Preface

The XIL™ Imaging Library provides a set of key functions from the fields of image processing and digital video. The purpose of this book is to explain how to use these functions in developing application programming interfaces (APIs) and end-user applications.

Who Should Use This Book

The XIL library was designed to meet the needs of developers creating APIs and applications for a number of markets. These markets include:

- Markets that require digital video technology
- Commercial document imaging
- Technical document imaging
- Desktop publishing
- Color prepress
- Graphics arts
- Technical imaging

How This Book Is Organized

This bulk of this book is divided into three parts. Chapters 1 through 8 explain how to create the framework for an XIL program. They discuss such things as input, output, and error handling. Chapters 9 through 11 discuss the XIL library's image-processing functions, functions that would be used inside the framework. Chapters 12 through 20 explain how the XIL library enables you to compress and decompress sequences of digital images.

A chapter-by-chapter description of the book follows:

Chapter 1, "Introduction to the XIL Library," provides an overview of the functions in the XIL library and discusses how the library relates to other Sun, and to third-party, libraries. It also includes information about verifying the installation of the XIL software developer's kit and setting environment variables.

Chapter 2, "Basic XIL Program," introduces programming with the XIL library by looking at a simple XIL program that reads an 8-bit grayscale image from a file and displays it in an X window.

Chapter 3, "XIL Images," discusses the different types of XIL images, what attributes XIL images have, and how images are stored in memory.

Chapter 4, "Handling Input and Output," takes a systematic look at how you handle the reading and writing of images in an XIL program, including input/output (I/O) with files, displays, and other devices.

Chapter 5, "Reading Kodak Photo CD Images," discusses the library's device handler for reading and decoding the Eastman Kodak Company's Photo CD™ format.

Chapter 6, "Preparing Images for Display," discusses some of the issues that arise when you need to display different types of XIL images on different types of displays.

Chapter 7, "Presentation Functions," discusses a group of functions that are useful in preparing images for display. The topics covered in the chapter include dithering and color-space conversion.

Chapter 8, "Error Handling," discusses the XIL library's default error handler and explains how to write and install a custom error handler.

Chapter 9, “Arithmetic, Relational, and Logical Functions,” covers the XIL library’s arithmetic and logical functions. These functions enable you to add two images, take the logical AND of two images, multiply an image by a constant, and so on.

Chapter 10, “Geometric Functions,” discusses the XIL library’s geometric functions. These functions enable you to do such things as scale images, rotate images, and transpose images.

Chapter 11, “Miscellaneous Image Processing Functions,” presents the remaining image-processing functions in the XIL library. Among other things, these functions give you the ability to filter images, pass images through lookup tables, and dilate or erode images.

Chapter 12, “Compressing and Decompressing Sequences of Images,” introduces the subject of compressing and decompressing image sequences by presenting an example movie maker and an example movie player.

Chapter 13, “Compressed Image Sequences,” discusses the data structure (called a CIS) in which you store compressed image data. The chapter goes over basic CIS operations, such as creating a CIS and writing data to it, and also discusses what attributes CISs have and how you set and read the values of those attributes.

Chapter 14, “Cell Codec,” deals with the Cell compressor/decompressor. (The Cell bytestream definition was developed at Sun.) The chapter briefly explains how the compressor works, discusses attributes that are specific to a Cell codec, and explains how to call optimized routines to play back Cell-encoded movies.

Chapter 15, “CellB Codec,” discusses the library’s CellB codec, which was derived from the Cell codec for use in videoconferencing applications. The chapter explains how the codec works and what special attributes a CellB CIS has.

Chapter 16, “JPEG Baseline Sequential Codec,” discusses how the library’s JPEG baseline sequential codec works and what special attributes a JPEG CIS has

Chapter 17, “JPEG Lossless Codec,” explains how the JPEG lossless codec performs its job and presents information about attributes that are specific to a CIS associated with a JPEG lossless codec.

Chapter 18, “H.261 Codec,” covers the XIL interface to the codec specified by the CCITT in Recommendation H.261. The chapter discusses how such a codec works and lists the CIS attributes that apply specifically to a CIS associated with an H.261 compressor or decompressor.

Chapter 19, “MPEG-1 Codec,” discusses the XIL interface to the MPEG-1 codec specified by the Moving Pictures Expert Group. The chapter discusses how an MPEG-1 codec works and lists the CIS attributes that apply specifically to a CIS associated with an MPEG-1 compressor or decompressor.

Chapter 20, “CCITT Group 3 and Group 4 Codecs,” discusses how these document image compressors do their jobs and lists the CIS attributes that apply only to this class of codec.

Chapter 21, “Acceleration in XIL Programs,” explains how the XIL runtime system defers the execution of functions called in XIL programs as long as possible so that it can replace certain sequences of functions with optimized routines.

Appendix A, “XIL Molecules,” lists the *molecules* provided with the current release of the library. These molecules are optimized routines that the library can execute in lieu of executing a predefined sequence of functions from the API.

Appendix B, “XIL Error Messages,” provides a list of XIL error messages. For each message, the appendix specifies an error ID and a list of functions that can generate the error.

Appendix C, “XIL-XGL Interoperability,” explains how a single program can use both XIL and XGL™ functions to process an image.

Appendix D, “Cell and CellB Bytestream Definitions,” presents the information about Cell and CellB bytestreams that you would need to implement a Cell or CellB compressor or decompressor.

Appendix E, “Bibliography,” lists some books and articles to consult for further information on such subjects as image-processing operations, JPEG compression, dithering, and color models.

The book also contains a glossary of terms from the fields of image processing and digital video.

Related Books

The primary companion to this book is the *XIL Reference Manual*. The reference manual contains man pages for all the functions in the XIL library.

Because programming with the XIL library can be closely tied to programming with the X library, you may also find it useful to consult the *Xlib Programming Manual* and the *Xlib Reference Manual*.

What Typographic Changes Mean

The following table describes the type faces used in this book.

Table 0-1 Typographic Conventions

Typeface	Meaning	Example
`AaBbCc123`	The names of commands, functions, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `system% You have mail.`
`AaBbCc123`	What you type, contrasted with on-screen computer output	`system%` **`su`** `password:`
AaBbCc123	Command-line placeholder: replace with a real name or value	To delete a file, type `rm` *filename*.
AaBbCc123	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in *User's Guide*. These are called *class* options. You *must* be root to do this.