

Figure 1.1	The layers of NeXTSTEP	1
Figure 2.1	In procedural programming, the functions are kept separate from the data they operate on	8
Figure 2.2	An object is a collection of data (instance variables) along with the functions (methods) that can access the data	9
Figure 2.3	Accessing an instance variable through one of the methods	9
Figure 2.4	Once a class is defined, it can be used to create instances	11
Figure 2.5	A subclass inherits the methods and instance variables defined in the superclass	14
Figure 2.6	A message expression has two parts	18
Figure 2.7	Polymorphism allows identically named methods in more than one class	19
Figure 2.8	The higher classes are more generalized than the lower classes	21
Figure 2.9	The interface file declares the instance variables and methods which the class contains	31
Figure 2.10	The implementation file contains the code for the methods defined in the class' interface file	34
Figure 2.11	The class object has two message dispatch tables that contain the addresses of the instance and class methods	37
Figure 2.12	Objective-C searches for the appropriate method in the dispatch table	39
Figure 2.13	Dynamic binding defers associating the receiver to the method until runtime	40
Figure 2.14	<b>self</b> is the current object and <b>super</b> is the superclass	43
Figure 2.15	Objective-C starts at the <b>Object</b> class to allocate the memory for a newly created instance	45
Figure 2.16	The contents of <b>theWindow</b> and <b>name</b> are completely external to <b>theDocument</b>	48
Figure 2.17	An object should free the memory block an instance variable is pointing to before freeing the instance variable	50
Figure 3.1	Object-oriented design is composed of activities rather than steps	55
Figure 3.2	<b>AbstractShape</b> has no collaborators	64
Figure 3.3	The <b>Rectangle</b> class has no collaborators	65
Figure 3.4	The <b>Square</b> class has no collaborators	65
Figure 3.5	The <b>List</b> class has no collaborators	66
Figure 3.6	In a message diagram, the classes are depicted as boxes, and the lines and their directions depict the messages	69
Figure 3.7	The <b>Object</b> class is always the root class of an Objective-C application	70
Figure 4.1	The major classes in the Application Kit	100
Figure 4.2	The Common Classes hierarchy	102
Figure 4.3	The CRC card for the <b>Menu</b> class	106
Figure 4.4	The CRC card for the <b>Window</b> class	107
Figure 4.5	The CRC card for the <b>Application</b> class	107

- Figure 4.6      The message diagram for **AppKitDemo**   111
- Figure 4.7      **AppKitDemo** in execution   114
- Figure 4.8      **AppKitDemo** with a **Quit** option   119
- Figure 5.1      The NeXTSTEP development cycle   125
- Figure 5.2      Creating a new project with ProjectBuilder   127
- Figure 5.3      The Files accessory view of ProjectBuilder   127
- Figure 5.4      The Attributes accessory view of ProjectBuilder   129
- Figure 5.5      The Build accessory view   129
- Figure 5.6      The initial screen in InterfaceBuilder   130
- Figure 5.7      The File Window contains the resources   131
- Figure 5.8      The Palettes Window contains more than one palette   132
- Figure 5.9      InterfaceBuilder automatically creates menu options for the Main Menu   132
- Figure 5.10      Adding a menu option to the Main Menu   133
- Figure 5.11      Adding a panel to the application   134
- Figure 5.12      Placing a textfield in the Info panel   134
- Figure 5.13      Displaying the Attributes Inspector for the Info panel   135
- Figure 5.14      Editing the title of a panel   136
- Figure 5.15      Editing the text of a textfield   137
- Figure 5.16      Editing the text of a menu option   137
- Figure 5.17      Making a connection to the Main Window   139
- Figure 5.18      Displaying an already existing connection.   140
- Figure 5.19      Switching to **Test Mode** in InterfaceBuilder   141
- Figure 5.20      Building an application in ProjectBuilder   144
- Figure 5.21      The components of an application   147
- Figure 6.1      The framework for a NeXTSTEP application   151
- Figure 6.2      Clicking on the **Hide** menu option sends a **hide:** message to **NXApp** (the target)   153
- Figure 6.3      Some sample buttons   155
- Figure 6.4      **ControlDemo** during execution   158
- Figure 6.5      The components of **ControlDemo**   159
- Figure 6.6      Some sample sliders   161
- Figure 6.7      The granularity of a slider   162
- Figure 6.8      **ControlDemo** with a slider and a button   164
- Figure 6.9      Some sample textfields   165
- Figure 6.10      A converter application with two textfields   166

Figure 6.11	<b>ControlDemo</b> with a button, a slider, and a textfield	167
Figure 6.12	The slider is the textfield's target and the textfield is the slider's target	168
Figure 6.13	A sample form	169
Figure 6.14	<b>ControlDemo</b> with all the controls	171
Figure 6.15	<b>ControlDemo</b> with the button as the form's target	172
Figure 6.16	The <b>windowWillClose:</b> method in action	180
Figure 6.17	<b>Money</b> with six textfields and a button	182
Figure 6.18	The CRC card for the <b>MoneyConverter</b> class	184
Figure 6.19	The message diagram for <b>Money</b>	185
Figure 6.20	The hierarchy graph for <b>Money</b>	185
Figure 6.21	Adding fields to a form	186
Figure 6.22	Labeling the form with the appropriate fields	187
Figure 6.23	Subclassing <b>Object</b> to create <b>MoneyConverter</b>	188
Figure 6.24	Adding the <b>moneyForm</b> outlet to the <b>Converter</b> class	189
Figure 6.25	Adding the <b>convert:</b> method	190
Figure 6.26	Instantiating the <b>MoneyConverter</b> class	191
Figure 6.27	Connecting the objects in <b>Money.nib</b>	191
Figure 6.28	Connecting to the form instead of to the formcell	192
Figure 6.29	Adding an arrow icon to the button	194
Figure 6.30	Generating the template files with the <b>Unparse</b> command	194
Figure 6.31	Setting the moneyconverter as the delegate of the Main Window	198
Figure 6.32	Determining the size of a window with the Size Inspector	199
Figure 6.33	Parsing in a class updates the outlets and actions for the class in InterfaceBuilder	200
Figure 6.34	Setting the moneyconverter as the delegate of the application object	201
Figure 6.35	Using the autosizing features in the Size Inspector	204
Figure 6.36	Setting the autosizing characteristics of the button and the form	205
Figure 7.1.	Coordinates in the base system and screen system	210
Figure 7.2.	A view's location inside its window	213
Figure 7.3.	Drawing order of views in a window	215
Figure 7.4.	A view's frame rectangle can be outside of its superview's	216
Figure 7.5.	Drawing a shape with PostScript	224
Figure 7.6.	Execution of a typical PostScript command	225
Figure 7.7.	Execution of <b>square_outline.ps</b>	226
Figure 7.8.	Execution of <b>black_square.ps</b>	227

**xviii      Figures**

- Figure 7.9.      Execution of **circle.ps**    **228**
- Figure 7.10.     Rotating the axes    230
- Figure 7.11.     Producing a shadow effect in PostScript    231
- Figure 7.12.     How **pswraps** fits in the program structure    235
- Figure 7.13.     A sample wraps function    236
- Figure 7.14.     An example of instance drawing    238
- Figure 7.15.     Correct and incorrect use of instance drawing    241
- Figure 7.16.     Updating a view in response to the user's actions    244
- Figure 7.17.     A preliminary interface for **Shapes**    **245**
- Figure 7.18.     A more refined interface for **Shapes**    **246**
- Figure 7.19.     The CRC card for the **ShapeView** class    247
- Figure 7.20.     The CRC card for the **SquareView** class    247
- Figure 7.21.     The CRC card for the **CircleView** class    248
- Figure 7.22.     The message diagram for **Shapes**    **251**
- Figure 7.23.     The hierarchy graph for **Shapes**    **252**
- Figure 7.24.     Instantiating the **SquareView** class    254
- Figure 7.25.     Creating a matrix of two sliders    255
- Figure 7.26.     The user interface with the sliders labeled    256
- Figure 7.27.     Grouping objects with a box    257
- Figure 7.28.     The user interface with the controls defined    259
- Figure 7.29.     Making the connections in **Shapes.nib**    **260**
- Figure 8.1      The precedence order for building the registration table    285
- Figure 8.2      Using **NXUpdateDefault()** to update a default's value in the registration table    288
- Figure 8.3      The views in a Preferences panel is controlled by a popuplist    289
- Figure 8.4      InterfaceBuilder doesn't allow connections between **.nib** files since this would violate encapsulation    291
- Figure 8.5      An object can appear as an instance in one **.nib** file and as the **File's Owner** in another **.nib** file    291
- Figure 8.6      A switchbutton is more appropriate than a textfield for options that only have two possible values    298
- Figure 8.7      The CRC card for the **PrefsController** class    304
- Figure 8.8      The CRC card for the **SwitchView** class    304
- Figure 8.9      The updated CRC card for the **MoneyConverter** class    305
- Figure 8.10     The message diagram for **Money**    **308**
- Figure 8.11     The updated class hierarchy graph for **Money**    **309**

Figure 8.12	Adding header files to a project by dragging them from the Workspace	311
Figure 8.13	Setting the class of the <b>File's Owner</b>	311
Figure 8.14	Editing the entries in a popuplist	312
Figure 8.15	The Preferences panel with the switchview	313
Figure 8.16	Connecting all the objects in <b>Prefs.nib</b>	313
Figure 8.17	Enabling the <b>Preferences</b> menu option	315
Figure 8.18	Connecting the objects in <b>Money.nib</b>	316
Figure 8.19	Centering a view in its superview's coordinate system	329
Figure 8.20	Drawing a beveled line	330
Figure 9.1	A regular coordinate system vs. a flipped coordinate system	338
Figure 9.2	The key window and the main window may or may not be the same window	343
Figure 9.3	The search order when a target is not explicitly set	345
Figure 9.4	A text object can grow beyond the boundaries of its superview	346
Figure 9.5	The components of a scrollview	347
Figure 9.6	A typical savepanel	351
Figure 9.7	A typical openpanel	357
Figure 9.8	Retrieving the selected filename(s)	360
Figure 9.9	A preliminary interface for <b>Words</b>	368
Figure 9.10	The CRC card for the <b>Document</b> class	369
Figure 9.11	The CRC card for the <b>TextController</b> class	370
Figure 9.12	The CRC card for the <b>SavePanel</b> class	370
Figure 9.13	The CRC card for the <b>OpenPanel</b> class	371
Figure 9.14	The CRC card for the <b>Window</b> class	371
Figure 9.15	The message diagram for <b>Words</b>	374
Figure 9.16	The hierarchy graph for the custom classes in <b>Words</b>	374
Figure 9.17	Adding a <b>Command-w</b> keyboard alternative to the <b>Close</b> menu option	375
Figure 9.18	Making the connections in <b>Words.nib</b>	379
Figure 9.19	Adding a scrollview to <b>Document.nib</b>	381
Figure 9.20	Connecting the objects in <b>Document.nib</b>	382
Figure 9.21	Double-clicking on a file from the Workspace sets off a complex series of events	403
Figure 9.22	Adding an icon and changing the extension for an application's documents	405
Figure 9.23	Changing the application's icon	406
Figure 9.24	Setting <b>Words</b> as the default application for <b>.word</b> documents	407
Figure 10.1	The on-line help for the keyboard in the Preferences application	412

Figure 10.2	Enabling <b>Developer Mode</b> in Edit	413
Figure 10.3	Inserting a link in a document	414
Figure 10.4	Displaying and editing a link	415
Figure 10.5	Inserting a marker in a file	416
Figure 10.6	The <b>New.rtf</b> file after it has been modified	420
Figure 10.7	The <b>New.rtf</b> file with the links and marker	421
Figure 10.8	The <b>Open.rtf</b> file with the links and marker	422
Figure 10.9	The <b>Save.rtf</b> file with the links and marker	423
Figure 10.10	Attaching help to the <b>New</b> menu option	424
Figure A.1	The NeXTSTEP login window	431
Figure A.2	The initial screen after logging in	432
Figure A.3	NeXTSTEP windows and icons	433
Figure A.4	Displaying a submenu	434
Figure A.5	Miniaturizing a window	435
Figure A.6	Display the contents of a folder and selecting a file	436
Figure A.7	Scrolling through the <b>README.rtf</b> file	437
Figure A.8	The title bar contains the filename and the path	438
Figure A.9	To close a window, click on the close button, located in the upper right hand of the title bar	439
Figure A.10	Double-click a word to select it	440
Figure A.11	Copying and pasting the text	440
Figure A.12	To get our attention, NeXTSTEP places the alert panel above the other windows	441
Figure A.13	Edit displays a savepanel to ask us where to save the file	442
Figure A.14	To recycle a folder, drag the folder to the Recycler icon	443
Figure A.15	Displaying the contents of the Recycler	443
Figure A.16	Renaming the folder from <b>NewFolder</b> to <b>JunkContainer</b>	444
Figure A.17	Recovering the <b>junk</b> folder from the Recycler	445
Figure B.1	Using the implicit Expansion Dictionary	448
Figure B.2	Adding an entry to the Expansion Dictionary	450
Figure B.3	Using an entry from the Expansion Dictionary	450
Figure B.4	Edit displays only the name of the method when the method is contracted	453
Figure B.5	Indexing an unindexed target in Librarian	455
Figure B.6	The initial screen of HeaderViewer (the Browser view)	458
Figure B.7	The Find Control Options panel of HeaderViewer	461

Figure B.8	The List view of HeaderViewer	462
Figure B.9	Appending the current directory in Terminal by dragging from the Workspace	469
Figure D.1	Searching an entire folder for a given string	503
Figure D.2	Including debugging information in ProjectBuilder	505
Figure D.3	Clicking on the <b>Debug</b> button in ProjectBuilder produces a gdb shell window	506
Figure D.4	The Gdb panel in Edit	507
Figure D.5	Click on <b>self</b> to display its contents	515
Figure D.6	The value of <b>popUpButton</b> 's and <b>switchView</b> 's <b>window</b> outlets should be identical since they refer to the same window	516
Figure D.7	Comparing the value of <b>switchView</b> 's <b>accessoryView</b> outlet against <b>truncateSwitch</b>	517
Figure D.8	Checking the values of the <b>rate</b> array in the moneyconverter	520

