(s): Southerton, Alan, Andrew Wolfe, Jr., and David Granz,
Title: "DOS and UNIX On a Two-Way Street"
Publisher: UNIX World, vol. 9, no. 8, pp. 48-56, August, 1992.
Description: A review of Quarterdeck's Desqview/X and Cayman System's XGator.

Desqview/X is a full X environment (server and libraries) for DOS. XGator allows Macintosh applications to display on X servers. They conclude that these are excellent products, though the initial versions do have some quality and performance problems.

Author(s): Spine, Thomas and Jacob VanNoy
Title: "The Evolution of the X User Interface Style"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 44-51, Summer, 1990.
Description: Describes the design and evolution of the DECwindows look and feel for the X Window System.

Author(s): Stroyan, Michael
Title: "Three-Dimensional Graphics Using the X Window System"
Publisher: Dr. Dobb's Journal, vol. 15, no. 2, pp. 28-36, February, 1990.
Description: A high level description of various approaches to developing 3D graphics tools for X, including those of the PHIGS Extension to X (PEX) and HP's Starbase-on-X11 (sox11).

Author(s): Sung, Hsien Ching Kelvin, Greg Rogers, and William Kubitz
Title: "A Critical Evaluation of PEX"
Publisher: IEEE Computer Graphics & Applications, vol. 10, no. 6, pp. 65-75, November, 1990.
Description: An evaluation of PEX, the X extension to support PHIGS, from the point of view of a PHIGS implementor.

Author(s): Sun Microsystems
Title: "OPEN LOOK Graphical User Interface Series"
Publisher: Addison-Wesley, 1990. ISBN 0-201-52365-5, ISBN 0-201-52364-7.
Description: This series includes Functional Specification and Application Style Guide.

They describe the OPEN LOOK user interface, not any particular implementation. OPEN LOOK was designed by AT&T and Sun and implementations are available from both. AT&T's implementation uses the X Toolkit. Sun's implementation uses XView, a similar, but not compatible, toolkit.

Author(s): Swick, Ralph R. and Mark S. Ackerman
Title: "The X Toolkit: More Bricks for Building User Interfaces"
Publisher: Proceedings of the Winter, 1988 USENIX Conference, pp. 221-233.
Description: An introduction to the X Toolkit.

Describes the toolkit architecture and the basic Athena widgets.

Author(s): Terek, Robert and Joseph Pasquale
Title: "Experiences with Audio Conferencing Using the X Window System, UNIX, and TCP/IP"
Publisher: Proceedings of the Summer, 1991 USENIX Conference, pp. 405-418.
Description: Describes an X protocol extension supporting audio.

Author(s): Tharenja, Ashok K. and Sridhar Ramachandran
Title: "Migration From ASCII To X"
Publisher: UNIX Review, vol. 9, no. 11, pp. 35-38, November, 1991.
Description: A discussion on user-level issues on converting from a character terminal environment to an X environment.

Author(s): Thomas, Spencer W. and Martin Friedmann
Title: "PEX - A 3-D Extension to X Windows"
Publisher: Proceedings of the Winter, 1989 USENIX Conference, pp. 139-149.
Description: Describes a demonstration implementation of PEX, the PHIGS/PHIGS+ 3D extension to X.

Author(s): Treggiari, Leo and Michael Collins
Title: "Development of the XUI Toolkit"
Publisher: Digital Technical Journal, vol. 2, no. 3, pp. 24-33, Summer, 1990.
Description: An overview of the XUI widget set. The Motif widget set uses the same application programming interface.

Author(s): Webster, John
Title: "XMedia as Part of X in Multimedia"
Publisher: The X Journal, vol. 2, no. 1, pp. 6-10, September, 1992.
Description: A review of XMedia, a multimedia system similar in architecture to X.

Author(s): Widener, Glenn
Title: "The X11 Inter-Client Communication Conventions Manual"
Publisher: Software Practice and Experience, vol. 20, no. S2, October, 1990.
Description: This is not a copy of the ICCCM, but an overview of its goals and features.

Author(s): Widener, Glenn and Vania Joloboff
Title: "Developing Internationalized X Clients"
Publisher: The X Resource, vol. 0, pp. 133-152, Fall, 1991.
Description: An overview of the new internationalization (localization) features of the X11R5 Xlib and Xt. They are based on the ANSI C setlocale function.

Author(s): Wilson, Dave
Title: "X Windows Terminals Designers Search For a Single-Processor Solution"
Publisher: Computer Design, pp. 77-88, August, 1991.
Description: A look at X terminal hardware design issues.

Author(s): Womack, Paula
Title: "PEXlib: A Tutorial"
Publisher: Prentice Hall, 1993. ISBN 0-13-015843-7
Description: A comprehensive tutorial on PEXlib with plenty of programming examples. Companion to the book by Mark Graff.

Not yet reviewed.

Author(s): Wood, Patrick, "Introduction to Xlib Programming (2 parts)," UNIX World, vol. 6, October-November, 1989. This is a two part tutorial article on Xlib programming. Not as good as Rosenthal's "hello, world" article.

Author(s): X/Open Company, Ltd.
Title: "X/Open Portability Guide: Window Management"
Publisher: Prentice-Hall, 1988.
Description: X/Open is an international user group of UNIX hardware and software developers. It publishes portability guidelines with the goal that developers that follow these guidelines will be portable across other hardware and software supporting the guidelines.

The current X/Open window management guidelines are based on the X11R3 specifications. They will probably be upgraded to a more recent version of X in their next revision.

Author(s): Young, Douglas A.
Title: "Object-Oriented Programming with C++ and OSF/Motif"
Publisher: Prentice-Hall, 1992. 0-13-630252-1.
Description: This is apparently the only detailed book on this subject.

Not yet reviewed.

Author(s): Young, Douglas A.
Title: "X Window System: Programming and Applications With Xt, OSF/Motif Edition"
Publisher: Prentice-Hall, 1990. ISBN 0-13-497074-8.
Description: This book is popular with Motif beginners, but it is based on X11R3 and Motif 1.0, so it is somewhat out-of-date. The Motif user interface language (UIL) is not covered at all. The section on subclassing widgets is also weak: see the Asente & Swick book for better coverage there.

Author(s): Young, Douglas A.
Title: "OSF/Motif Reference Manual"
Publisher: Prentice-Hall, 1990. ISBN 0-13-642786-3.
Description: A reference manual for the most popular C language Motif and Xt functions. The UIL interface to Motif is not covered at all.

Author(s): Young, Douglas A.
Title: "Programming with the X Toolkit (3 parts)"
Publisher: UNIX World, vol. 7, no. 1-3, January-March, 1990.
Description: This three part tutorial article is based on Young's books on the X Toolkit.

Author(s): Young, Douglas A. and John A. Pew
Title: "X Window System: Programming and Applications With Xt, Open Look Edition"
Publisher: Prentice-Hall, 1991. ISBN 0-13-982992-X.
Description: A tutorial on X Toolkit programming, using AT&T's Open Look Intrinsics Toolkit (OLIT)

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