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Objective-C Categories and Their Use

by Nick Christopher
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With the advent of remote objects in NeXTSTEP 3.0, an addition to the Objective-C lexicon was made: protocols. My immediate reaction was nervousness: I was concerned because protocols seemed to be a hastily conceived addition grafted on to the pure rootstock of Objective-C. I mention protocols only because they relate to what I believe is a very commonly held belief concerning Objective-C. People think of Objective-C as simple, pure and – dare I say – elegant? With perhaps only twenty syntactic additions to C, and a few conceptual additions, an extremely effective object-oriented language was created. Having programmed C++ for several years as well, I see Objective-C's simplicity as a great bonus.

However, Objective-C is not so plain-vanilla as one might think. Hidden in the lesser-used regions of Objective-C are some interesting constructs. Most of these features are two-edged swords that are as likely to harm your code as they are to help it. But one feature that is not often used – the capability to create class categories – has some real benefits that make it worth looking at.

What is a category? Categories are a sort of limited subclass. The online glossary defines it as follows:

> ***category***
>
> "In the Objective-C language, a set of method definitions that is segregated from the rest of the class definition. Categories can be added to existing classes."

From the above, two concepts worth noting are hinted at:

- categories provide method segregation;

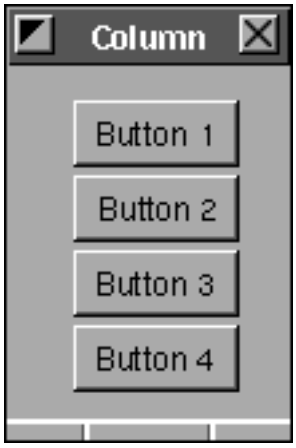
- categories provide method addition to existing classes.

Those two features of categories are what make learning their use worth while.

Method addition

Of the two features of categories, this one is the more obviously useful, once it's understood. Categories will allow you to add methods to an existing class. A subclass also allows you to add methods to a class, right? No. A subclass allows you to create a *new* class that adds methods to an existing class. A category adds the methods to the *existing* class. While this appears to be only a semantic difference it is not; it's very important.

Consider the following. In Interface Builder, you alt-drag a button into a one-column matrix of buttons (see figure).



Conceptually you have a button list, but since it is in fact an instance of the class Matrix the individual buttons must be accessed with the "-cellAt: (int) row : (int) column;" method. The column argument is totally redundant in the above example, and one would like to leave it off, but the Matrix requires it. There are several ways of dealing with that redundant requirement. The most common solution is to ignore the problem and make sure the redundant ":0" gets in all the right places. Traditional C would push you towards using some form of preprocessor #define macro – blech! The Objective-C solution might seem to be subclassing Matrix and then using your new class. The problem with that solution is that Interface Builder does not know about your subclass unless you create a custom palette. To use your new class without a custom palette, Interface Builder will require you to use a custom view and then you need to do all the layout work by hand in your code. Again blech.

I said the Objective-C solution might seem to be subclassing, but in fact the above is a perfect example of when a category should be used. Let's walk through the solution to the problem above using a category.

First, let's start by defining the category. Here's the the interface file (SingleColumnMatrix.h):

```
#import <appkit/Matrix.h>
@interface Matrix (SingleColumnMatrix)

- selectCellAt:(int)row ;
- cellAt:(int)row ;

@end
```

To define a category, simply create an new interface for the existing class (in this case Matrix), and then in parentheses append the category name to the class name. The above defines a category of Matrix, "SingleColumnMatrix", that will provide two new methods that no longer require the redundant column value. The above would be your .h file. Lets look at SingleColumnMatrix.m, the implementation:

```
#import "SingleColumnMatrix.h"
@implementation Matrix (SingleColumnMatrix)

- selectCellAt:(int)row
{ return [self selectCellAt: row : 0]; }

- cellAt:(int)row
{ return [self cellAt: row : 0 ]; }

@end
```

The implementation, like the interface, simply defines the class and then in parentheses the category. The above fully defines the SingleColumnMatrix category.

Now that the category is defined, how do we use it? Well, first, make sure you add SingleColumnMatrix.[hm] into your project in Interface Builder, so that the category gets compiled and linked into the project. Then, in any .m file that uses a Matrix and needs the new SingleColumnMatrix methods simply #import SingleColumnMatrix.h. Its that simple. Any id that is an instance of the class Matrix, even those dragged out in Interface Builder, can respond to the SingleColumnMatrix methods once the interface is imported. Matrix never needed to know about SingleColumnMatrix for it to respond to the methods!!!

There is some bad news. Before you go rewriting the appkit with your own categories you should know of the two limitations:

- categories can not add instance variables to the class;

- categories can not override an existing method.

While categories have these limitations I still find them extremely useful.

Method Segregation

The following is going to sound a little like C++ but don't worry, it's not as bad as that. Categories can also be used to segregate methods. When would you want to separate out a group of methods? Well there are two good examples I can think of: delegate methods and private methods.

I warned you this would sound like C++. But even in Objective-C there can be such a thing as a private method. Suppose you have your own version of NXBrowserCell that allows its foreground and background text colors to be set, and can draw itself as normal or highlighted. Both draw and highlight are very similar methods, simply requiring the colors be reversed. You find that most of the similar code in the two methods can be extracted and placed into a common method. That common drawing method centralizes similar code, but unless the colors are set first by the appropriate calling method, draw or highlight, it will not work properly. The common draw method is a good example of a method you want private – you need it but you don't want others to call it since that would likely cause errors. So the goal is for the interface to have:

```
@interface ColorBrowserCell:NXBrowserCell

// Draw
- drawInside:(const NXRect *)cellFrame
    inView:controlView;

// Highlight
- highlight:(const NXRect *)cellFrame
    inView:controlView lit:(BOOL)lit;

@end
```

while the implementation has:

```
@implementation ColorBrowserCell

// Draw
- drawInside:(const NXRect *)cellFrame
    inView:controlView
{ ... }

// Highlight
- highlight:(const NXRect *)cellFrame
    inView:controlView lit:(BOOL)lit
{ ... }

// generic draw that also takes the colors
- _drawInside:(const NXRect *)cellFrame
    inView:controlView
    backgroundColor:(NXColor)bColor
    textColor:(NXColor)bColor
{ ... }

@end
```

No problem, right? Most people quickly find that Objective-C does not require a one-to-one correspondence between the interface and implementation, so you can just code it exactly as I have shown (if the common drawing method precedes the others you won't even get any warnings!). But what happened to the readability and therefore maintainability of the code – shot! So, use a category. Leave the .h the same but change the .m to read as follows:

```
@interface ColorBrowserCell (SecretStuff)
// Category interface
```

```
-_drawInside:(const NXRect *)cellFrame
    inView:controlView
    backgroundColor:(NXColor)bColor
    textColor:(NXColor)bColor;

@end

@implementation ColorBrowserCell
// Class implementation

- drawInside:(const NXRect *)cellFrame
    inView:controlView
{ ... }

- highlight:(const NXRect *)cellFrame
    inView:controlView lit:(BOOL)lit
{ ... }

@end

@implementation ColorBrowserCell (SecretStuff)
// Category implementation

-_drawInside:(const NXRect *)cellFrame
    inView:controlView
    backgroundColor:(NXColor)bColor
    textColor:(NXColor)bColor
{ ... }

@end
```

This little example makes the category solution look cluttered but it actually works nicely. The beginning of your .m defines a category with any of your private methods. Next you code the class's implementation. And finally, the private category's implementation is coded. The order of implementations is not mandatory; I just like to emphasize the main class and then get to the category. If you really find this layout too cluttered, separate the category off into another .h and .m file.

Note also that I preceded my private methods by underbar ("_"). Why?, you might ask. The problem is that things are never *really* private. Suppose the class is subclassed and one of the private method names is used as a method name in the subclass? Then my class breaks. The underbar is simply a NeXT convention to avoid name duplication. That's right, a NeXT convention! You see, NeXT uses the idea of private categories all over the appkit.

Delegate methods

Have you ever looked at how the NeXT classes that rely on a delegate define the interface for the delegate methods? Generally they use a category. For example, at the end of Window.h you'll find the following:

```
@interface Object(WindowDelegate)
- windowWillClose:sender;
- windowWillReturnFieldEditor:sender
    toObject:client;
- windowWillResize:sender
    toSize:(NXSize *)frameSize;
- windowDidResize:sender;
- windowDidExpose:sender;
- windowDidMove:sender;
- windowDidBecomeKey:sender;
- windowDidResignKey:sender;
- windowDidBecomeMain:sender;
- windowDidResignMain:sender;
- windowWillMiniaturize:sender
    toMiniwindow:miniwindow;
- windowDidMiniaturize:sender;
- windowDidDeminiaturize:sender;
- windowDidUpdate:sender;
- windowDidChangeScreen:sender;
@end
```

Those are all the methods that a delegate of Window may implement. Why use a category to define the delegate methods? The advantage is that, by defining a category, any class that imports Window.h has prototypes of the delegate methods with no obligation to implement them. Had they been added as methods to Window itself then the Window implementation would need to include code for them, or generate endless compilation errors. As a category, even the Window class need not implement them, but they are properly prototyped for use by anyone who wants to implement or call them.

In Closing

Well, that's a whirlwind tour of categories. I hope it proved useful. Poke around in /usr/include/appkit for more examples of their use. Or if you are interested, send me email and I'll drop some of my better examples in the mail for you.

GUN General Meeting August 12, 1992

by Geoffrey S. Knauth, gsk@marble.com

Hadar Pedhazur

The main speaker at the August 12th GUN meeting was Hadar Pedhazur, from the Union Bank of Switzerland. He spoke about 3.0, related the history of his involvement with NeXT, and gave some advice on developing apps in the financial marketplace.

3.0 Impressions

Hadar thinks 3.0 is very solid from the user's perspective, and expects to upgrade his user machines to 3.0 as soon as he gets it.

In 3.0PR1, he was disappointed with DBKit, but with 3.0PR2, he has more hope. DBKit does much of what businesses want: simple sorts, searches, joins. People who do very sophisticated things with databases may run up against DBKit's limitations. Nevertheless, Hadar said DBKit beginners were doing impressive things every day, and developers are busy writing adapters.

He looks forward to using distributed objects a lot. At the moment, the NeXT computer is not the very fastest machine in the

world, but with distributed objects, that may not matter, because the work can be spread around in new, creative ways. He's tried distributed objects. They're real, they work.

As for the IndexingKit, Hadar thinks it's a great idea, but he's annoyed at the changes in Digital Librarian (between 2.x and 3.0PR2). DL's summary lines sometimes contain no useful information. [Also, DL still crashes from time to time when multiple targets are selected.]

History

When Hadar was introduced to the NeXT cube, he thought it was too slow, and rejected the platform. Because he thought NeXTSTEP was somehow more special than anything he'd seen before, he went to Dev Camp anyway – years ago – and was lucky to see a prototype 68040 that was 3 times faster than the cube, so he stuck with NeXT. At Dev Camp, Steve Jobs pulled a prototype slab out of a black bag. Later it turned out the prototype slab was made of wood.

Hadar makes Program Trading and Equity applications. According to Hadar, programming financial services apps is "not rocket science," but sometimes you have to be clever, because timing is so critical.

The biggest advantage he sees to NeXT is rapid development time. He also has numerous programmers who use NeXT computers successfully without knowing Unix – they concentrate their thoughts on the appkit. He says this is not be possible on a Sun (you have to know Unix).

The longest he's seen it take someone get up to speed on NeXTSTEP is two months. That person is now a super programmer. He's also seen people get their arms around NeXTSTEP in two weeks.

Advice

Hadar recommends FAME for any time-series database work.

When writing object-oriented software, don't try to design the perfect object hierarchy on your first pass, or you'll never finish your application. You learn what the right objects should be through trial and error. Be patient. Get something working first.

Let your programmers play with the machine and get a feel for it. Initially, they will write ridiculous programs that bear no resemblance to what you want. Don't worry. Soon enough they will turn play into productivity. Again, be patient.

He likes the Perl programming language, and uses it a lot.

A member of his group wrote an application for an unnamed bank in three months using NeXTSTEP, and this application is still in use. Meanwhile, the bank dumped NeXT, and nearly wasted 9 man-years developing a Smalltalk-based application on a Sun, which turned out to be a flop. [This is interesting, because another institution is considering a similar approach.]

Smalltalk is nifty, he said, but it also wants to own your machine. If you make calls external to the Smalltalk environment, expect your machine's performance to drop precipitously.

Hadar related an interesting training story. Two programmers from London came to New York to verify that the wonderful NeXT custom applications they were seeing were not so much fluff. They spent two days, Thursday and Friday, watching New York programmers go about their work, i.e., using Interface Builder, Digital Librarian, Emacs, gdb, etc. The Londoners brought their PC apps on floppy, and on Saturday and Sunday, reproduced their PC applications under NeXTSTEP. Hadar spent two hours getting them "unstuck" now and then, but that was it. The Londoners were delighted with the four-day experiment, and Hadar learned an important lesson: that the promised NeXT productivity is there if you can somehow make sure a resource is available to unstick a momentarily stuck mind. With one mentor around, newcomers can become productive quickly.

George Cummings

George Cummings, in charge of sales for the northeast United States, spoke next.

J. P. Morgan

He started by commenting on the recent news that J.P. Morgan had decided not to standardize on the NeXT platform at this time, preferring a combination of Sun and Macintosh computers. George said NeXT will win back the Morgan account, but it might take a while – perhaps a year. Part of the problem was that there were 25 NeXT programmers at JPM, vs. 300 for Macintosh and 250 for Sun, and that JPM had an existing investment in architecture to consider. [JPM also commented in a securities publication that it was unsure of the portability of Objective-C.] On the good side, he said that JPM appreciated the technical capabilities of NeXT computers. The loss of JPM is a blow to NeXT, but George said NeXT will reveal several buyers of equal stature to JPM in the next 90-120 days, so keep the faith.

Release 3.0

3.0 will ship in two weeks (end of August).

4.0 vs. More NeXTSTEP Ports

Numerous persons are planning 4.0 at NeXT, and that 4.0 has a higher priority than porting NeXTSTEP to more hardware platforms. The reason is economic reality. Support for lots of platforms is expensive, and NeXT would prefer to continue innovating. If money were no object, though, NeXT would spend more resources porting NeXTSTEP to new platforms.

NeXTSTEP-486

NeXTSTEP-486 is expected to ship in 1Q 93.

NRW

NRW (NeXT RISC Workstation) apparently is a code name for new hardware from NeXT. George kept mum about this, except to utter the party line, "NeXT will never fall behind the industry's performance curve."

Data General

NeXT has recently partnered with Data General. The purpose of this is to make use of Data General's extensive sales force, 1200 strong, which reaches many markets new to NeXT. DG would like to promote the idea of NeXT computers on the desktop attached to DG's AViiON servers. The marketplace likes AViiON servers, but has not embraced AViiONs on the desktop.

Sun

George said that Sun isn't all bad. For one thing, Sun is doing a lot to legitimize Unix on the desktop. [See NT below!]

As for porting NeXTSTEP to the Sun SPARCstation, apparently Steve Jobs said NeXT would do the port "if 'they' will pay for it."

Microsoft NT

This wasn't said at the meeting, but after dinner later in the evening, two experts I respect said very positive things about NT. The scariest thought, according to one, was that NT could be a "Unix killer." In other words, Microsoft may have finally achieved technical sophistication. Steve Jobs has called NT a "Unix wannabe." But if he's wrong, imagine a world without Unix, and try to figure your place in it, or what you'll do about it.

NeXT In The News

by Eric Rosenthal

David Strom, Which OS Is For You? It Depends, *Network Computing*, July 1992, pp. 69-70. The Conventional Wisdom Watch observes "[Unix] stands to win the most in the IBM/Microsoft OS wars. Look out for NeXT."

NeXT Workstation To IBM Mainframe Connectivity, *UniForum Monthly*, July 1992, p. 47. Product announcement for Avatar Corp.'s InSession 3270 and NeXT Programmer's Toolkit.

Untitled item in In Brief, *Computerworld*, July 6, 1992, p. 97. NeXT, Inc. receives $55 million credit line from Canon, Inc. and $10 million credit line from Steve Jobs. Borrowed funds would be converted to equity if NeXT goes public.

Tom Quinlan, NeXT taps Canon, Jobs for another $65 million in financing, *InfoWorld*, July 6, 1992, p. 33. NeXT Inc. receives $55 million credit line from Canon Inc. and $10 million credit line from Steve Jobs, both convertible to stock when the company goes public. Bernard Woebker was named vice president for Europe, and will move distribution to the direct sales model used in the United States.

Mark L. Van Name and Bill Catchings, Business Audio Should Be Just the Beginning, *PC Week*, July 6, 1992, p. 87. "NeXT's systems offer a nice alternative [to the microphone] that should be available for PCs: a microphone built into their monitors."

Jane Morrissey, NeXT's European Operation Gets New Structure (item in News Digest), *PC Week*, July 6, 1992, p. 139. Slow European sales lead to a direct sales effort and personnel changes. New rounds of financing are obtained from Canon and Steve Jobs.

NeXT Misses Release Dates of NeXTSTEP Duo (item in Late News), *PC Week*, July 6, 1992, p. 146. There will be no NeXTSTEP 486 beta or NeXTSTEP 3.0 product in June.

Steve Gibson, Darwinism will make dinosaurs of all platforms except the PC, *InfoWorld*, July 13, 1992, p. 34. "I believe that the radical advances in the PC's power-to-cost ratio will have another far-ranging impact [in addition to a shakeout in the PC clone industry]. All competing hardware platforms are dead. Inertia may carry them forward for a while, but their justifications for existing have completely evaporated.… Now what do you suppose it means when NeXT Inc. announces that it is porting its very nice NeXTSTEP operating environment to the 486 PC platform? Oh sure, that sleek and sexy black NeXT cube has won all kinds of design awards and it's even become something of a status symbol when perched alongside one of those new fully automated executive cappuccino machines. But NeXT hasn't been able to sell many of its workstations. Why? Because in just the past year or so, the PC has become *way* too powerful and *way* too cheap. However, those high-end PCs, which are selling for less than $2,000, will soon be able to run NeXTSTEP, giving it millions of high-end PCs to call home.… And what if you need to take a NeXT cube or Sun workstation on the road? Could you purchase an inexpensive, battery-powered NeXT or Sun workstation? Sorry. Not today and probably not ever. However, once NeXTSTEP and Solaris are ported to the Intel platform, they could easily run on my laptop."

Bruce Schneier, Bedrock has developers wary, *MacWEEK*, July 13, 1992, p. 10. NeXTSTEP cited as an application framework which does not require source code by MacApp developer.

Lisa Picarille, IBM could be promiscuous, fickle partner, *MacWEEK*, July 13, 1992, pp. 62, 64. Survey of IBM PC operating systems observes "IBM also licensed NeXTSTEP, NeXT Computer Inc.'s object-oriented development environment, more than two years ago for use in AIX. Thus far, it has failed to do anything with the technology."

Marisano James, NeXT: Enviable platform, but Apple still in the lead (letter), *MacWEEK*, July 13, 1992, p. 69. Despite the ease of programming NeXT, Apple leads in multimedia and RISC.

Dan Margorian, A/UX 3.0 offers better Unix, *MacWEEK*, July 13, 1992, pp. 84-85. "Since it has never been aggressively marketed, developers view A/UX as a dead product or at least an expensive risk. Many university departments that standardized on A/UX for technical labs and engineering users are switching to better-supported platforms, such as Sun or NeXT."

Paul M. Sherer, NeXT Misses Delivery of NeXTSTEP 486, 3.0, *PC Week* , July 13, 1992, p. 16. NeXTSTEP 486 misses June beta test date, delaying competition in high-end operating systems. It is now due for OEMs in the fourth quarter and as a shrink-wrapped product in 1993. NeXTSTEP 3.0 is also late, delaying other products. NeXT also received new financing and named a new vice president of European operations. The O'Connor & Associates division of Black Diamond Technology will be the exclusive distributor of Lotus Realtime for NeXTSTEP.

Mike Woods, Multimedia Musings (letter), *PC Week*, July 13, 1992, p. 66. "Most applications within Macintosh and NeXT support (and have supported for some time) voice annotation."

Untitled item in Short Takes, *UniNews*, July 13, 1992, p. 4. NeXT Computer, Inc. receives $55 million credit line from Canon, Inc. and $10 million credit line from Steven Jobs.

Michael S. Malone, Home Is Where The Megabytes Roam, *The New York Times*, July 19, 1992, Section 3, p. 23. Executive Life column profiles home computer systems of several Silicon valley executives and scientists. Jim De Arras, co-founder of Hand Held Products Inc. has many computers including a NeXT.

Rosemary Hamilton, Advanced financial tools home in on spreadsheets, *Computerworld*, July 20, 1992, p. 4. Lotus vice president Frank Ingari said Windows for Improv would enter beta test in a few months and be released late this year. Borland's director of product management, Lee Philips, said spreadsheets need data organization and data retrieval capability which is better provided by database technology than spreadsheet technology like Improv.

Jean S. Bozman, Three lessons in objectivity, *Computerworld*, July 27, 1992, p. 12. Microsoft, Borland, and NeXT demonstrated their object features in a three-hour session at Object World. Jobs criticized Windows 3.1 for having too few object-oriented features. Microsoft's Jim Allchin claimed greater cost-effectiveness than NeXT, saying "Steve showed all the things I showed, but I showed it on PCs." Jobs also said NeXTSTEP 3.0 will ship next month and conform to Object Management Group specifications.

Cate Corcoran, NeXT joins the OMG, enters partnership with Object Design, *InfoWorld*, July 27, 1992, p. 15. NeXT Computer Inc. joins the Object Management Group and will submit its technology to the OMG. NeXTSTEP 3.0 objects will conform with the OMG when the software ships in August. NeXT and Object Design Inc. will jointly develop object storage and database technology and attempt to make it an industry standard.

Jean-Louis Gassée, Apple, Symantec, Microsoft cross the great divide, *MacWEEK*, July 27, 1992, pp. 50, 52. Frame Technology Corp.'s FrameMaker and WordPerfect's WordPerfect, supported on NeXT, cited as examples of cross-platform development.

Rumor Central, *PC Week*, July 27, 1992, p. 142. "Put heavy hitters from IBM, Microsoft and NeXT in the same room at Object World and what do you get? Naturally, a contest to see who has the biggest objects. Jobs started it by saying Jim Allchin of Microsoft showed nothing more than a text-search utility when he demo'd Cairo, the future object version of Windows. Then Steve whacked Taligent president Joe Guglielmi, alleging everything Taligent plans to do NeXT has today. Allchin, stuttering with rage, shot back that Jobs was 'Pinocchio' and had missed NeXTSTEP shipping deadlines. Indeed, one-upping Jobs is difficult. 'We're going to be 60 days late. At least we have software to ship,' Jobs na na na'd. Jobs and the diplomatic Guglielmi remained on stage after the seminar. '[Steve] believes he has technologies we'd like to use,' quoth Joe."

Untitled item in Nanobytes, *BYTE*, August 1992, p. 28. Sun has hired Guy "Bud" Tribble, cofounder of NeXT Computer and chief developer of NeXTSTEP, as vice president of Sunsoft. According to Jobs, Tribble left after senior executives rejected him as general manager of the new software division. Tribble had been on a leave of absence for four of the last nine months, and NeXT says "NeXTSTEP 3.0 should begin shipping by the time you read this [*BYTE*]."

Dick Pountain and John Bryan, All Systems Go, *BYTE*, August 1992, pp. 112-116, 125-126, 130, 132, 134-136. Survey of parallel processing mentions NeXTSTEP among Unix variants offering multiprocessing.

Sydney S. Weinstein, Normal is Wonderful, *The C Users Journal*, August 1992, pp. 101-105. Recent Usenet postings includes the patch to patch for v2.0.12u6 to comp.sources.bugs and patch 1 for mawk to comp.sources.reviewed, both adding NeXT support.

Steven J. Vaughan-Nichols, NeXTSTEP: Another Path, Another Way, *Computer Shopper*, August 1992, p. 188. NeXTSTEP 486 is the latest candidate for a Unix alternative to Windows and OS/2. NeXTSTEP has an established reputation as a graphical object-oriented operating system which includes multitasking, networking, and multimedia. "NeXTSTEP has to be regarded as a dark horse in the graphical operating system derby. Its system requirements dwarf those of the other systems and, by comparison, it doesn't have as many applications. On the plus side, beauty is in the eye of the beholder, but few can doubt that NeXTSTEP's WorkSpace Manager interface combines object-oriented grace with raw Unix muscle. It's a potent pairing, which has made NeXTSTEP the GUI and operating system of choice for many workstation users. Whether it will charm PC users as well remains to be seen, but power users should give NeXTSTEP a chance. NeXTSTEP's blend of power, interoperability, and beauty makes it a real operating system contender."

Ian Gladwell, Review of *Mathematica: A Practical Approach* by Nancy Blachman, *Computing Reviews*, August 1992, p. 426. Mentions presence of notes covering NeXT and other platforms.

Lee Sherman, CraftMan Objects Provide Building Blocks for NeXT, *New Media*, August 1992, pp. 28-29. Review of Xanthus AB's CraftMan object-oriented multimedia authoring environment.

Douglas J. Nakakiara, letter, *PC Magazine*, August 1992, p. 19. The May 12 comparison of platforms should have included Amigas because they are more common than NeXT machines, which were reviewed.

Rick Reynolds, Nothing Compares 2 UNIX, *Publish*, August 1992, p. 17. Adobe Illustrator and Adobe Type Library are available for NeXT. Altsys, the developer of Aldus Freehand, will introduce Altsys Virtuoso in August. Appsoft will introduce Image, the first NeXT color photo editor, in September. RightBrain Software's forthcoming PasteUp page layout program offers the precision of QuarkXPress but is easier to use than PageMaker.

NeXT Guru Jumps Ship for Sunsoft (item in Industry News), *UnixWorld*, August 1992, pp. 12-13. Guy L. "Bud" Tribble, cofounder and vice president of software engineering at NeXT, has become vice president of end user software at Sunsoft. Some analysts think Tribble could cut NeXT's three-year lead over Sun, but Jobs says Tribble "has not been the driving force behind NeXTSTEP for some time."

Designed in Stone, *UnixWorld*, August 1992, p. 116. Product announcement for Stone Design's Dataphile.

Untitled item in Hardware & Software Support, *UnixWorld*, August 1992, p. 120. Short listings for Informix Software's Informix-SE RDBMS and White Pine Software's Exodus X Window server.

John D. Ruley, Windows is Coming to a UNIX Near You, *Windows Magazine*, August 1992, p. 18. Insignia Systems is demonstrating a Windows emulator for its SoftPC, to appear on NeXT and other platforms.

NeXT licenses NetInfo, *Workstation News*, August 1992, p. 9. NeXT Computer Inc. to license its NetInfo network administration software.

Letters, *MacUser*, September 1992, p. 13. Reader surprised by Steve Wozniak's appearance in PowerBook ad told "Perhaps you're thinking of that other Steve (Jobs, that is), who claims to have the NeXT thing."

Excerpts from NeXT Nugget News Digest

[Some of these excerpts have been edited slightly... -Ed.]

NeXTSTEP Release 3.0 Fact Sheet

NeXT Computer, Inc.

NeXTSTEP Release 3.0 is a new generation of NeXTSTEP object-oriented system software. NeXTSTEP, the only object-oriented system software currently shipping, greatly speeds the development of mission-critical custom applications up to five times faster than with competing environments. In addition, the NeXTSTEP graphical user interface lets mere mortal users take advantage of the powerful custom and shrink-wrapped applications written for the platform.

Among the most significant enhancements of NeXTSTEP Release 3.0 are additional software objects that commercial and in-house developers can use to create their applications. Release 3.0 bundles three major new object kits, and third-party developers already market more than 100 additional objects aimed at a wide range of specialized tasks. Because NeXTSTEP is completely object-oriented, all these new objects fit seamlessly into the development environment, making the real promises of object-oriented computing available for the first time on any commercial platform.

NeXTSTEP Release 3.0 also adds a number of new connectivity, communications and other standards to the already standards-rich environment of NeXTSTEP Release 2.

Highlights of NeXTSTEP Release 3.0

- New objects for the NeXTSTEP library, plus enhanced object-oriented technologies

- Database Kit (DBKit), which provides a single, consistent interface to SQL databases from multiple vendors; extends the power of NeXTSTEP's object-oriented capabilities to the development of database applications

- 3D Graphics Kit (3DKit), based on the RenderMan standard for photorealistic rendering and interactive manipulation of 3D models, enables easy integration of three-dimensional graphics into existing NeXTSTEP applications

- Distributed Objects, which extends the simple yet powerful messaging model used between objects within a NeXTSTEP application to messaging between different applications and across a network

- Object Links, a multimedia hyperlinking system based on Distributed Objects that enables documents to share dynamic information

- PhoneKit, for taking advantage of high-speed voice and data transmission over ISDN as well as analog lines

- Even more support for standards

- Bundled Novell Client and AppleShare Client software, for accessing file servers and PostScript printers on NetWare and AppleTalk networks

- Macintosh file system support

- Improvements to DOS file system support

- ISDN networking support (with inexpensive external hardware by Hayes Microcomputer)

- CD-ROM support (includes ISO 9660, High Sierra, RockRidge and Macintosh formats)

- PostScript Level 2 integration, which adds support for calibrated color output, imaging filters for faster printing and pattern support

- Pantone Matching System, the premier standard for specifying colors in printed output

- Expanded ability to share files, printers (from various vendors), fax modems and CD-ROM drives among networked users

- Seamless client operation with all leading high-quality servers (e.g., Auspex, DEC, Hewlett-Packard, IBM, Pyramid, Sequent, Sun, Teradata)

- Global computing, automatically

- Integrated foreign language support, so that all applications shipped with NeXTSTEP computers to be set by the user for English, French, German, Italian, Spanish or Swedish (in Japan, NeXTSTEP users will be able to work in both English and Japanese)

- Other enhancements

- Integration with NeXT's 360 dpi, four-color Color Printer

- An integrated, multimedia on-line hypertext Help system

- Multimedia file compression

- Additional network administration tools

Compatibility: Any application written under NeXTSTEP Release 2 will run in Release 3.0, and will automatically take advantage of many Release 3.0 features.

DBkit Documentation Update

NeXT Computer, Inc.

Between 3.0 PR2 and the final 3.0 Release, there was a minor DBKit API change that didn't make into the online technical documentation and one DBKit example in the release. If you are interested, you can get the new AddressBook example via anonymous ftp (file transfer protocol) from one of the following Internet archive servers. Note that they may still be in /pub/next/submissions.

cs.orst.edu:
pub/next/documents/NeXTanswers/MiniExample (may still be in pub/next/submissions)

sonata.cc.purdue.edu:
pub/next/docs/MiniExamples (may still be in pub/next/submissions)

MiniExamples are small programming examples provided by NeXT Developer Support. Each one contains its own README file.

The August 92 Release contains two miniexamples for the 3.0 NeXTSTEP Release.

The AddressBook example shows you some simple usage of the DBKit Access Layer such as how to get connected to a SYBASE server, and how to do simple operations such as select, update, and delete. This example supersedes the same example that comes with the 3.0 Release under /NextDeveloper/Examples/DatabaseKit that doesn't work properly.

Please note that the on-line documentation for the method saveModifications: for DBRecordList has some errors. A return value 0 should mean success. Here are the corrections for DBRecordList. The possible return values from saveModifications: are as follows:

Value	*Reason*
0	The save operation was successful.
1	The save completed but not all records were saved. Thishappens if errors are encountered but the delegate requests that the save proceeds anyway.

DB_NoIndex - Either the DBRecordList isn't ready (its status is DB_NotReady or DB_NoRecordKey), or one or more records in the database have changed since they were fetched and the delegate hasn't forced the modifications to be saved. (See recordStream:willFailForReason: (DBRecordStream))

The TextORama example is a 2.0 example adapted to 3.0. It illustrates two things:

1. How to create a TextField which supports one or more of these features:

- Restricting text length (both when typing and pasting)
- Autojumping to another TextField when maximum length is reached
- Interpreting a carriage return literally rather than as an indication to end editing

2. How to implement emacs key binding support for the Text object.

MusicKit Update

by Robert Poor

NeXT Computer, Inc

NeXT is unbundling the MusicKit. CCRMA (the computer music research center at Stanford University) is taking over the development and support for the MusicKit. This is good for several reasons:

* CCRMA can do a better job of maintaining and developing the MusicKit than NeXT – NeXT lacked the dedicated resources and the time to give the MusicKit the attention it deserved.

* In the past, releases of the MusicKit have been tied to major releases of NeXTSTEP, usually once every 12-18 months. Now, CCRMA will be in a position to release upgrades and bugfixes more frequently.

With our internal resources free to focus on other Sound- and Music-related stuff, we've implemented a bunch of improvements in the SoundKit and MIDI drivers (which we are NOT unbundling). A few of the new features you can expect in Release 3.0 of NeXTSTEP include:

*Real time mixing of sounds

*Audio Transform Coding to give you 4:1 to 10:1 data reduction without affecting sound quality

*High-quality sample rate conversion of arbitrary ratios

*A leaner, meaner MIDI driver (thanks to David Jaffe) with support for MIDI time code

NeXT is working with CCRMA to make it easy for eveyone in the world to get the MusicKit for Release 3.0. I can't tell you (yet) about the schedule for CCRMA's release of the MusicKit. We still have to deliver a full-fledged Release 3.0 to them (and the rest of the world), and there's still an important signature that's missing before CCRMA is legally empowered to distribute the MusicKit.

Stay tuned for more news as it breaks. We'll keep the nextmusic mailing list (email nextmusic-request@wri.com to join) informed.

NeXT Developer's Library for NeXTSTEP 3.0

Addison-Wesley

0-201-63248-9	NeXTSTEP General Reference
0-201-63249-7	NeXTSTEP Development Tools
0-201-63250-0	NeXTSTEP User Interface Guidelines
0-201-63251-9	NeXTSTEP OOP and the Objective-C Language
0-201-63252-7	NeXTSTEP Operating System Software
0-201-63253-5	NeXTSTEP Programming Interface Summary
0-201-63254-3	NeXTSTEP Network and System Administration

Modem Toll-Free Access For ANDI Members

by Bill Strehl (strehl@socrates.umd.edu)

ANDI (Association of NeXTSTEP Developers International) selected MCI to provide telephone service for the Association. As part of the three year agreement which has been signed, the Association will offer 800-number modem access to its network as well as dialup switched digital 56K service. ANDI's modem pool contains ZyXEL modems running at 14.4K (V.32.bis) and 16.8K (a ZyXEL proprietary speed) and Motorola CODEX modems running at 14.4K (V.32.bis) and 24K (Motorola CODEX's implementation of V.fast). This provides analog dialup connectivity to ANDI and the Internet at higher speeds than an other service provider on the planet at rates competive with vendors limited to 2400 and 9600 baud service.

ANDI announced support of the popular ZyXEL modems after successfully testing B & W Software's $135 NXFax fax software which includes the ability to automatically reset the modem to either fax or modem depending on the call. Craig Goss, President of B & W, said owners of the Neuron 14.4 modems can also run his software with a change to ZyXEL ROMs. Neuron owners electing this option will no longer be able to use the Neuron specific software. Further details are available from B & W at 802-496-8500.

ANDI also is the first provider of dialup ISDN Basic Rate Service anywhere in the world. ISDN terminal adapters that conform to the national ISDN1 standard, such as the Hayes ISDN Systems Adapter, as well as the NeXT specific ISDN Systems extender will be supported at speeds up to 144K. This service is meant to complement the Switched Digital services of MCI. Initial ISDN service will be limited to the Washington, DC area until MCI receives approval from the Regional Bell Operating companies and has filed tariffs with the FCC.

By selecting MCI, any present or future member of ANDI will receive special discounts on their long distance service of up to eleven percent. Existing MCI customers who join ANDI will receive the same discount. MCI and ANDI announced a special promotion which provides members with one month of free long distance service subject to the limitations of the particular calling plan selected. Members whose long distance bill is $500 per month or more can receive $30,000 in free long distance for one month as part of the special promotion, and members whose long distance bill is $50 to $500 per month can receive one months free long distance service equal to an amount approximating their monthly usage. This means that members who select or are already using MCI can offset the cost of ANDI membership which ranges between $100 and $1500 by enrolling in the special Association program which is schedule to expire before the end of the year. More details are available directly from the Association or Alan Miller at MCI World Headquarters. Alan can be reached at 800-283-0200. ANDI can be reached at 301-681-3932.

In a related issue, ANDI also announced that it will be installing an Intel based 486 computer running NeXTSTEP on its network

in order to provide developers with a place to compile and debug their code written on the 680x0 family of processors. This will allow ANDI members, including dealers, VARS, VADS, and Integrators to see/offer NeXTSTEP 486 apps soon after the release of the 680x0 version. The Association feels this will help speed up the availability of software on the 486 platform, and plans to install other machines whenever NeXT ports NeXTSTEP to other platforms.

ANDI is a trademark of the Association of NeXTSTEP Developers International, Inc. NeXT and NeXTSTEP are trademarks of NeXT Computer Inc.

Data General, NeXT Announce Relationship

NeXT Computer, Inc.

Data General Corporation and NeXT Computer, Inc. announced a relationship in which Data General will resell NeXT workstations with AViiON servers. In addition, the two companies will cooperate in the further development of advanced client/server solutions.

"Our AViiON servers combined with NeXT's revolutionary object-oriented workstations will offer the best client/server solution in the industry," said Ronald L. Skates, president and CEO of Data General. "As our customers move their strategic business applications to client/server systems, they can use AViiON servers to guarantee availability and security of their data and NeXT workstations to access this data effectively."

"We think this collaboration will open up new markets to NeXT and expand our overall distribution capability," said Steven P. Jobs, chairman and CEO of NeXT. "This is especially important as corporate America re-engineers its business processes to achieve greater productivity."

Client/Server Solutions for Mission-Critical Applications

Using NeXT workstations and AViiON servers, companies can provide their users with database-driven custom applications. Data General's AViiON servers support the industry's leading relational databases, including Oracle, Sybase, Ingres and Informix. These high-availability servers, in combination with disk arrays, offer data security and back-up products that preserve the integrity of customers' data, even in the event of equipment or power failures.

NeXT's workstations run NeXTSTEP, the industry-acclaimed object-oriented environment that enables corporate customers to create and deploy their mission-critical custom applications five to 10 times faster than ever before. In addition, NeXT's new Database Kit of objects allows even faster creation of client/server applications that rely on intensive database usage on the server, and provides a single, consistent interface to SQL databases from multiple vendors.

As part of its complete client/server solution, Data General will also port NeXT's NetInfo to its AViiON servers by the end of 1992. NeXT recently began licensing the source code for NetInfo, its network administration software. NetInfo lets system administrators manage users, machines, file systems and other network resources on UNIX networks, and can be ported to any UNIX-based computer. Based on a distributed, extensible database, NetInfo gives system administrators a much more flexible and manageable access control scheme than with other UNIX network administration tools. NetInfo ported to AViiON will provide top-quality support of heterogeneous NeXTSTEP/AViiON environments by AViiON servers.

NeXTSTEP Programming Book Update

by Mike Mahoney

SCaN President and SCaNeWS

co-editor Southern California NeXT Users' Group

Email: mahoney@csulb.edu (NeXTmail capable)

"NeXTSTEP Programming – Step 1: Object-Oriented Applications", by Simson L. Garfinkel and Michael K. Mahoney, will be on the bookshelves in mid-November. The Garfinkel/Mahoney book has been reviewed and is currently being copy edited. Simson and I are hoping that it will be on the shelves in September. It's upgraded to work with NeXTSTEP 3.0 (e.g., Project Builder, new development environment), but doesn't discuss 3DKit or DBKit. We're happy with the book, but bringing a book to print is a long process. If you'd like to learn more about the book, please call the following number for Springer-Verlag, the publisher: (800)SPRINGE or (800)777-4643.

The Next Public Domain CD-ROM For Education

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Jeff Blum Higher Education Technical Assistant
Email: jblum@next.com

Soon you will be seeing quite a few CD-ROMs containing files from the major NeXT archive sites (e.g. Purdue, Oregon State). Some are being produced by NeXT user groups, others are from software publishers, and even others are included when you buy a hard disk from a particular vendor. Much of the really incredible educational software, however, does not appear at the NeXT public archive sites, and therefore may not be included in these productions.

What Is The Public Domain Education CD-ROM?

The Higher Education Marketing group at NeXT Computer, Inc. is gathering educational software that is available either free of charge (freeware) or for minimal costs (shareware) and will distribute the wares via CD-ROM. There will also be a handful of commercial demos (education-oriented only) on the CD-ROM, as well some selected demonstration applications developed at NeXT which are not part of NeXT's current product lines.

NeXT plans to distribute the CD-ROM this fall to many of our education users, and will give it away to attendees at the 1992

EDUCOM conference in Baltimore, MD (October 28 - 31).

We realize that we're going to get gigabytes of stuff, and not all will fit on one CD-ROM. NeXT will evaluate for software for stability and then select the submissions to be included on this version of the NeXT Public Domain CD-ROM for Education.

Partial List Of Software Categories

Architecture
Astronomy
Art/Design
Biology
Business
Chemistry
Communications
Computer
Science
CraftMan (Both programs & palettes. NeXT will supply CraftMan Engine)
Economics
Engineering
English
Foreign
Language
Games
Geology
History
Information
Management
Law
Linguistics
Mathematics (Including Mathematica Notebooks and front ends to Mathematica)
Medical
Multimedia
Music
Networking
Philosophy
Physics
Programming (e.g. palettes, objects, examples)
Psychology
Publishing
Statistics
Utilities/Services

"Jewel of the Matrix" CD-ROM

Object Horizons, Ltd. announced the availability of their "Jewel of the Matrix" CD_ROM. "Jewel of the Matrix" is a comprehensive collection of NeXT and UNIX shareware, demos and public domain software. "Jewel of the Matrix" contains a large collection of applications, sounds, music, tiff and EPS graphic files, source code, newsletters, literature, animations, Backspace views, GNU tools and languages, icons, login images, comp.sys.next related materials, Frequently Asked Questions etc. All included, the CD-ROM contains nearly two gigabytes of data when fully uncompressed. "Jewel of the Matrix" has many additional features such as 10 digital books (including all of the comp.sys.next lists from 1989 on broken into threads) fully indexed for Digital Librarian, the definitive automatic untar and uncompress application, and a logical and understandable directory structure. For pricing and order information call (617)499-9523 or write:

Object Horizons, Ltd.
167 Milk St., Ste. #212
Boston, MA 02109-4315

ObjectWare: Component-Based Software

NeXT Computer, Inc.

At the Object World '92 conference in San Francisco July 21, 1992, NeXT Computer, Inc. announced ObjectWare, component-based software for application development. NeXT also announced NeXT OBJECTWARE, the industry's first object catalog, containing more than 100 commercially available objects from more than 50 NeXTSTEP developers.

"While the rest of the industry is still dreaming about objects, NeXT is delivering real objects now, and our customers are buying and using them," said Steven P. Jobs, chairman and CEO of NeXT. "This ObjectWare catalog marks an historic event in the software industry."

NeXTSTEP's object-oriented architecture makes possible a new category of software, which sits between traditional system software and traditional application software. Called ObjectWare, it consists of objects that can be bought and licensed by developers to create custom applications much faster.

Emergence of an Object Marketplace

"Nine months ago we predicted that an object marketplace would begin to appear," said Doug McLeod, an analyst at International Data Corporation (IDC). "NeXT's ObjectWare catalog is tangible evidence that this prediction is coming true with NeXTSTEP. I was impressed by the diversity of the objects in the catalog, with nearly every major category represented. Given that NeXTSTEP has been object-oriented from the beginning, it's not surprising that the trend toward component-based software is happening on NeXT first."

Object-oriented technology is increasing in popularity because it addresses a growing demand for software that is faster and easier to develop, plus simpler to maintain and revise. Numerous studies show that the single largest cost in a software application's life cycle is in maintenance and upgrades. With object-oriented technology, customers can not only create custom applications more quickly, but also significantly reduce the amount of time and effort needed to maintain and enhance the software.

Nowhere is the trend toward object-oriented software more evident than in vertical markets that have highly specific needs, such as financial services, health care and legal. Developers in these markets can use objects such as those listed in the Object-

Ware catalog to build specialized applications for financial modeling, simulation, database access and management, health care, communications, document management, publishing and decision support.

ObjectWare: Real Objects Right Now

Software objects provide real-world functionality that developers can incorporate into any kind of application.

Objects in NeXT's ObjectWare catalog include the following:

- objects for incorporating bar codes into any type of printed matter;
- an object that converts English typed text into words "spoken" by a NeXTSTEP computer
- a "document engine" that can provide the basis for component-based publishing applications
- an object library for developing distributed networking applications
- objects for mathematical modeling and financial simulation
- objects for scanner and serial port device interfaces; and
- graphing and 3D display objects

In addition to its 100 commercially available objects, NeXT's ObjectWare catalog features a selection of free, public domain objects.

Some of the objects listed were derived from custom applications. For example, financial trading objects provided by Anderson Financial Systems (AFS) for the NeXT ObjectWare catalog were distilled from earlier custom projects for its Wall Street clients. AFS's TradeKit objects provide pre-written code for standard trading functions, such as ticket writing and position management. Even developers with minimal knowledge of the securities industry can use these AFS objects to create custom trading applications in a fraction of the time previously required.

In a separate press release, NeXT also announced today that all NeXTSTEP objects (those provided by NeXT as well as all third-party ObjectWare) are fully conformant with the Object Management Group (OMG)'s object model. The OMG, which NeXT announced it has joined as a corporate member, is considered the leading consortium focused on object-oriented technology.

NeXTSTEP: Architecture for ObjectWare Development

The third-party objects and object kits listed in NeXT's ObjectWare catalog complement the mature library of foundation objects provided in NeXTSTEP. Since Release 1.0, NeXTSTEP has been based on rich classes of extensible software objects. Release 2.0 of NeXTSTEP added features and functionality common to all applications, such as integrated printing and faxing, color, interapplication communications and sound.

The third generation of NeXTSTEP, due to ship in volume next month, will include kits of more complex objects (including the Database Kit, 3DKit, PhoneKit and Indexing Kit) as well as Distributed Objects, which extends NeXTSTEP's object-oriented paradigm for single applications to include messaging between different applications, machines and networks.

Because all these objects run in NeXTSTEP, they can be subclassed and customized; combined, they provide most of the code needed to build a custom application.

"The NeXTSTEP Application Kit is the best collection of objects I've ever seen," said Alex Cone, president of the software development company Objective Technologies, Inc. (OTI). "It allows us to create industrial-strength objects that are well-tested, versatile, generalized and well-documented. With NeXTSTEP, object orientation pervades the entire system. NeXT is the only system in which you can write purely object-oriented code."

"NeXTSTEP's object-oriented development environment is what most of us had always wanted, but just didn't think was possible," said Vince Jordan, director of software development for WilTel's Advanced Technology Center, the nation's fourth largest fiber optic network and a NeXT customer. "Our current telecommunications network management system would have taken six to eight years to develop if we were working on our old platform."

Ordering NeXT's ObjectWare Catalog

NeXT's ObjectWare catalog is available now for $10.95 and can be ordered by calling 1-800-TRY-NeXT. All objects in the catalog are available through their respective third-party developers.

NeXT Joins OMG (Object Management Group)

NeXT Computer, Inc.

NeXT Computer, Inc. announced that it has joined the Object Management Group (OMG) as a corporate member and plans to participate by submitting its technology for consideration.

In addition, NeXT announced that its rich set of NeXTSTEP objects are all fully OMG conformant. As a result, NeXT becomes the first computer company to ship an OMG-conformant suite of objects, significantly ahead of its competitors.

The OMG-conformant objects include those provided in NeXTSTEP Release 3.0, NeXT's latest release of its highly acclaimed object-oriented environment, as well as the third-party NeXTSTEP objects included in the NeXT OBJECTWARE catalog, which was announced today. NeXTSTEP 3.0 also includes Distributed Objects, placing NeXT significantly ahead of its competitors in the race to offer distributed objects.

The announcements were made at ObjectWorld, a conference dedicated to both the technology and business of object-oriented software, being held here through July 23.

"We are certainly pleased to see NeXT, a leading provider of object-oriented technology, join the OMG," said Chris Stone, president of OMG. "We welcome NeXT's full participation in our work to establish widely used standards for object technology."

"NeXT is the only platform with real OMG objects available now, way ahead of our archrival Sun," said Steven P. Jobs, chairman and CEO of NeXT. "NeXT is pleased to participate and offer its expertise in the OMG, the industry's leading consortium focused on object-oriented technology. In joining, we also bring the experience and knowledge of the entire NeXTSTEP community numbering in the tens of thousands to the OMG, with the result being better object-oriented technology for the entire industry."

"This is one more demonstration that NeXT is leading the way in object-oriented systems," said Tom Campbell, senior vice president at the First National Bank of Chicago, a NeXT customer.

About the OMG

Headquartered in Framingham, Mass., with marketing operations in Boulder, Colo., the OMG is an international organization of systems vendors, software developers and users founded to promote the theory and practice of object management technology in the development of software. Its goal is to develop a common framework for object-oriented applications based on industry guidelines. The adoption of this framework will make it possible to develop a heterogeneous applications environment across all major hardware and operating systems.

OMG membership spans five categories: corporate, end user, associate, university and subscribing memberships. Corporate members are entitled to full participation in all OMG activities, including voting on the acceptance of technology for OMG standards, serving on OMG's Technical Committee and submitting technology for adoption.

Short Course: Object-Oriented Programming And The NeXTSTEP Development Environment

by John R. Glover

Electrical Engineering Department University of Houston

Houston, Texas 77204-4793

Email: glover@uh.edu August 1992

The notes are located in /pub/next/submissions/UHOOP_3.0.tar.Z on Purdue archive site. These are notes used in a 3-day short course taught occasionally at the University of Houston. Included is the schedule used in teaching the course, the notes themselves, the lab exercises, and several additional example programs. The notes here are updates to the August 1991 edition. I have updated everything to NeXTSTEP 3.0, added to and improved many parts, and corrected known errors.

The notes are sized for landscape presentation on the screen with a video projector. They are most easily used as follows: Call up the desired chapter in WriteNow. Set the magnification of the window to 125% and resize the window to fill the screen. Click on the page forward/backward buttons to move through the notes. You can modify selected pages in each chapter to give "progressive disclosure" of the several points on each page.

For hardcopy of the notes, you can either print out the notes as they are so that each class participant has a full-size page of what is on the screen, or you can print the pages in 4 Up (Page/Page Layout...) to reduce the printing volume. In either case, I suggest you provide a three-ring binder of the notes to each participant.

The Labs folder contains laboratory exercises 2-9, as listed in the Schedule. To prepare the labs for use, you must first go to the project directories within the Solution and Extension directories of each lab and type "make." Or, have each student do so after copying the lab to his/her own folder. (I removed the object and executable files to make this package smaller.)

The Examples folder contains some programming examples I have collected. A couple are referred to in the notes and labs. To run these you must also go to each one and type "make."

There is a file in the Labs folder named Labs.README which gives instructions on how each student should set up to use the labs.

These notes were developed and adapted from many sources, including my old NeXT Developer Camp notes and several other sources I cannot even remember. For that reason I am making them public. They are being made public under guidelines similar to that of GNU software. That is, I ask that you make these notes, or any notes derived from these notes, freely available to others, giving appropriate credit to the original source(s).

If anyone sends me corrections or suggested changes, I will incorporate them and update these notes in the future, again making them available to all. If anyone wishes to add their own notes on OOP, NeXTSTEP, IB, etc., I will be happy to merge them in some fashion that makes sense and make the combined notes available to all.

Past Issues Of The NeXT Nugget News Digest

NeXT Computer, Inc.

Issues of the NeXT Nugget News Digest have been distributed to the growing number of NeXT User Groups.

Due to popular demand, past issues of the NeXT Nugget News Digest are archived and updated quarterly on the Purdue archive server (sonata.cc.purdue.edu) located on the internet.

Look in /pub/next/Newsletters/nugget for the Fall 1991 and Winter 1992 archived releases:

```
-rw-r--r--   52968 Apr  1 17:46 1991Q4.tar.Z (5 issues)
-rw-r--r--   63467 Apr  1 17:46 1992Q1.tar.Z (6 issues)
```

How To Access Purdue FTP Archives Via Email

NeXT Computer, Inc.

Many of you have email access only and below is described a way for you to retrieve public domain applications from the Purdue archive site: cc.purdue.edu.

Send mail to archive-server@cc.purdue.edu whose body contains a list of commands (see the commands below).

Purdue University Computing Center
NeXT Archive Server
List Of Commands

The following is a partial list of commands and their descriptions supported by Purdue University Computing Center for the NeXT archive server. They are listed here in alphabetical order.

help
: Sends a general help file for file submissions and requests.

submission
: Putting the key word 'submission' in your subject line (and only in your subject line!) will tell the archive server to send the enclosed document to the archive moderator for inclusion into the archives. NeXT attachments are welcome. Please include a description of your submission and the minimum release required to run your software.

index [archive...]
: "Index" mails to you a listing of the files in the specified archives. If an archive is not specified, then the index of the available archives will be sent.

path <mail-path>
: "Path" is used to override the mail path that the archive server chooses from the header of your mail message. You should use this whenever you know that the return address of your message will not be useful to the archive server. The archive server only knows about internet domain. This means that the archive server understands name@site.edu, but NOT name@site.bitnet or name@site.UUCP. There are two sites on campus which can forward to UUCP addresses and one which can forward to bitnet addresses. The two UUCP sites are "purdue" and "pur-ee". The bitnet site is "vm.cc.purdue.edu" (known on the BITNET side of the world as PURCCVM).

  To route mail to a UUCP site, I'd suggest first omitting the "path" directive and letting the archive-server attempt to guess. However, if your mail is not returned (or is returned with errors) you might try:

  wellknownsite!yoursite!yourname@uunet.uu.net
  or
  wellknownsite!yoursite!yourname@ee.ecn.purdue.edu
  or
  wellknownsite!yoursite!yourname@cs.purdue.edu

  If you have any doubts about your mail address, you should ask your system administrator for a correct domain style address. Two examples uses of "path" are

  path mrd@sun.soe.clarkson.edu
  path wellknownsite!yoursite!yourname@uunet.uu.net

send <archive> <file...>
: "Send" mails to you the files in the specified archive. All of the files that you request will be sent to you archived together (see "archiver"), possibly packed (see "pack"), possibly encoded (see "encoder") and split up into messages that are small enough to be mailed (see "size"). If you specify an archive and do not specify any files, then all of the files in that archive will be sent. You may have as many "sends" in the body of your mail message as you wish.

encodedsend <archive> <file...>
: "Encodedsend" is identical to the command "send" except that the files are guaranteed to be encoded (see "encoder"). This is useful if you know that the return message will go through EBCDIC based computers.

archiver <archiving-method>
: You may specify the method of archiving (merging a group of files into one large file) the files with "archiver". By default, files that are mailable are simply stuck together with the text "cut here" between files and; non-mailable files are archived via unix tar. The available archiving methods are:

  • arc (the PC program)
  • none (the files are simply stuck together)
  • shar (Unix sh script)
  • simple (the files are separated by "cut here" – default)
  • tar (Unix Tar – default for non mailable files)
  • zoo (Unix, VMS, PC's)
  • dclshar (VMS, creates a file you can unpack with @FILE.-COM)
  • nextmail (NeXT mail format)

pack <packing-method>
: You may specify that the files be packed (compressed) before delivery. This has the advantage that the mail files will be smaller. By default the files are not packed. The available packing methods are:

  • compress (the Unix command compress)
  • none
  # This site does not support compact.
  • compact (the Unix command compact – slower than compress)

encoder <encoding-method>
: Non-mailable files must be converted to something mailable. By default this is done with "uuencode". You may also specify that the files must be encoded with the command "encodedsend." The available encoding methods are:

  • uuencode (default)
  • btoa
  # This site does not have rscs as an encoder
  • rscs

size <max-file in bytes>
: The archive server splits files up so that they are smaller than this limit. This is done because many sites have a maximum mail size limit. A value of 0 means that there is no limit. The archive server

has a default size limit of 300000 bytes. You may change this if you know that you have different limits. Most (but not all) uucp sites have a limit of 100000 bytes. Internet and Bitnet sites should set this to 300000 bytes.

length <number>
Many mailers will truncate long lines. To overcome this the archive server encodes files that contains lines longer than 130 characters (see "encoder"). If you know that your mail files will not be truncated then you can set this value to something larger.

limit <number>
The archive-server limits the amount of data that will be returned by any one request. This limit is very large. By using this command you may lower this limit. This is typically done to prevent errors by the user.

search <string> <archive> <file...>
You may search through the archive for a string. A string is considered to be any sequence of alphanumeric characters; case does not matter. If you only provide an archive name then all of the files in the archive will be searched. You will be returned all lines that contain the string.

find <string...>
You may search for file names that contain the given string. Case is significant in the string. You will be returned all file names that match the given string.

Example

Here is an example message that you could send to the archive-server. It gives an example of all the supported commands.

```
help
path mrd@sun.soe.clarkson.edu
index latex-style res.sty
encodedsend latex-style res.sty res-sample.tex
send isetl
archiver tar
pack compress
encoder rscs
size 200000
length 80
search resume texhax texhax.89.001 texhax.89.002
find resume
```

Appendix

1) Files are considered mailable if they do not have any lines longer than 130 characters and do not have characters other than tabs, carriage returns, newlines, vertical tabs, formfeeds and characters between space through tilde (using ascii ordering).

2) If you have problems or questions, you should send mail to archive-management@cc.purdue.edu.

3) If you have an archiving, packing, encoding program that runs under BSD Unix that I do not have and you would like me to support then please send it to me. It is very easy to incorporate it into this package.

4) The archive server was written by Michael DeCorte. It consists of groups of Bourne shell and awk scripts designed to work under BSD Unix based computers. There are no restrictions on its redistribution provided the copyright notice is left intact. The original sources for the archive-server can be obtained via anonymous ftp to sun.soe.clarkson.edu or by sending messages in the format given above to archive-server@sun.soe.clarkson.edu (of course you won't get any of the modifications this site has added for NeXT support). Any further inquiries can be sent to archive-management@cc.purdue.edu.

5) Unix is a registered trademark of AT&T.

How to Submit to the Purdue Archive Site

Send submissions to: archive-server@cc.purdue.edu with the subject line 'submission'.

3.0 User Interface Guidelines by Anonymous FTP

from The Bay Area NeXT Group

The latest version of NeXT's User Interface Guidelines (.rtfd) is now available for anonymous FTP from sutro.sfsu.edu [130.212.15.230] in the directory pub/UIGuide_July_92/. This supersedes the previous draft release already on the archives. The UIGuide_July_92 directory contains the following files:

• README (instructions how to uncompress the Guidelines)
• UserInterface.squfold (UnSquashOnly)
Addison-Wesley will publish the final version in hardcopy form as part of the NeXTSTEP 3.0 documentation set.

Thanks to Kathy Walrath for making these files available to BANG and for permission to redistribute them electronically.

BANG P.O Box 1731 Palo Alto, CA 94302 info@bang.org (415) 327-BANG

NeXT User Group Discounts on Bulk Book Orders

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Within the US and Canada, we offer User Groups a 10% discount if they order 5 or more books, ordered at the same time and shipped to the same address. The person to contact about discounts is Kerri Bonasch <kerri@ora.com>, O'Reilly & Associates, Inc, 103A Morris Street, Sebastopol, CA 95472, 707-829-0515.

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Fall Election Campaign To Use NeXT Computers

The DCM Group, a Northern Virginia based advertising and political campaign management firm, announced their plans to use NeXT workstations for the management of the Earle Williams for Virginia Governor Campaign. The workstations will be used for general office productivity in addition to running custom software for campaign management developed by RDR, Inc.

"Using NeXT technology allows us to be extremely competitive", said Mr. Williams, former President and CEO of BDM International, Inc., "I have been able to quantify in just a few days the amount of time I have saved just using NeXT's multimedia electronic mail."

Throughout his business career and most recently as president and CEO of BDM, Mr. Williams has extensive experience in bringing technology to bear to solve complex problems. Leadership in high technology is but one element of an overall strategy for rebuilding the economy and revitalizing the State.

A local area network (LAN) of NeXT machines was installed in the McLean offices by DPC, Inc., a local NeXT value added dealer. In addition, a remote site was installed in Richmond, allowing for electronic mail, file sharing, and database access. "By keeping the remote site up to date with the latest information, we can be much quicker to react to fast changing events in Richmond." said Mr. Ed DeBolt, President of DCM, "It also makes joint preparation of documents and reports a much easier task than what we are used to from our old PC environment."

Productivity applications provide group calendar management, as well as traditional word processing and desktop publishing. These applications are being used by the staff to enhance the day to day management of information by the campaign.

In addition to commercial off-the-shelf (COTs) applications, the campaign relies heavily on custom software developed by RDR, a local registered NeXT developer and integrator. The campaign management software produces mailings, contribution histories, and delegate status and political information for the campaign.

The DCM Group is based in McLean, Virginia, and provides advertising and campaign management services to its clients. DCM has worked in campaigns for Presidents Ford, Reagan, and Bush and such varied congressional campaigns as Senators Warner of Virginia, Roth of Delaware, and Simms of Idaho as well as numerous other Republican state and federal races.

DPC is based in Alexandria, Virginia, and is Washington's first NeXT authorized dealer. DPC provides systems, service, integration, and consulting for the NeXT and Macintosh platforms. DPC was founded in 1987 by its president, Bryan M. Vaughan.

Headquartered in Fairfax, Virginia, RDR specializes in professional services, custom application development, consulting and integration for the NeXT platform. RDR's customers include commercial companies and Federal Government agencies. RDR is an authorized NeXT federal systems integrator and NeXT registered developer.

NeXT Announces POSIX/GOSIP Compliance For NeXTSTEP 3.0

NeXT Computer, Inc.

NeXT Computer, Inc. announced that it will offer full POSIX and GOSIP compliance for NeXTSTEP 3.0 for federal government and other customers that require these standards. Providing a version of NeXTSTEP that completely supports these standards allows NeXT to compete for the entire range of federal hardware and software procurements that mandate POSIX and GOSIP.

"NeXT products have tremendous appeal to government users, and with this announcement NeXT becomes a full-fledged player across all federal markets," said Fred Giordano, regional federal sales manager for NeXT. "POSIX and GOSIP compliance, and the interoperability they provide, are important components of NeXT's overall strategy of combining industry standards with NeXTSTEP's innovative object-oriented system software. These standards are key additions to NeXTSTEP 3.0, which will provide the broadest set of interoperation tools available from any workstation vendor."

NeXT also announced it plans to support the C2 government specification for security of a computer's operating system from unauthorized penetration. NeXT products supporting POSIX, GOSIP and C2 standards for NeXTSTEP 3.0 will be available in Q4 1992. Details on pricing and distribution will be announced at a later date.

POSIX, GOSIP Required by the Federal Government

POSIX, or Portable Operating System Interface, is a generic operating system interface and environment definition based on, but not restricted to, the UNIX operating system. The goal of the POSIX standard is to allow any software application developed under POSIX to run on any computer system that is compliant with POSIX. POSIX compliance is currently required for most federal RFPs.

GOSIP, or Government Open Systems Interconnection Profile, is a set of hardware-independent networking protocols and tools designed to work across diverse computer platforms, replacing the variety of competing network protocols with a consistent standard. GOSIP compliance is currently required for most federal RFPs.

"Support for GOSIP is part of NeXT's continuing commitment to providing organization-wide interoperability," Fred Giordano said. "NeXTSTEP 3.0 system software, for example, also includes integrated support for AppleTalk and Novell NetWare support. GOSIP adds an additional and significant building block to this collection of connectivity tools."

About GUN...

Board

Paul Murphy *(president)*.....Paul_Murphy@gun.com
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Mike McMahon .....Mike_McMahon@gun.com

The BULLETin

The GUN BULLETin is produced monthly (more or less) using *FrameMaker* 3.0 on a NeXT computer, with headlines created by Adobe *TouchType*. Text is written directly in *FrameMaker*, with *WordPerfect*, or imported from other platforms (ugh!).

Pulled From The Net

Pulled From The Net is a service designed to provide a synthesis of important NeXT-related Usenet information to those without network access and to those too busy to keep up with Usenet. Usenet, or Net News, is a bulletin board service available free of charge to anyone with Internet access. It includes hundreds of special-interest posting areas (groups), read by hundreds of thousands of people across the planet.

All GUN members receive *Pulled From The Net* with their membership. It is emailed to those capable of reading Next Mail as soon as it is available; ASCII copies are sent to those capable of reading only ASCII mail; paper copies are sent to everyone else, along with the newsletter.

Pulled From The Net tracks the following groups:

comp.sys.next.misc
Miscellaneous NeXT related information

comp.sys.next.announce
NeXT related announcements

comp.sys.next.admin
NeXT administrative information

comp.sys.next.programmer
NeXT programming information

Discounts

Many vendors are willing to give user group members discounts on their hardware and software. GUN does everything possible to ensure that its members have access to these savings. Every month, GUN compiles a list of currently available discounts. If you are interested in an unlisted item, write to discounts@gun.-com or call GUN at 718-260-9848 and ask for the person in charge of group discounts. If possible, we will add the item to the list. Vendors are encouraged to contact GUN to participate in this program.

Membership & Sponsorship

Individual Dues

- $25 per year (tax deductible)
- newsletter
- email alias and inclusion in group email list
- eligible for group discounts (contact Ed Wright)
- eligible for individual UUCP services
- eligible for individual Internet connectivity
- NeXTWORLD disount

Corporate Sponsorship

- $100 per year (tax deductible)
- newsletter
- email alias and inclusion in group email list
- employees are eligible for group discounts
- eligible for corporate UUCP services
- eligible for corporate Internet connectivity
- employee NeXTWORLD disount
- sponsorship is recognized in every issue of the newsletter

GUN Sponsors

Corporate Benefactors

Organizations who have contributed material or equipment:

Athena Design
Mesa

BoxHill Systems Corp.
760 Mb Hard Disk Storage System for GUN Archive Server

Electronic Directions
use of facilities for general meetings

Marble Associates, Inc.
Consulting Services, Marble Teleconnect communication software, Designer Labels labeling software

Stone Design
DataPhile database software, Diagram!, Create, and TextArt

Telebit Corporation
T3000 Modems, NetBlazer Router

Uninet Peripherals, Inc.
SLAT Adapter

Corporate Sponsors

Organizations who have contributed $100 or more this year:

AGS Informations Services, Inc.
American General Information Services, Inc.
Charles River Computers
CS First Boston (Japan) Limited
Custom Word Processing, Inc.
Executive and Technical Recruiters, Ltd.
Frame Technology Corp
Light Printing Co., Inc.
Marble Associates, Inc.
NorthStar Technologies, Inc.
Nova Works Computer Systems, Inc.
Objective Technologies, Inc.

Communications

Individual Email

GUN maintains a list of all members who can be reached via e-mail. All mail sent to gun-members@gun.com is redistributed to everyone on the list. In addition, GUN assigns an alias to every member of the list making it possible for that person to be reached by sending mail to Firstname_Lastname@gun.com.

Eligibility: all dues-paying members

Cost: included in membership

Timetable: available immediately

Individual UUCP

GUN maintains a server connected to the Internet. UUCP service allows members' machines to connect to this host to send and receive email. Mail from the outside can be addressed to user@gun.com. Mail you send appears to originate from the gun.com domain,and is addressed as if you were on the Internet (i.e., user@next.com). Mail volume is not limited. A GUN volunteer will help you set up and maintain the UUCP connection.

Accounts will be given on a first-come, first-served basis. Once our current maximum capacity is reached, we will need to purchase additional lines and modems. This could cause a slight delay in obtaining service.

Eligibility: All dues-paying members

Cost: $10/month

Timetable: 2,400 - 57,600 bps (v.22, v.32, v.32bis–v.42 & v.42bis) – available immediately

Individual Internet Connectivity

The gun.com domain is a wide area network (WAN). Machines are connected via the Serial Line IP protocol (SLIP). Any machine on the network can connect to any other as if it lived on the local ethernet, and can share resources, mount each other's file systems, etc. Becoming a member of the GUN WAN gives you unrestricted access to all Internet resources, including mail services, netnews (with thousands of special interest groups), hundreds of archive servers, Archie (a database of software/documents stored on the archives), library card catalogues, the Internet White Pages (X-Windows-based email directory service), and value-added services (AP news feeds, stock market data, vertical market information, etc.). GUN maintains a local archive to mirror the most important NeXT-related sites in the world.

Eligibility: All dues-paying members

Cost: $80/month

Timetable: 2,400 - 57,600 bps (v.22, v.32, v.32bis–v.42 & v.42bis) – available immediately

Corporate Email

Corporations can request either a corporate alias or ten individual aliases. The corporate alias allows an unlimited distribution of GUN mail within the organization. The individual aliases allow individuals to be reached by sending mail to Firstname_Lastname@gun.com.

Eligibility: corporate sponsors with e-mail access are eligible for this service

Cost: included in sponsorship

Timetable: available immediately

Corporate UUCP

Identical to Individual UUCP. Limited to ten employees.

Eligibility: corporate sponsors with e-mail access are eligible for this service

Cost: $15/month

Timetable: 2,400 - 57,600 bps (v.22, v.32, v.32bis–v.42 & v.42bis) – available immediately

Accounts will be given on a first-come, first-served basis. Once our current maximum capacity is reached, we will need to purchase additional lines and modems. This could cause a slight delay in obtaining service.

Corporate Internet Connectivity

Identical to Individual Internet Connectivity.

Eligibility: corporate sponsors with e-mail access are eligible for this service

Cost: $80/month, $500 sign-up fee

Timetable: 2,400 - 57,600 bps (v.22, v.32, v.32bis–v.42 & v.42bis) – available immediately