

Building User Interfaces in NeWS

Don Hopkins

University of Maryland

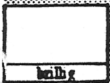
Human Computer Interaction Lab

The NeWS window system is a multitasking, interactive PostScript programming environment. It's a network based, extensible window server. It's also a whole lot of fun! PostScript is a high level, device independent, industry standard page description language. NeWS has extensions to PostScript, that make it a powerful platform for building window systems. NeWS uses an object oriented programming package, providing a Smalltalk-like class mechanism. The user interface toolkit is a set of classes that can be easily customized. NeWS has a modular look and feel.

HyperTIES is a hypermedia browser for the NeWS window system, under development at the Human Computer Interaction Lab, at the University of Maryland, that takes advantage of many of the unique features of NeWS.

The UniPress Emacs text editor is a powerful NeWS programming environment. It supports multiple frames, text selection, menus, control panels, and many other window system features.

Pie menus are menus with their choices positioned in a circle around the menu center. In NeWS, pie menus are displayed in round windows. Many types of pie menus will be demonstrated.



Building User Interfaces in NeWS

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Outline

Definition

```
11111111111111111111111111111111p
1111p
ok .pile @ .define Building User Interfaces in NeWS
11p
ok .pile @ .articulate Building User Interfaces in NeWS
11111111111111111111111111111111p
ok .pile @ .articulate Building User Interfaces in NeWS
11111111111111111111111111111111p
ok 0
```

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

The outline of a talk about building user interfaces in NeWS.

- > The NeWS Interactive Programming Environment
- > The HyperTIES hypermedia browser
- > The UniPress Emacs Text Editor
- > Plc Menu Demonstration
- > NeWS Hacks

Definition

```
ok .pile @ .articulate Building User Interfaces in NeWS
111111111p
ok .pile @ .articulate Building User Interfaces in NeWS
111111111p
ok .pile @ .define Outline
11p
ok .pile @ .articulate Outline
11111111p
ok
```

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

The NeWS window system is a multitasking, interactive PostScript programming environment. It's a network based, extensible window server. It's also a whole lot of fun!

- > The PostScript Programming Language
- > NeWS Extensions to PostScript
- > The Object Oriented Programming Package
- > The X11/NeWS Merge

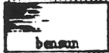
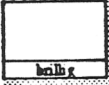
Definition

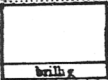
```

11p
ok .pile @ .articulate Outline
11111111p
ok .pile @ .define The NeWS Interactive Programming Environment
111p
ok .pile @ .articulate The NeWS Interactive Programming Environme
nt
111111111p
ok

```

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH





- > PostScript is a page description language.
- > A "de facto" industry standard. (For what that's worth.)
- > A flexible, high level programming language.
- > An interactive, interpretive environment.
- > A high level, device independent imaging model.
- > It feels like a cross between Lisp and Forth.
- > It's weird, but it's fun and powerful.
- > PostScript is a trademark of Adobe Systems Incorporated.

Definition


```

111p
ok .pile @ .articulate The NeWS Interactive Programming Environme
nt
111111111p
ok .pile @ .define The PostScript Programming Language
111p
ok .pile @ .articulate The PostScript Programming Language
111111111p
ok

```

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

ben/hg



ben/sun

```

ok .pile 0 .return
11111111p
ok .pile 0 .define NeWS Extensions to PostScript
11p
ok .pile 0 .articulate NeWS Extensions to PostScript
11111111111111111111p
111111111111p
1111111111111111p
ok
  
```

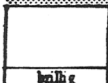
NeWS window system extensions to the PostScript language.

- > Lightweight Processes
- > NeWS schedules many lightweight PostScript processes.
- > They all live together in the NeWS server's address space.
- > They're cheap!
- > Scheduling is non-preemptive.
- > A lightweight process consists of:
 - > Graphics context
 - > Execution stack
 - > Dictionary stack
 - > Operand stack
- > Lightweight processes are good for:
 - > Servicing events.
 - > Managing interactive objects.
 - > Pre-processing local input on behalf of the client.
 - > Performing background processing.
 - > Building interactive graphical user interface toolkits.
 - > Interactive animation.
 - > And many other things too kinky to go into here.

Definition

NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



- > Events
- > NeWS has an event queue, and a clean virtual event mechanism.
- > Input from hardware devices generates events.
- > NeWS processes can generate events.
- > It's easy to simulated input from virtual devices.
- > Coordinates of events reported in the current coordinate system.
- > NeWS processes express interest in events they want to get.
- > Then they loop waiting for and processing such events.
- > NeWS processes can communicate with each other by sending events back and forth.

Definition

Empty rectangular box for definition content.

```

ok .pile @ .return
11111111p
ok .pile @ .define NeWS Extensions to PostScript
11p
ok .pile @ .articulate NeWS Extensions to PostScript
11111111111111111111p
111111111111p
1111111111111111p
ok 0

```

FIRST BACK PAGE **NEXT PAGE** LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

The screenshot shows a NeWS window with a large grey area. In the top left corner, there are two small icons: one labeled 'brillig' and another labeled 'vsn.tam'. In the bottom left corner, there is a terminal window with the following text:

```

ok .pile 0 .return
llp
ok .pile 0 .define NeWS Extensions to PostScript
llp
ok .pile 0 .articulate NeWS Extensions to PostScript
llp
llp
llp
ok

```

- > Canvases
- > Drawing surface.
- > Its own coordinate system.
- > Arbitrarily shaped!!!
- > Shape defined by a PostScript path.
- > Lines, arcs, bezier curves, and conic splines as edges.
- > Holes, and disconnected regions!
- > Shape influences the clipping of graphical output, and the distribution of input events.
- > Useful as arbitrarily shaped targets.
- > NeWS processes can receive input events whenever the mouse enters, leaves, clicks, or moves around in a canvas.
- > Natural to use as animated "sprites", using NeWS processes to periodically blink, move, or paint them.

Definition

FIRST BACK PAGE

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

Object Oriented Programming in NeWS

- > NeWS uses an object oriented programming package.
- > Provides a Smalltalk-like class mechanism.
- > Works in a PostScript laser printer, too!
- > Uses the PostScript dictionary stack to implement inheritance.
- > Each object is an instance of a class defining its behavior.
- > Customize the UI toolkit, by subclassing predefined classes.
- > Save time and reuse code, by building on top of previous work.
- > The NeWS object oriented toolkit implements menus, windows, buttons, cycles, message fields, editable text fields, sliders, scroll bars, scrolling text canvases, terminal emulators, and other objects, entirely in object oriented PostScript.
- > The toolkit resides inside the NeWS server, not in its clients.
- > Clients can share code and data structures in the server.
- > The toolkit does not have to be linked into each client.
- > More responsive interaction, and less network traffic.
- > Modular look and feel.
- > Modify and customize parts of the toolkit, independant of clients that use them.
- > Change the UI without altering, recompiling, or relinking clients.

You can examine the classes defined in the NeWS server, using Bruce Schwartz's Class Browser.

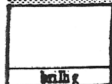
Definition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```

11111111111p
1111111111111p
ok .pile @ .return
111111111p
ok .pile @ .define The Object Oriented Programming Package
11p
ok .pile @ .articulate The Object Oriented Programming Package
11111111111111111111111111111111p
ok 0

```



Date: Sat 12 Dec 1987 17:01:36 EST
From: David Rosenthal <dshr@Sun.COM>
Subject: Extensions for "documentation graphics"
To: xtensions@athena.mit.edu, xpert@athena.mit.edu

There has been some discussion recently of the need to extend X11 to support "documentation graphics". I believe that what people need is, in effect, access to both the X11 and the PostScript (TM Adobe Systems) language imaging models.

The implications of the recent deal between Sun and AT&T are relevant to this debate. As part of the deal, Sun will be supplying to AT&T, and AT&T including in their Unix source licensing program, a merged server supporting both X11 and NeWS protocols. If you are a Unix licensee, you will be getting this code as part of the normal AT&T source distributions, and it will, therefore, be a part of "standard Unix". No license with Sun will be required.

Robin Schauffer will discuss the details of the implementation of the merged server at the X conference at MIT in January. Briefly, it will support:

- Vanilla X11 clients
- Vanilla NeWS clients
- A single window tree accessible to both

Definition

```
1111111111111111111111111111111111p
ok .pile @ .return
1111111111p
ok .pile @ .define The X11/NeWS Merge
11p
ok .pile @ .articulate The X11/NeWS Merge
1111111111111111111111111111111111p
1111111111111111111111111111111111p
ok
```

NET PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



- A single event distribution mechanism accessible to both
- The use of PostScript programs and operators to image onto X11 windows.

The C source code will include:

- X11 protocol interpreter
- PostScript language interpreter, with NeWS extensions
- Window tree and event management core shared by both
- A complete implementation of the high-performance imaging library that supports them both, for memory framebuffers. (This is an improved version of the imaging library that currently supports the NeWS product)

The intention behind this arrangement is to ensure that those who need the PostScript language imaging model will have it available. There will be no reason not to support this capability for those who are Unix licensees, since they will be getting it, already integrated with X11, as part of their Unix source distribution. Almost all significant companies in the computer industry are Unix licensees. I hope that this will reassure those who need "documentation graphics" that the X11 servers they talk to are likely to support the capabilities they need, and that there is no need to design new extensions to address this area.

David.

Definition

```

1111111111111111111111111111111111p
ok .pile @ .return
1111111111p
ok .pile @ .define The X11/NeWS Merge
11p
ok .pile @ .articulate The X11/NeWS Merge
1111111111111111111111111111111111p
1111111111111111111111111111111111p
ok 0

```

FIRST BACK PAGE

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

NeWS HyperTIES is a hypermedia browser for the NeWS window system, under development at the Human Computer Interaction Lab, at the University of Maryland. You're looking at it!

Here are some links to interesting parts of the database to browse.

- > The Space Telescope in Orbit
- > Miscellaneous
- > PopupTarget
- > Scroll
- > Founders
- > AnimatedTarget

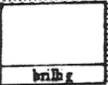
Definition

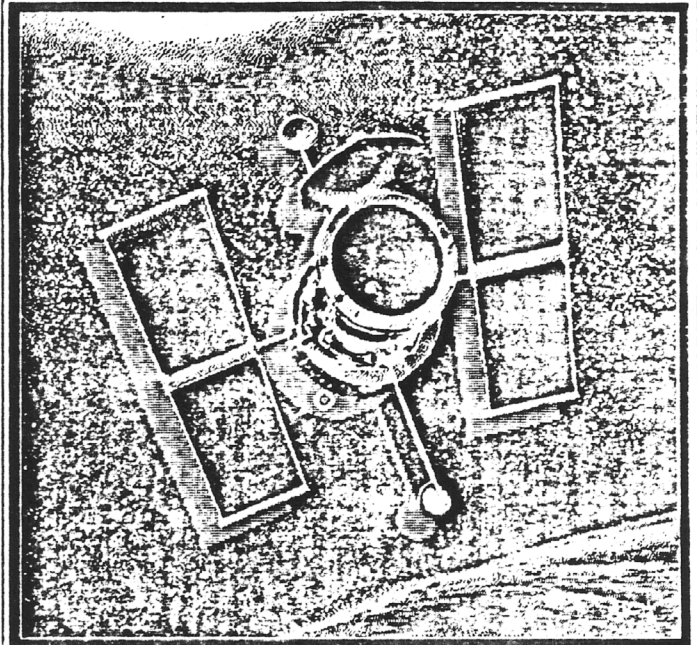
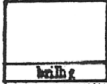
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```

ok .pile @ .return
111111111p
ok .pile @ .return
111111111p
ok .pile @ .define The HyperTIES hypermedia browser
111p
ok .pile @ .articulate The HyperTIES hypermedia browser
111111111111111p
ok

```





Diagram

Introduction

```

ok .pile @ .articulate The HyperTIES hypermedia browser
11111111111111p
ok .pile @ .define The Space Telescope in Orbit
11p
ok .pile @ .articulate The Space Telescope in Orbit
111p
ok .pile @ .define Hubble Space Telescope - Main View
11p
ok

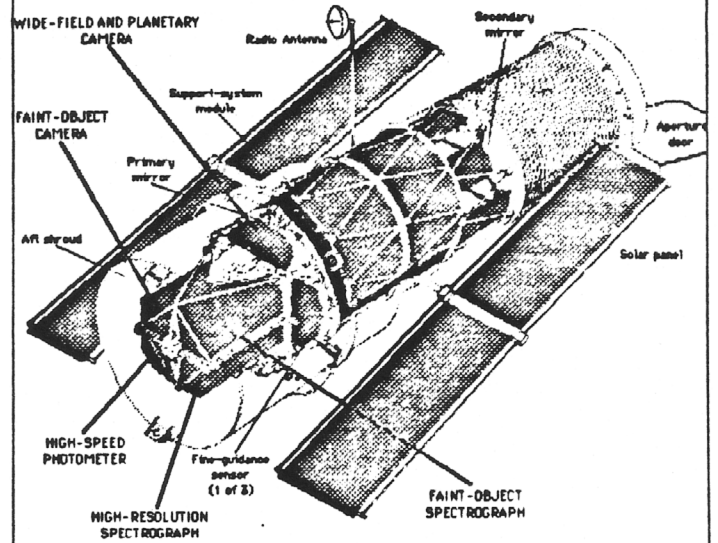
```

Hubble Space Telescope - Main View

A diagram of the telescope with major components labelled.
FULL ENTRY

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

Edwin P. Hubble Space Telescope



Optical Telescope Assembly - diagram

A diagram of the Optical Telescope Assembly.

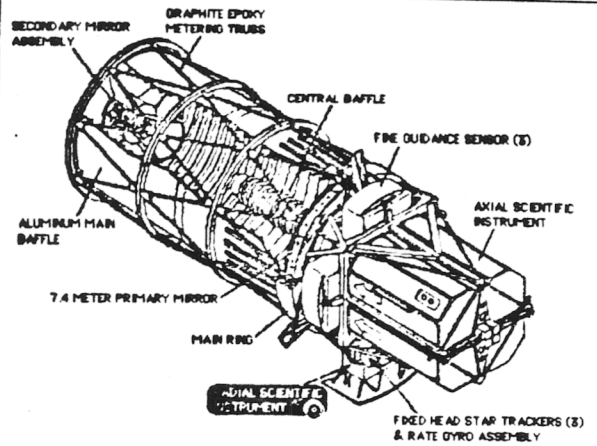
FULL ENTRY

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```

ok .pile 0 .define Hubble Space Telescope - Main View
11p
ok .pile 0 .define Hubble Space Telescope - Main View
11p
ok .pile 0 .articulate Hubble Space Telescope - Main View
11p
ok .pile 0 .define Optical Telescope Assembly - diagram
11p
ok

```



Scientific Instruments

The wide field/planetary and faint object cameras, the faint object and high resolution spectrographs, and the high-speed photometer.

FULL ENTRY

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```

ok .pile @ .define Scientific Instruments
111p
ok .pile @ .articulate Scientific Instruments
11111111111111111111p
ok .pile @ .return
1p
ok .pile @ .define Scientific Instruments
111p
ok

```

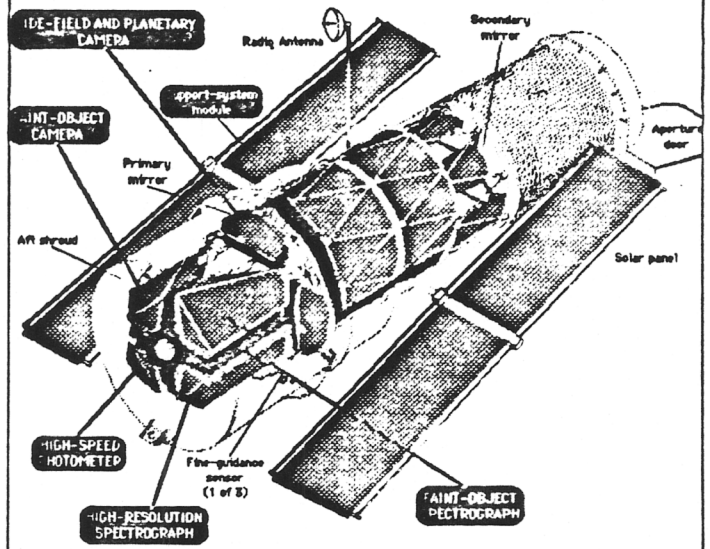

hubble



bereton

Hubble Space Telescope - Main View

Edwin P. Hubble Space Telescope



Optical Telescope Assembly - diagram

A diagram of the Optical Telescope Assembly.

FULL ENTRY

```

ok .pile @ .define Hubble Space Telescope - Main View
11p
ok .pile @ .define Hubble Space Telescope - Main View
11p
ok .pile @ .articulate Hubble Space Telescope - Main View
11p
ok .pile @ .define Optical Telescope Assembly - diagram
11p
ok 0

```

The five scientific instruments, four American and one European, are located behind the primary mirror, at the focal plane, where they can pick up light reflected from the telescope. They are the wide field/planetary camera, the faint object spectrograph, the high resolution spectrograph, the high speed photometer, and the faint object camera, the latter provided by the European Space Agency. In addition, the fine guidance sensors, part of the support systems module, because of their ability to accurately locate stars, could be considered a sixth scientific instrument. Each instrument is housed in a separate module and will draw 110 to 150 watts of power. All are exchangeable during maintenance visits by the Space Shuttle.

Definition

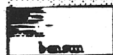
```
ok .pile @ .return
lp
ok .pile @ .define Scientific Instruments
lllp
ok .pile @ .define Scientific Instruments
lllp
ok .pile @ .articulate Scientific Instruments
lllllllllllllp
ok @
```

The five scientific instruments, four American and one European, are located behind the primary mirror, at the focal plane, where they can pick up light reflected from the telescope. They are the **wide field/planetary camera**, the **faint object spectrograph**, the **high resolution spectrograph**, the **high speed photometer**, and the **faint object camera**, the latter provided by the **European Space Agency**. In addition, the **fine guidance sensors**, part of the **support systems module**, because of their ability to accurately locate stars, could be considered a sixth scientific instrument. Each instrument is housed in a separate module and will draw 110 to 150 watts of power. All are exchangeable during maintenance visits by the Space Shuttle.

Definition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```
ok .pile 0 .return
lp
ok .pile 0 .define Scientific Instruments
lllp
ok .pile 0 .define Scientific Instruments
lllp
ok .pile 0 .articulate Scientific Instruments
lllllllllllllp
ok 0
```





Miscellaneous Stuff



```

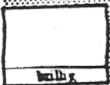
ok .pile @ .return
111111111111111111p
ok .pile @ .define Miscellaneous
11p
ok .pile @ .articulate Miscellaneous
11p
ok .pile @ .define nowhere
11p
ok 0

```

NoWhere

This link leads nowhere!
FULL ENTRY

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



A PopupTarget is an unconstrained shape defined by an outline. When touched by the mouse cursor, the shape pops up. The body includes an argument list and an initialization function. The argument list specifies the the X, Y of the translation vector, the expansion ratio, and the raster image for the popup. The initialization function defines /ItemPath, the stencil of the target, as a NeWS function that creates a path. It can also define /HoleColor, the color of the hole left when the target pops up. HoleColor, which is a NeWS color object, defaults to 25% gray.

Today all the information is in a PostScript form but we will later develop additional classes easier to author, and authoring tools to create objects interactively.

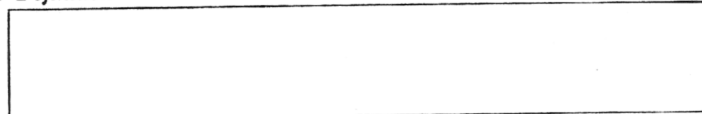
Turn the page to see an example of how to use a PopupTarget!

```

11p
ok .pile @ .return
1111111111111111p
ok .pile @ .define PopupTarget
11p
ok .pile @ .articulate PopupTarget
11111111111111111111p
1111111p

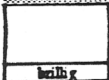
```

C Definition



NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



Target file miscellaneous.bunny.tn0:

```

0.4061 0.694 1lneto
0.408 0.736 1lneto
0.408 0.759 1lneto
0.396 0.61 1lneto
0.384 0.8532 1lneto
0.374 0.886 1lneto
0.396 0.9282 1lneto
0.4061 0.944 1lneto
0.408 0.9673 1lneto
0.408 0.975 1lneto
0.481 0.973 1lneto
0.3941 0.973 1lneto
0.391 0.9873 1lneto
closepath } unit-scale } def }

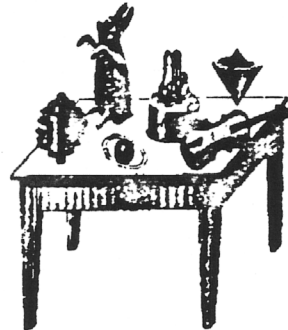
```

In storyboard file example.st0:

```

.picture miscellaneous
.target miscellaneous.bunny
nowhere

```



```

11111111111111111111p
ok .pile @ .define PopupTarget
11p
ok .pile @ .articulate PopupTarget
111111111111111111111111p
11111111p
ok .pile @ .define nowhere
11p
ok

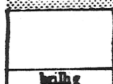
```

NoWhere

This link leads nowhere!
FULL ENTRY

FIRST BACK PAGE

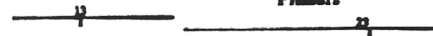
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



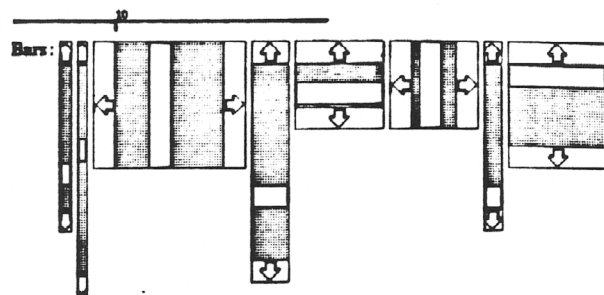
Root Gray:

Life Support

Phasers



Shields



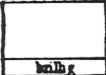
Here are some Magic... Cookies...
You can enter a line of text here:

File: /bensun/don/

forth ?know if honk else forth learn then

```
ok .pile @ .define nowhere
llp
ok .pile @ .return
llp
ok .pile @ .define Scroll
llp
ok .pile @ .articulate Scroll
llp
ok
```

Definition



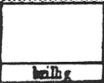
```

ok .pile @ .articulate Scroll
11111111p
ok .pile @ .return
11111111111111p
ok .pile @ .define Founders
111p
ok .pile @ .articulate Founders
1111p
ok

```

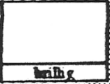
Definition

Empty rectangular box for definition content.



Definition

```
ok .pile @ .articulate Scroll
11111111p
ok .pile @ .return
11111111111111p
ok .pile @ .define Founders
111p
ok .pile @ .articulate Founders
1111p
ok 0
```



```

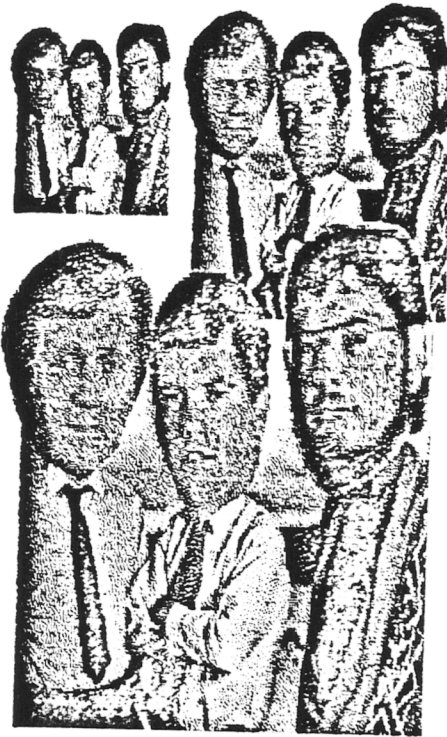
ok .pile @ .articulate Scroll
11111111p
ok .pile @ .return
11111111111111p
ok .pile @ .define Founders
111p
ok .pile @ .articulate Founders
1111p
ok

```

Definition

Empty rectangular box for the definition of the term.

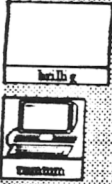
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



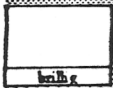
Definition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```
ok .pile B .articulate Scroll
11111111p
ok .pile B .return
11111111111111p
ok .pile B .define Founders
111p
ok .pile B .articulate Founders
1111p
ok
```



These is still too gross to document, but here are some to try out...



```
ok .pile @ .articulate Founders
1111p
ok .pile @ .return
1111111111111111p
ok .pile @ .define AnimatedTarget
11p
ok .pile @ .articulate AnimatedTarget
111p
ok 0
```

Definition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

These is still too gross to document, but here are some to try out...

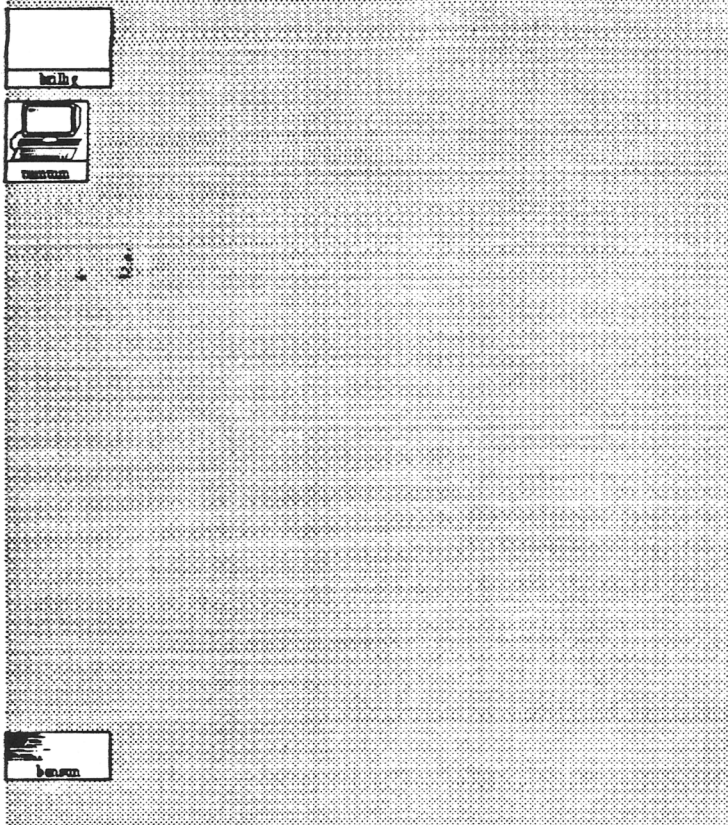


Definition

```

ok .pile @ .articulate Founders
1111p
ok .pile @ .return
1111111111111111p
ok .pile @ .define AnimatedTarget
11p
ok .pile @ .articulate AnimatedTarget
111p
ok
  
```

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



Things to show in a demo of UniPress Emacs. (NeMACS)

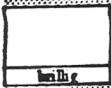
- > Multiple frames
- > Tab windows
- > Shell window
- > PostScript shell debugger window
- > Directory editor
- > Text selection
- > Local rubber banding
- > Selected newlines appear rounded
- > Edit/Execute PS code
- > Menus
- > Font menu
- > Color menu
- > Describe key, bind-to-key
- > Menu compiler
- > Control panels
- > Buttons
- > Scroll bar
- > Control panel compiler
- > User Interface styles
- > Window classes
- > Menu classes

```

ok .pile @ .return
11111111111111p
ok .pile @ .return
11111111p
ok .pile @ .define The UniPress Emacs Text Editor
11p
ok .pile @ .articulate The UniPress Emacs Text Editor
11111111111111111111111111111111p
ok 0
  
```

Definition

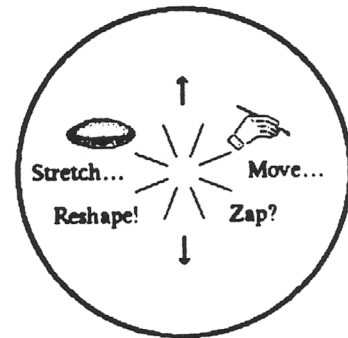
[Empty rectangular box for definition]



How to Choose with Pie Menus

Don Hopkins
University of Maryland
Human Computer Interaction Lab

Jack Callahan
University of Maryland
Heterogeneous Systems Lab



C Definition

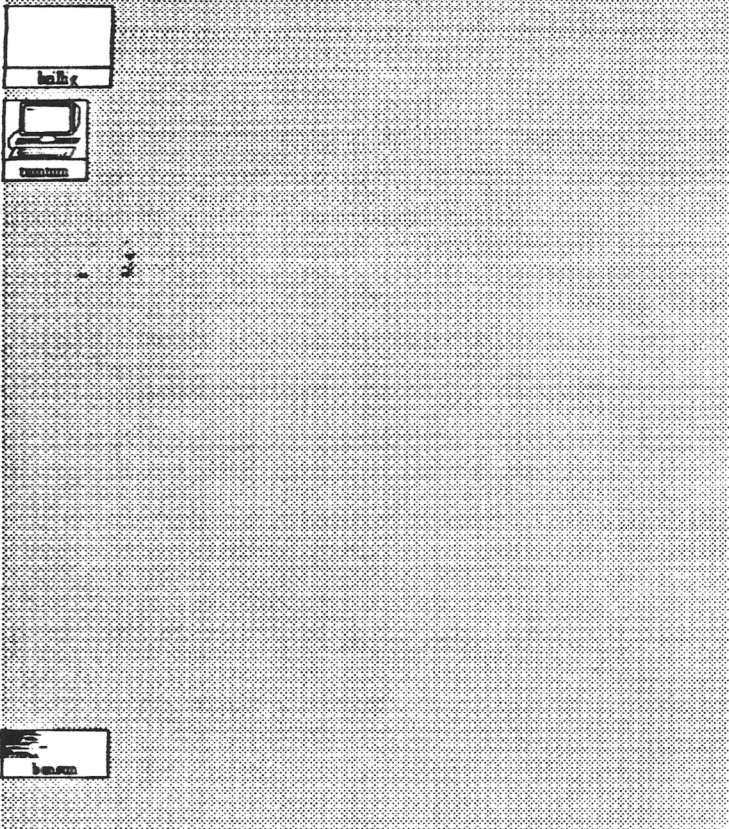
```

11111111111p
111111111111111p
11111111111p
1111111111111111111p
11111111111p
111111111111111p
111111111111111p
11111111111p
ok 0

```

NEXT PAGE **LAST**

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



Pie menus have their choices positioned in a circle around the menu center.

Pressing a mouse button pops up a menu, with the cursor initially located in a small inactive region at the menu center. £

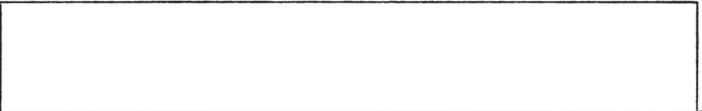
Each choice is adjacent to the cursor, but in a different direction.

Moving the cursor in the direction of one of the choices highlights its label.

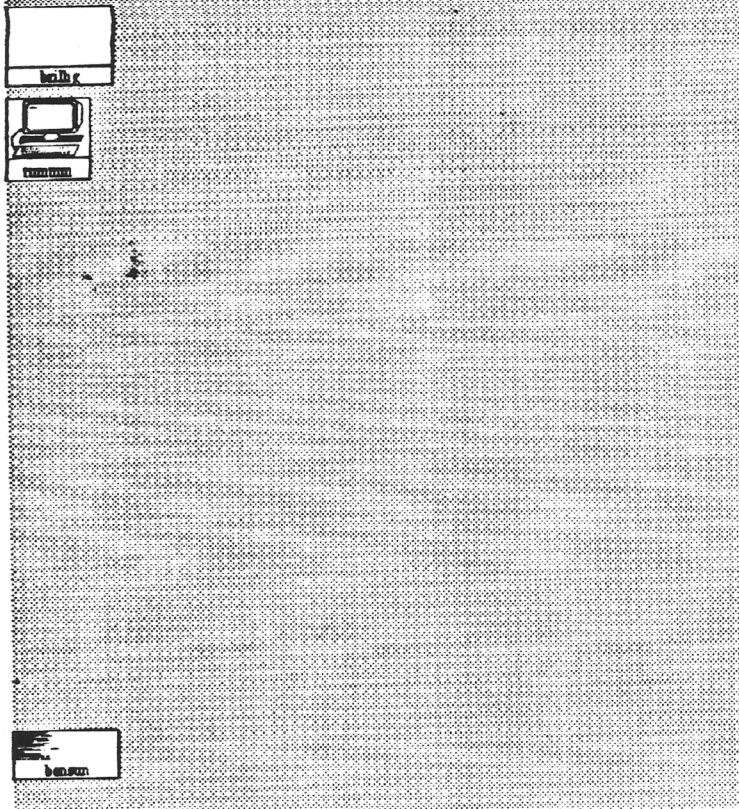
Clicking the mouse button selects the currently highlighted item.

```
1111111111p
111111111111p
1111111111p
11111111111111p
1111111111p
111111111111p
111111111111p
1111111111p
111111p
ok
```

C Definition



FIRST BACK PAGE **NEXT PAGE** LAST
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



Selection is defined by the direction of relative cursor motion between button clicks.

The selection accuracy becomes more precise as the cursor moves further away from the menu center.

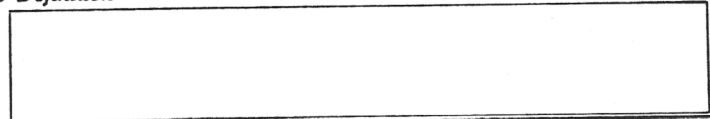
The distance may also serve as a parameter to the choice.

```

11111111111p
1111111111111p
1111111111p
111111111111111p
1111111111p
1111111111111p
1111111111111p
1111111p
ok

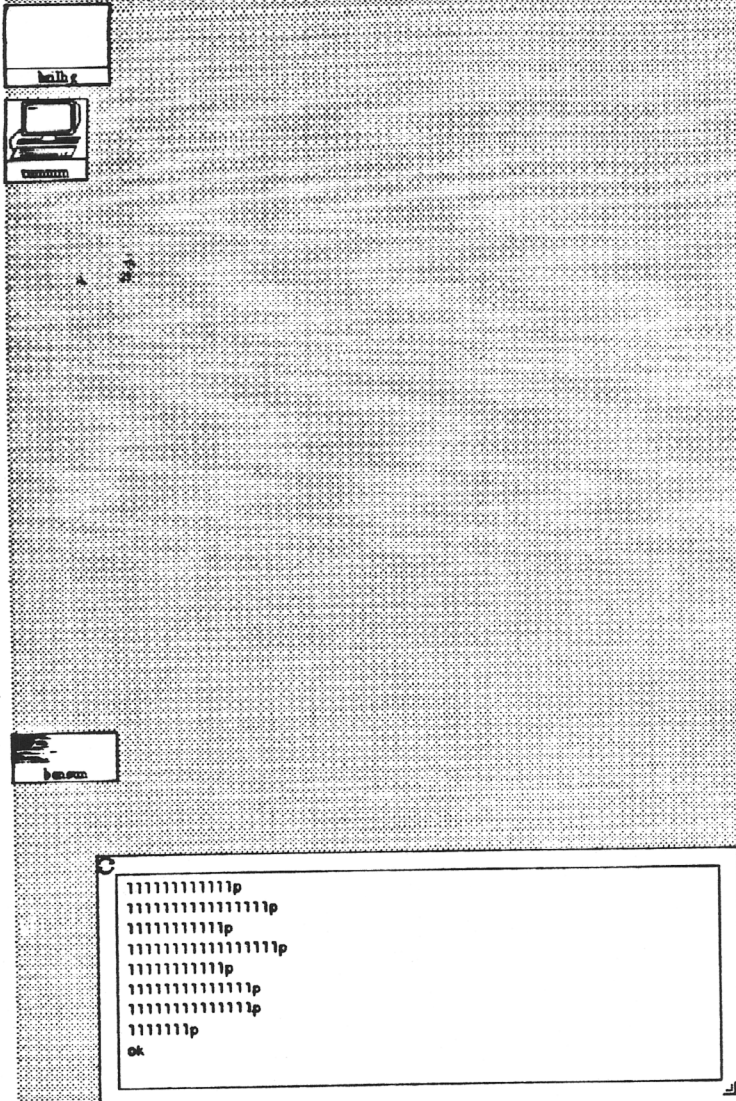
```

Definition



FIRST BACK PAGE **NEXT PAGE** LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

The circular layout of a pie menu is very appropriate for certian applications:

Spatially oriented items can be placed in their corresponding directions.

[Compass Menu] [Binary Tree Menu]

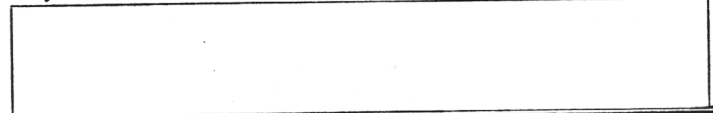
Pairs of complementary items can be placed in opposite directions.

[Confirmation Menu] [Zoom Menu]

Other natural and intuitive arrangments are possible.

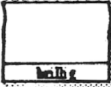
[Week Days Menu] [Hour Menu]

C Definition



FIRST BACK PAGE NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

The circular layout of a pie menu is very appropriate for certain applications:

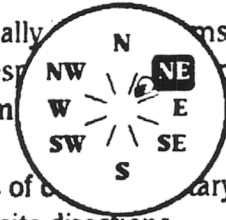
Spatially related items can be placed in their corresponding directions.

[Command Menu] [Secondary Tree Menu]

Pairs of related items can be placed in opposite directions.

[Confirmation Menu] [Zoom Menu]

Other natural and intuitive arrangements are possible. [Week Days Menu] [Hour Menu]



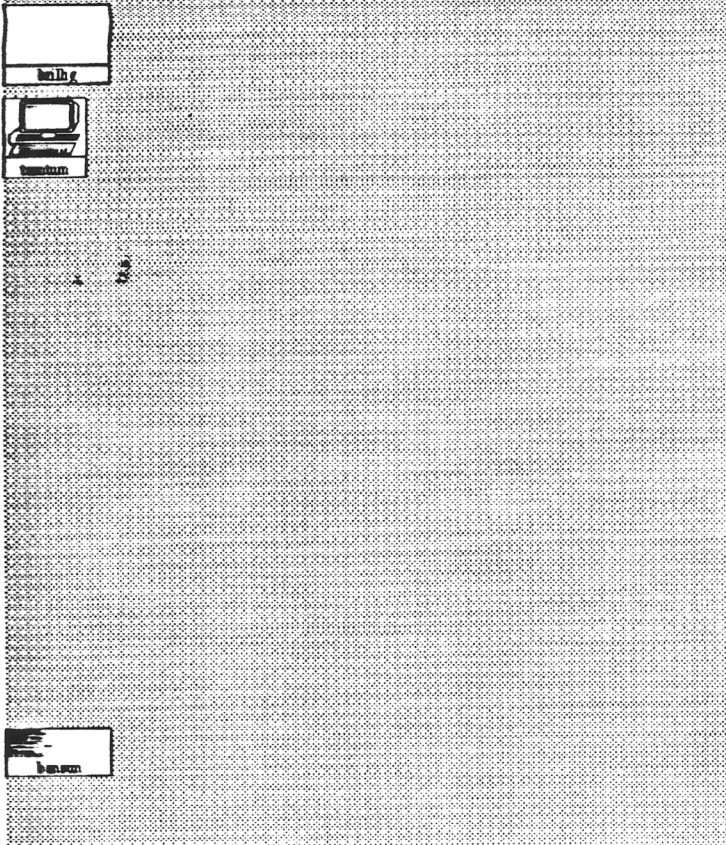
```
1111111111p
11111111111111p
1111111:11p
1111111111111111p
1111111111p
11111111111111p
11111111111111p
1111111p
ok
```

Definition

[Empty text area]

FIRST BACK PAGE NEXT PAGE LAST

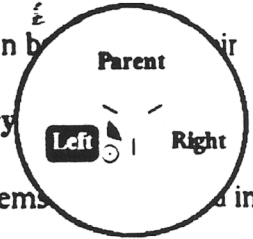
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

The circular layout of a pie menu is very appropriate for certian applications:

Spatially oriented items can be accessed in corresponding directions.
[Compass Menu] [Binary]



Pairs of complementary items can be arranged in opposite directions.
[Confirmation Menu] [Zoom Menu]

Other natural and intuitive arrangments are possible.
[Week Days Menu] [Hour Menu]

```

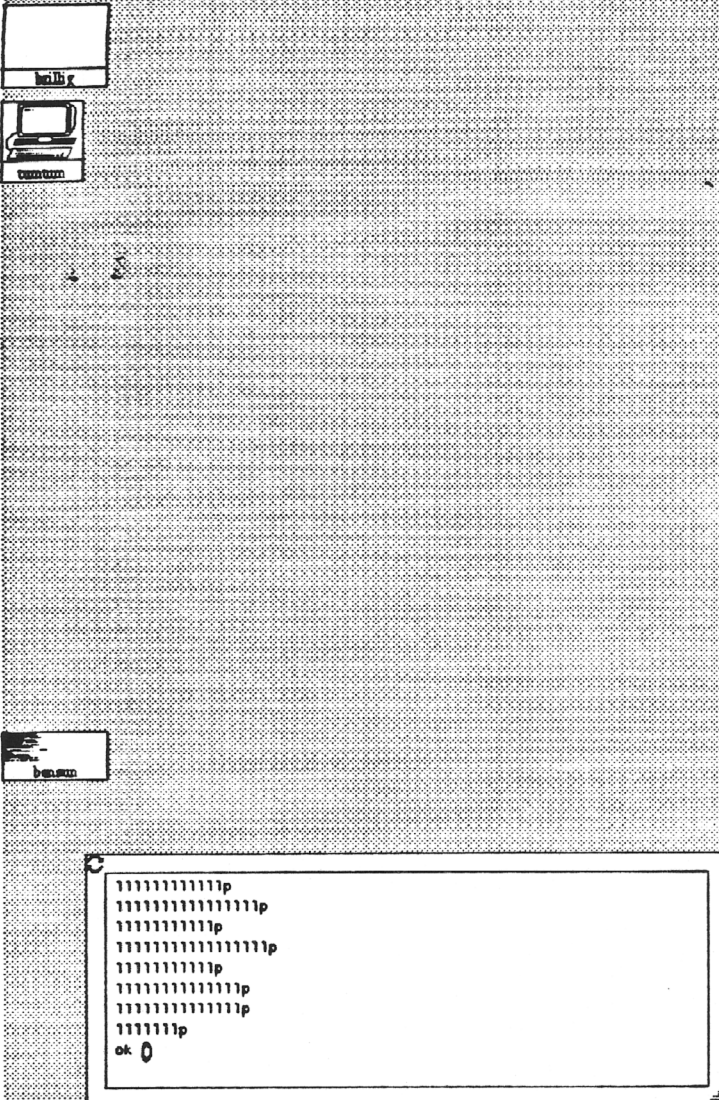
1111111111p
11111111111111p
1111111111p
1111111111111111p
1111111111p
11111111111111p
11111111111111p
11111111111111p
11111111p
ok 0

```

Definition

FIRST BACK PAGE NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

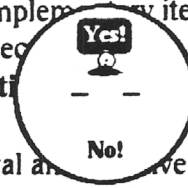
The circular layout of a pie menu is very appropriate for certain applications:

Spatially oriented items can be placed in their corresponding directions.

[Compass Menu] [Binary Tree Menu]

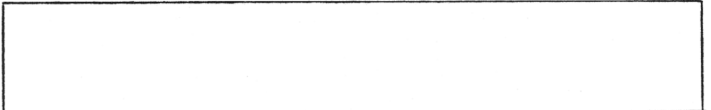
Pairs of complementary items can be placed in opposite directions.

[Confirmation Menu] [Pop Menu]



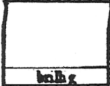
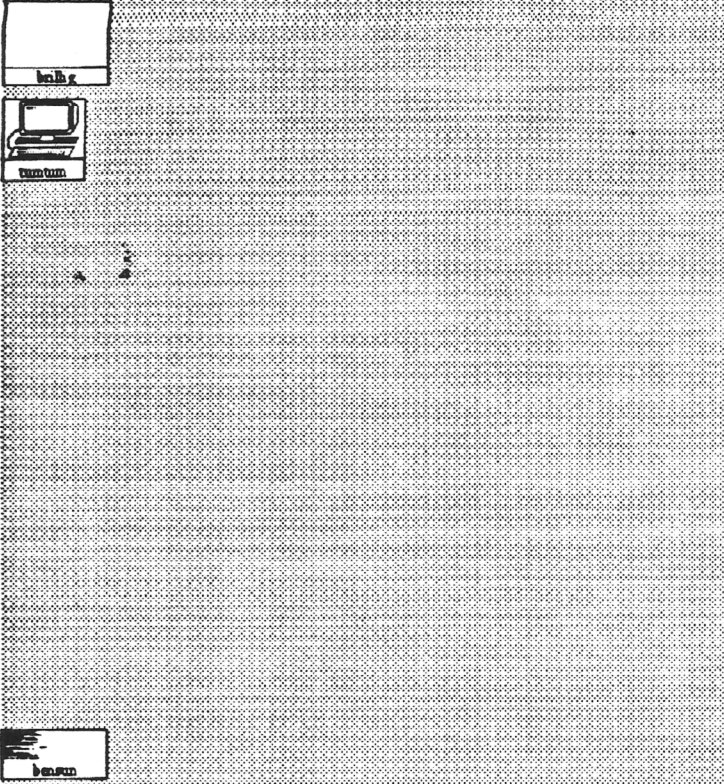
Other natural and effective arrangements are possible. [Week Days Menu] [Hour Menu]

Definition



FIRST BACK PAGE NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

The circular layout of a pie menu is very appropriate for certain applications:

Spatially oriented items can be placed in their corresponding directions.

[Compass Menu] [Binary Tree Menu]

Pairs of complementary items can be placed in opposite directions.

[Confirmation Menu] [Zoom]



Other natural and intuitive arrangements are possible. [Week Days Menu] [Hour Menu]

```

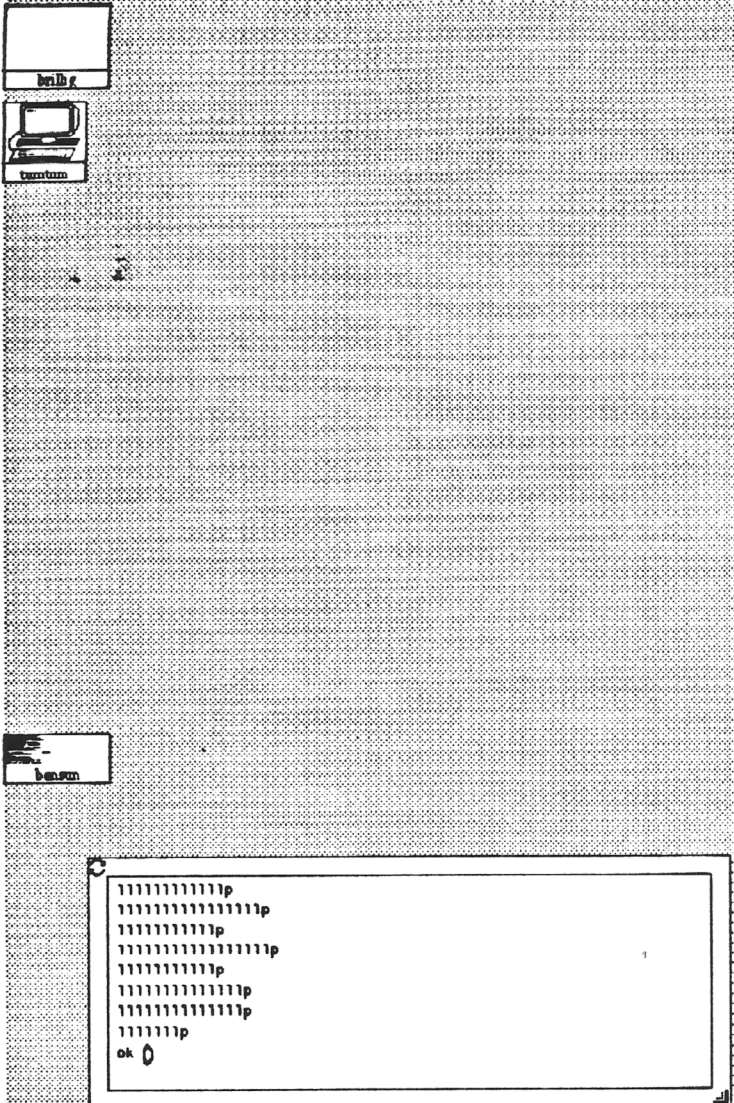
1111111111p
111111111111p
1111111111p
1111111111111111p
1111111111p
111111111111p
111111111111p
1111111p
ok
  
```

Definition

Empty text box for the definition.

FIRST BACK PAGE NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

The circular layout of a pie menu is very appropriate for certain applications:

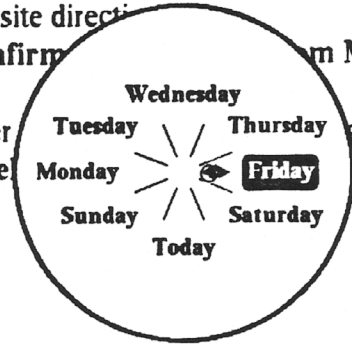
Spatially oriented items can be placed in their corresponding directions.

[Compass Menu] [Binary Tree Menu]

Pairs of complementary items can be placed in opposite directions.

[Confirmation Menu]

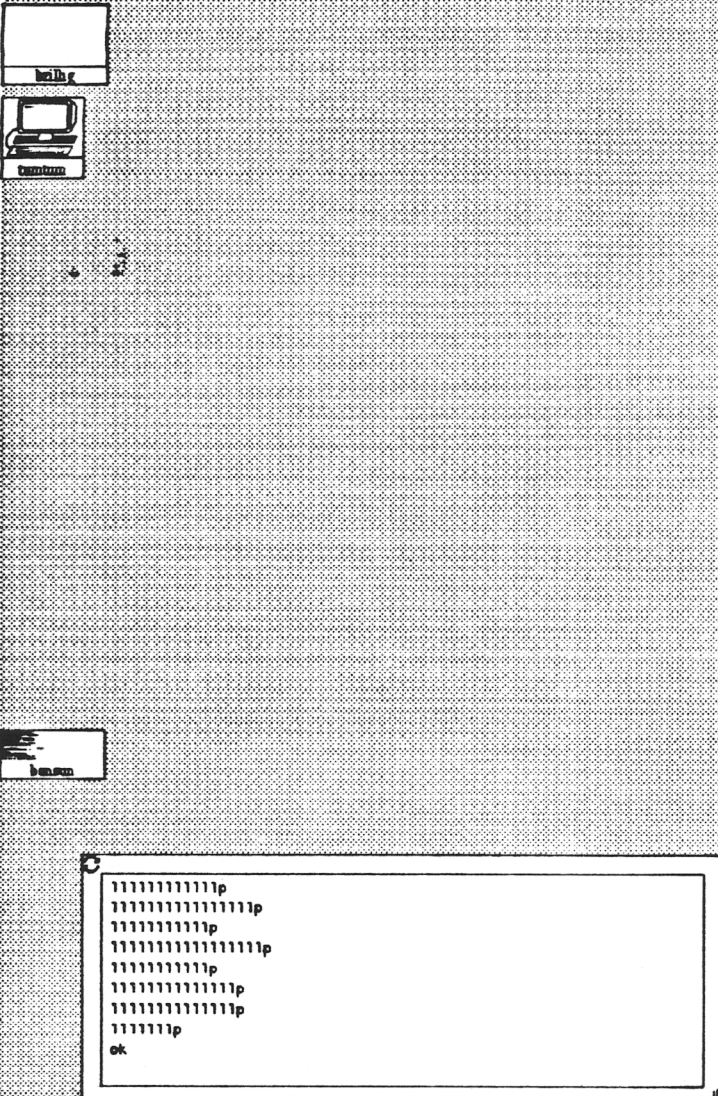
Other segments are possible. [Week Menu]



C Definition

FIRST BACK PAGE NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



You can click the right mouse button on the following targets to pop up example pie menus!

The circular layout of a pie menu is very appropriate for certian applications:

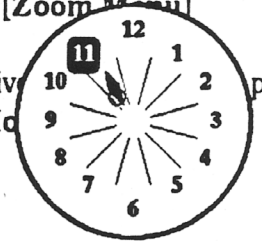
Spatially oriented items can be placed in their corresponding directions.

[Compass Menu] [Binary Tree Menu]

Pairs of complementary items can be placed in opposite directions.

[Confirmation Menu] [Zoom Menu]

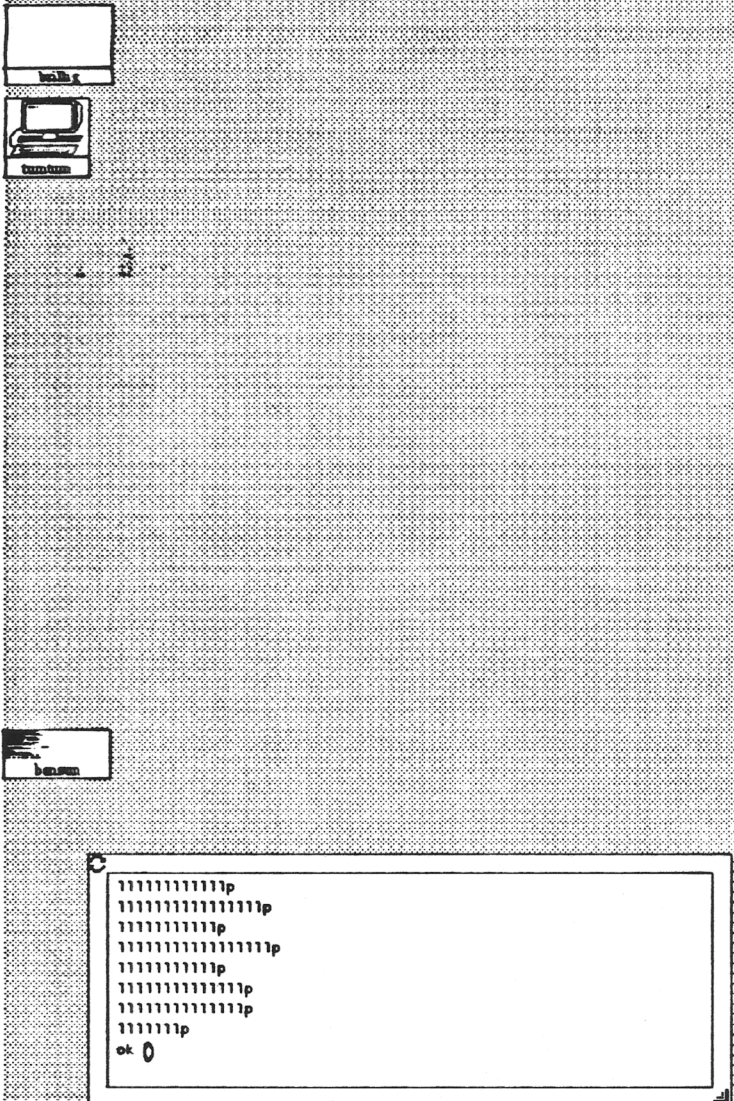
Other natural and intuitive layouts are possible. [Week Days Menu] [H...



Definition

FIRST BACK PAGE NEXT PAGE LAST

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



Selecting without seeing:

Pie menus do not require a lot of visual attention to use, because they are based on direction of relative mouse movement, instead of absolute cursor positioning.

An experienced pie menu user can make selections quite reliably from a familiar, reasonably sized menu, without even looking at the display!

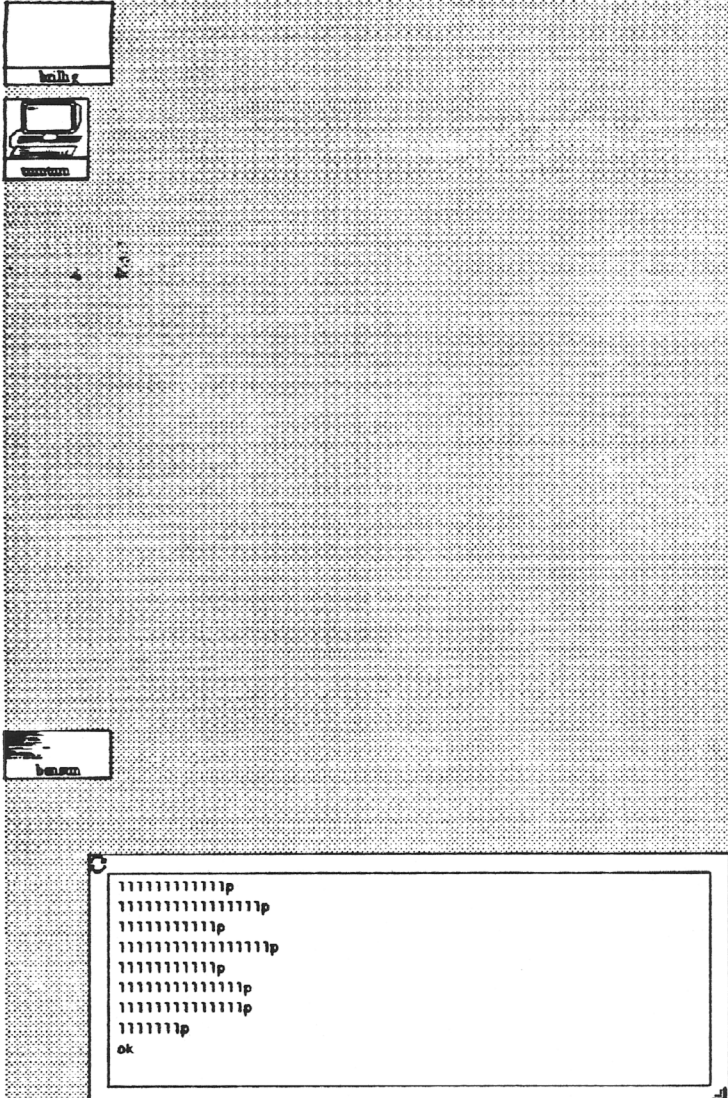
Definition

Empty rectangular box for the definition of pie menus.

```

11111111111p
11111111111111p
11111111111p
1111111111111111p
11111111111p
11111111111111p
11111111111111p
11111111111p
ok 0

```



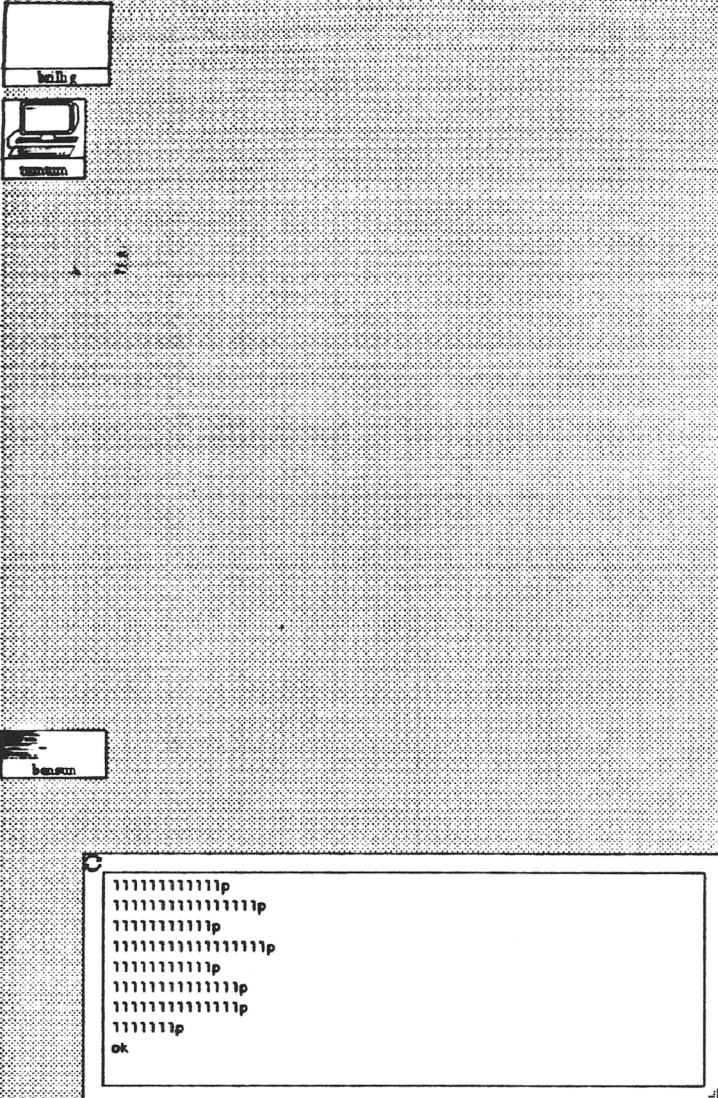
Mouse ahead:

Pie menus work very well with mouse ahead! Mouse ahead is when the user gives commands to the computer with the mouse more quickly than the computer can process, but instead of the computer ignoring the commands, it buffers them, and processes them all in order.

Because it possible to use a pie menu without seeing it, experienced pie menu users are able to mouse ahead through several levels of nested menus without waiting for them to be displayed.

Definition

FIRST BACK PAGE **NEXT PAGE** LAST
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



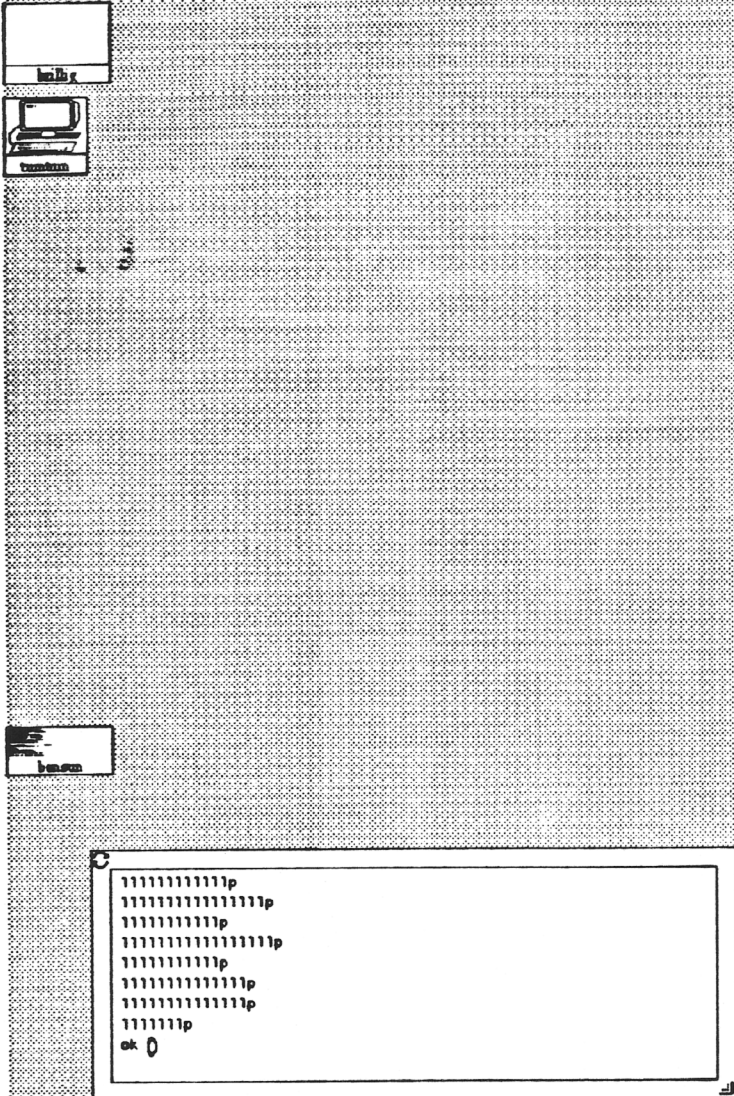
Display suppression:

With mouse ahead display suppression, a menu is not displayed on the screen if the user mouses ahead through it quickly enough.

When the user completely specifies a selection before the computer can display the menu, seeing the menu is no longer necessary, if feedback is not required, or acting on the selection provides feedback. This feature speeds up interaction considerably if the user is fast or the system is unresponsive.

Definition

FIRST BACK PAGE **NEXT PAGE** LAST
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

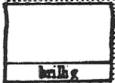


Chunking:

Experienced users can learn to "chunk" selection actions into single gestures they can perform quickly and automatically, utilizing mouse ahead display suppression more often than novice users.

© Definition

FIRST BACK PAGE
RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



A repository of Neat Window System hacks.

-> **Object Browser & Pseudo-Scientific Visualizer**
Jeremy Huxtable's Object Browser, combined with Don Hopkins' Pseudo-Scientific Visualizer.

-> **Mousee**
Don Hopkins' graphical mouse tracker.

-> **KeySee**
Stan Switzer's graphical keyboard tracker.

-> **Eyeballs**
Jeremy Huxtable's "Big Brother" eyeballs.

-> **Melt**
Jeremy Huxtable's screen meltdown feature.

-> **Reagan Bites**
Don Hopkins' animated political statement.

```
11111111111111p
1111111p
ok .pile @ .return
1111111p
ok .pile @ .define NeWS Hacks
11p
ok .pile @ .articulate NeWS Hacks
111111111111111111p
ok
```

Definition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

NeWS Hacks

A repository of Neat Window System hacks.

-> Object Browser & Pseudo-Scientific Visualizer
Jeremy Huxtable's Object Browser, combined with Don Hopkins' Pseudo-Scientific Visualizer.

mouse tracker.

keyboard tracker.

balls.

eature.

lement.

inition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH

```

systemd:
  /push-mouse: array(9)
  /copy: 'copy'
  /newprocessgroup: 'newprocessgroup'
  /adddkbinterests: array(16)
  /RunDemoProgram: array(7)
  /currentflat: 'currentflat'
  /SliderTarget: dictionary(30)
  /PieMenu: dictionary(146)
  /store:
    /MapMenu: array(16)
    /NumbHole: false
    /paint: array(
      /calcreat: array(
        ParentDictArray: array(2)
        /Gap: 9
        /MenuFont: font(Helvetica-Bold12)
        /ChunkProc: array(
          /RetainCanvas?: true
          /MenuArrowWidth: 1
          /gemenuation: array(
            /PaintMenuFrame: array(
              /InstanceVars: dictionary(
                /StrokeSelection: false
                /EnterProc: array(1)
                /UpProc: array(10)
            )
          )
          /PaintMenuValue:
            /SetMenuValue:
              /MenuLine:
                /SliceArrow:
                  /popdo:
                    /lay: 'type'
                    /MouseXDelta: dictionary(
                      /PaintSI: 'eq'
                      /ParentDict: array(17)
                      /reshi: array(13)
                      /show: 'ifeise'
                    )
                  /InstanceVars: dictionary(
                    /SubClasses: array(2)
                    /LiteWithArrow?: true
                    /MouseYDelta: -3
                    /NumbRadius: 14
                    /makeinterests: array(103)
                    /KerProc: array(16)
                    /MenuArrowCap: 1
                    /DamageProc: array(9)
                    /Border: 3
                    /ClassName: '/SimplePieMe
                    /PaintMenuValue: array(7)

```

Editing dictionary(146) /StrokeSelection

Value: false

New: false

Put Null Cut Paste Done

Editing dictionary(146) /MenuFont

Value: font(Helvetica-Bold12)

New: font(Helvetica-Bold12)

Put Null Cut Paste Done

```

1111111111111111p
1111111p
ok .pile 0 .return
111111111p
ok .pile 0 .define NeWS Hacks
11p
ok .pile 0 .articulate NeWS Hacks
11111111111111111111111111111111p
ok 0

```

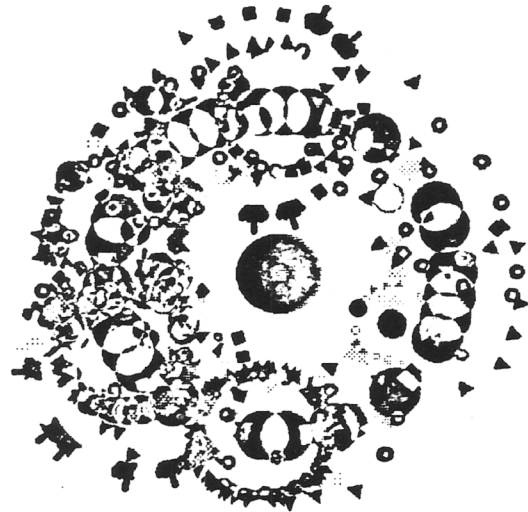
NeWS Hacks

A repository of Neat Window System hacks.

-> Object Browser & Pseudo-Scientific Visualizer
Jeremy Huxtable's Object Browser, combined with Don Hopkins' Pseudo-Scientific Visualizer.

-> Mousec

The NeWS Pseudo-Scientific Visualizer



```

parentDict
  /push-mouse: array(9)
  /copy: 'copy'
  /newprocessgroup: 'newprocessgroup'
  /addkbinterests: array(16)
  /RunDemoProgram: array(7)
  /currentflat: 'currentflat'
  /SliderTarget: dictionary(30)
  /PieMenu: dictionary(146)
  /store:
    /MapMenu: array(16)
    /NumbHole: false
    /paint: array(4)
    /calcreat: array(17)
    /ParentDictArray: array(2)
    /Gap: 9
    /MenuFont: font(Helveti
    /ChunkProc: array(8)
    /RetainCanvas?: true
    /enuArrowWidth: 1
    /getmenueaction: array(8)
    /paintMenuFrame: array(27)
    /InstanceVars: dictionary(6
    /StrokeSelection: false
    /EnterProc: array(1)
    /UpProc: array(10)
    /PaintMenuItems: array(10)
    /SetMenuValue: array(27)
    /MenuLineCap: 1
    /SliceArrows: false
    /popdown: array(29)
    /layout: array(58)
    /MouseXDelta: 0
    /PaintSlice: array(6)
    /ParentDict: dictionary(14
    /reshape: array(27)
    /showat: array(142)
    InstanceVarsDict: dictionary(6
    InstanceVarsExtra: 10
    /SubClasses: array(2)
    /LiteWithArrow?: true
    /MouseYDelta: -3
    /NumbRadius: 14
    /makeinterests: array(103)
    /KerProc: array(16)
    /MenuArrowCap: 1
    /DamageProc: array(9)
    /Border: 3
    /ClassName: /SimplePieM
    PaintMenuValue: array(7)

```

```

111111111111111111p
1111111p
ok .pile 0 .return
111111111p
ok .pile 0 .define NeWS Hacks
11p
ok .pile 0 .articulate NeWS Hacks
111111111111111111111111p
ok 0

```

array[16]


```

systemdx:
  /push-mouse: array(9)
  /copy: 'copy'
  /newprocessgroup: 'newprocessgroup'
  /addkbdinterests: array(16)
  /RunDemoProgram: array(7)
  /currentflat: 'currentflat'
  /SliderTarget: dictionary(30)
  /PieMenu: dictionary(146)
  /store
  /listenpath:
  /flush:
  /go!:
  /canvablow:
  /bouncemenu:
  /TextItem:
  /restore:
  /bindkey:
  /currentlinecap:
  /extend:
  /cvrs:
  /killprocessgroup:
  /dbgkillbreak:
  /hookup

  /MapMenu: array(16)
  /NumbHole: false
  /paint: array(4)
  /calcreat: array(17)
  /ParentDictArray: array(2)
  /Gap: 9
  /MenuFont: font(Helvetica)
  /ChunkProc: array(8)
  /RetainCanvas?: true
  /MenuArrowWidth: 1
  /getmenuaction: array(8)
  /PaintMenuFrame: array(27)
  /InstanceVars: dictionary(64)
  /StrokeSelection: false
  /EnterProc: array(1)
  /UpProc: array(10)
  /PaintMenuItems: array(10)
  /SetMenuValue: array(27)
  /MenuLineCap: 1
  /SliceArrows: false
  /popdown: array(29)
  /layout: array(58)
  /MouseXDelta: 0
  /PaintSlice: array(6)
  /ParentDict: dictionary(14)
  /reshape: array(27)
  /showwat: array(142)
  /InstanceVarsDict: dictionary(64)
  /InstanceVarsExtra: 10
  /SubClasses: array(2)
  /LiteWithArrow?: true
  /MouseYDelta: -3
  /NumbRadius: 14
  /makeinterests: array(103)
  /KerProc: array(16)
  /MenuArrowCap: 1
  /DamageProc: array(9)
  /Border: 3
  /ClassName: /SimplePieM
  /PaintMenuValue: array(7)

```

```

1111111111111111p
1111111p
ok .pile @ .return
11111111p
ok .pile @ .define NeWS Hacks
11p
ok .pile @ .articulate NeWS Hacks
11111111111111111111p
ok

```

NeWS Hacks

A repository of Neat

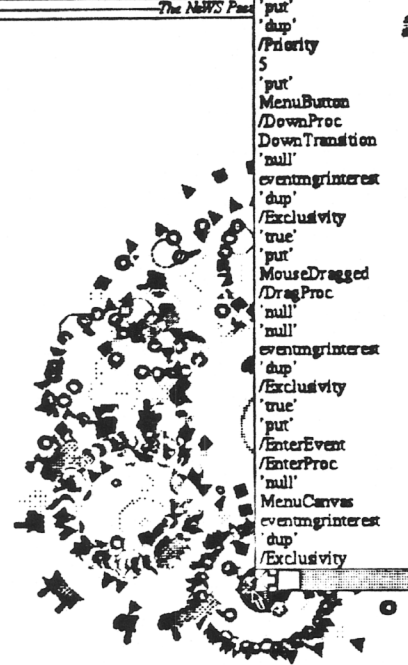
-> Object Browser & Jeremy Huxtable's Object Pseudo-Scientific Visualizer

-> Mousec

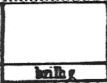
array(103)

- /MenuInterest
- 'mark'
- MenuItemButton
- /UpProc
- UpTransition
- 'null'
- eventmgrinterest
- 'dup'
- /Exclusivity
- 'true'
- 'put'
- 'dup'
- /Priority
- 5
- 'put'
- MenuItemButton
- /DownProc
- DownTransition
- 'null'
- eventmgrinterest
- 'dup'
- /Exclusivity
- 'true'
- 'put'
- MouseDownged
- /DragProc
- 'null'
- 'null'
- eventmgrinterest
- 'dup'
- /Exclusivity
- 'true'
- 'put'
- /EnterEvent
- /EnterProc
- 'null'
- MenuCanvas
- eventmgrinterest
- 'dup'
- /Exclusivity

array(103)



array(103)



```

11111111111111111111p
11111111p
ok .pile @ .return
11111111p
ok .pile @ .define NeWS Hacks
11p
ok .pile @ .articulate NeWS Hacks
11111111111111111111111111p
ok 0

```

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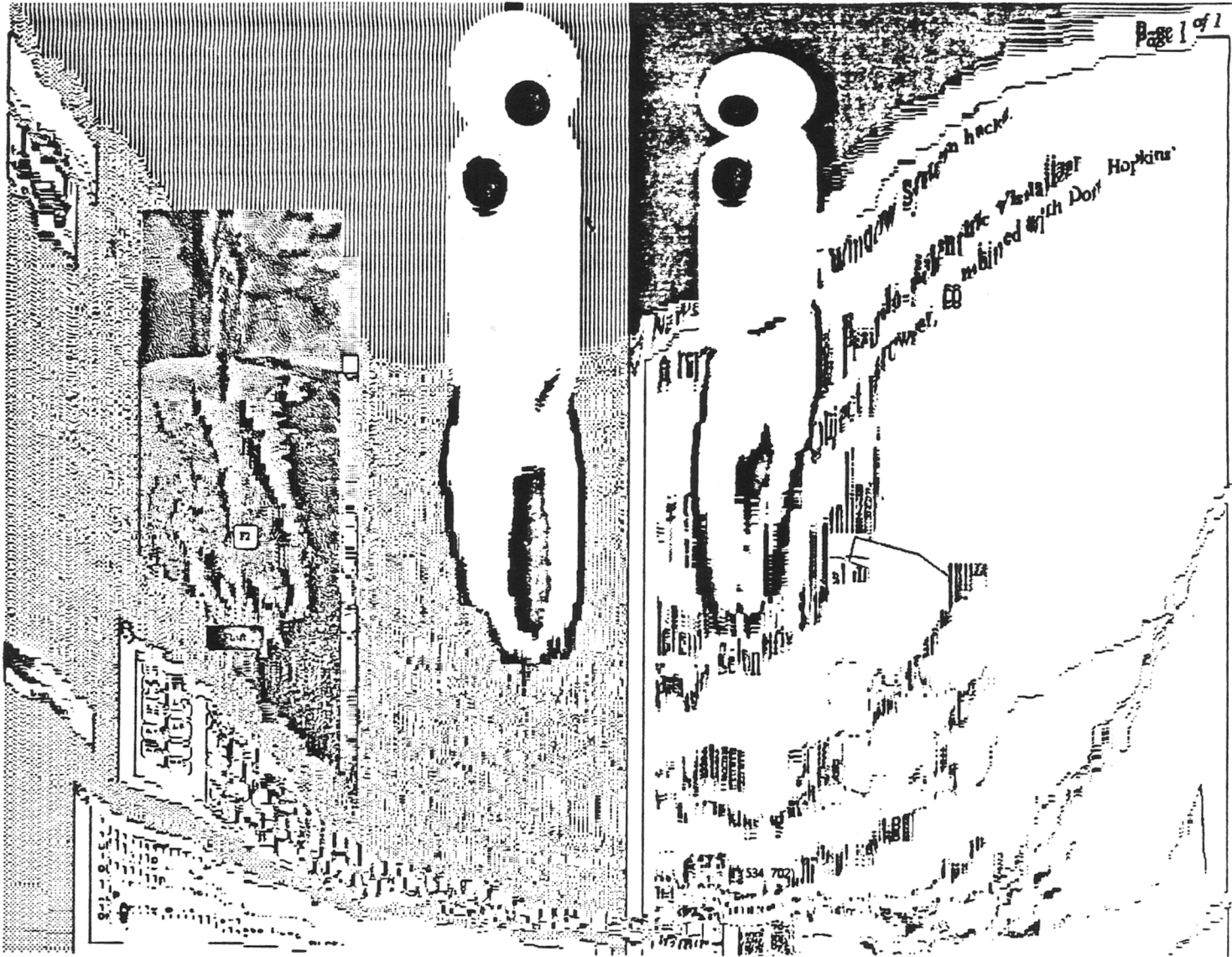
-> Eyeballs
Jeremy Huxtable's "Big Brother" eyeballs.

-> Melt
Jeremy Huxtable's screen meltdown feature.

-> Reagan Bites
Don Hopkins' animated political statement.

Definition

RETURN TOPICS INDEX HOME SHOW QUIT REFRESH



Window system
combined with

THE...

72

534 702


Hopkins

```

eye.ps      paint.ps      viewport.ps
fish.ps     panel.ps      visualize.ps
floorNEW.ps panel.ps      windowlasses.ps
gadgets.ps  picomnu.ps    windowlasses.ps.CKP
garden.ps  pm.ps        zippy.ps
gks.ps     psdome.ps
[fontuu:/usr/emacs/lib/emacs/ps 22]
psh eye.ps
[fontuu:/usr/emacs/lib/emacs/ps 23]

```

Frame 1: shall



Frame 5: newstalk.st0

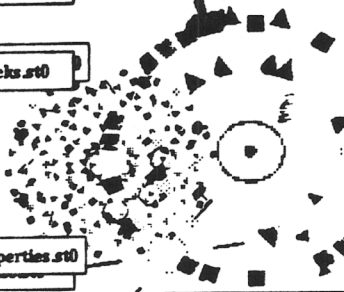
```

title
NEWS Hacks

.synonyms
hacks
kludges
Rube Goldberg devices

```

Frame 11: hacks.st0



```

title
NEWS HyperTIES

-r-r-r-r-r- 1 don 32880 May 6 2
-r-r-r-r-r- 1 don 155 Jul
-r-r-r-r-r- 1 don 9598 Feb
-r-r-r-r-r- 2 don 1824
-r-r-r-r-r- 1 don 11274
-r-r-r-r-r- 1 don 1127
-r-r-r-r-r- 1 don 5

```

Frame 10: hyperties.st0

/benusvdon/n

/benusvdon/n/NEWS

Frame 8: environment.st0

```

title
The NEWS Interactive Program

.synonyms
NEWS environment
NEWS Interactive Programming

.definition
The NEWS window server is a g
programming environment.

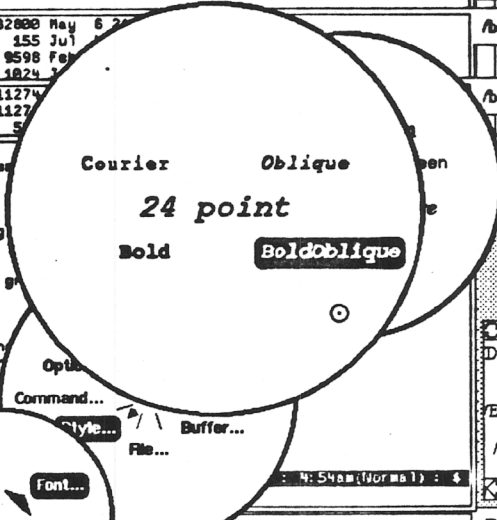
.contents
- The PostScript Programin
- The Object Oriented Progr
- X11/NEWS .nl

```

Courier Oblique

24 point

Bold BoldOblique



```

v1
[/execfile /bye
randomos random eq
false
hp zip zip zip zip zip zip zip zip zip zip zip zip zip zip zip zip zip
she : [None] : 4:38am(listener-mode) : 86%

```

Frame 12: psh

brllg

benun

/EmacsParentCanvas

/BottomCanvas : canvas(1152x900,r

/CanvasAbove : null

/CanvasBelow : null

/Color : false

EventsConsumed : /AllEvents

/Interests : array[3]

/Mapped : true

/EmacsParentCanvas : canvas(1152x900,r

/MainMenu : dictionary[98]

/MainMenu

/MapMenuEvent : null

/MapShortDelay : 0.0041

/MenuActions : array[8]

/MenuCanvas : canvas(235x235,u

/MenuEventMgr : null

/MenuHeight : 234

/MenuInterests : array[11]

/MenuItems : array[8]

/MenuKeys : array[8]

Value: (Mode...)

New: (Mode...)

Put Null Cut Paste

```

/Pile
/Can: canvas(544x544)
/ContentsPileID: 0
/ControlsPileID: 2
/DefinedTID: null
/DefinitionPileID: 1
/FilePos: array[4]
/Page: dictionary[42]
/PageHeight: 544
/PageWidth: 646
/ParentPileID: 0
/PileID: 0
/Win: dictionary[98]

```

```

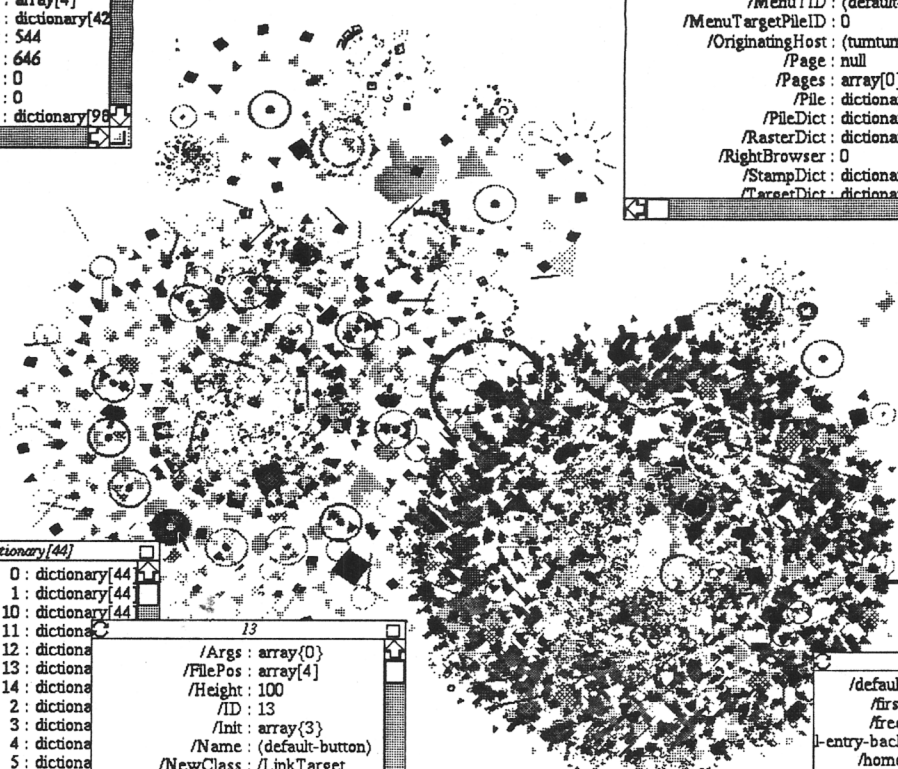
dictionary[66]
/FontName: (times)
/FontSize: 24
/FontStyle: (normal)
/LastSelectionTime: 0
/LastTID: (full-entry-background.0)
/LeftBrowser: 0
/MenuRef: (Space Telescope Scier
/MenuTID: (default-button.7)
/MenuTargetPileID: 0
/OriginatingHost: (tuntum.cs.umd.edu)
/Page: null
/Pages: array[0]
/Pile: dictionary[30]
/PileDict: dictionary[20]
/RasterDict: dictionary[20]
/RightBrowser: 0
/StampDict: dictionary[44]
/TargetDict: dictionary[98]

```

five six

And this is More! And

Pat Buchannen



```

dictionary[44]
0: dictionary[44]
1: dictionary[44]
10: dictionary[44]
11: dictionary[44]
12: dictionary[44]
13: dictionary[44]
14: dictionary[44]
2: dictionary[44]
3: dictionary[44]
4: dictionary[44]
5: dictionary[44]
6: dictionary[44]
7: dictionary[44]
8: dictionary[44]
9: dictionary[44]

```

```

13
/Args: array[0]
/FilePos: array[4]
/Height: 100
/ID: 13
/Init: array[3]
/Name: (default-button)
/NewClass: /LinkTarget
/Obj: null
/ParentDict: dictionary[30]
/ParentDictArray: array[3]
/Ref: (nowhere)
/Serial: 16
/TID: (default-button.13)
/Width: 200
/X: 291
/Y: 176

```

```

dictionary[98]
/default-button.9: dictionary[44]
/first-button.0: dictionary[44]
/free-button.0: dictionary[44]
/home-button.0: dictionary[44]
/index-button.0: dictionary[44]
/last-button.0: dictionary[44]
/next-button.0: dictionary[44]
/quit-button.0: dictionary[44]
/refresh-button.0: dictionary[66]
/return-button.0: dictionary[66]
/show-background.0: dictionary[66]
/show-background.1: dictionary[66]
/show-background.2: dictionary[66]

```

```

/quit-button.0
/ItemEventManager: null
/ItemHeight: 15
/ItemInitialValue: null
/ItemPaintedValue: null
/ItemParent: canvas(544x544)
/ItemPath: array[1]
/ItemValue: null
/ItemWidth: 36
/NotifyUser: null
/ParentDict: dictionary[98]
/ParentDictArray: array[3]
/Ref: (!OptionQuit)
/ReshapeNeeded?: false
/TID: (quit-button.0)

```

QUIT

```

setenv REL $doc/V2.22 res
setenv INS $doc/D.illustrations
setenv REF $man/D.refman
setenv IUS $man/D.users

setenv PSLIBDIR $ps/

```

Frame 1: .cshrc

dictionary(20)

Emacs

/B: array(6)
/F: array(3)
OriginatingHost: (bensun.cs.un...
/RDC: array(9)
...
/OriginatingHost

/9x15: font(9x151)
/palencia: font(palencia)
/dali: font(dali)
/black-shadow: font(black-shadow)
/Cyrillic: font(Cyrillic)
/Symbol-Medium: font(Symbol-Medium)
/Kingsbury: font(kingsbury1)
/cartoon: font(cartoon1)
/micr25: font(micr251)
/Courier-Bold: font(Courier-Bold1)
/Times-BoldItalic: font(Times-BoldIta...
/kiltercn: font(kiltercn1)
/isengard: font(isengard1)
/bauhaus: font(bauhaus1)
/Courier-Oblique: font(Courier-Obliq...
/Times-Roman: font(Times-Roman...
/kilterd: font(kilterd1)
/palatini: font(palatini1)

```

MenuPSBegin
EmacsDict begin

/firstword {
  ( ) search {
    exch pop exch pop
  } if
} def

/sendprefixarg { % arg => -
  [ /BUCKY 27 4 -1 roll 10 string cvs ] menustring
} def

/prefixarg {
  getmenuarg firstword sendprefixarg
} def

/makenumberlabel { % n label => string
  exch
  dup 1 eq (s) ifelse % label n s
} def

```

(menu)emacs-move Editing

SO: /OS

```

'rwbo | grep "\!*"
'a 'egrep -i "\!*" ~$
'ws "rm -i PS.out ; $
'setenv NEWSERVER $

```

Frame 2: .cshrc

```

end21)
ng1)
gon1)
vetica-Med
e-shadow
ten1)
a-wallal)

```

```

if ($?prompt
.cshrc : .csh

```

Frame 3: .cshrc

```

d11)
re serif1)
nd11)
B01)
i1)
d1)
nnal)

```

```

0123456789
!@#$%^&*[]
abcdefghijklmnopq
foo* : [None] : [Normal] : 28%
alias adj18 "adjacentscreens /dev$
alias ena0 "switcher -e 0"
alias ena1 "switcher -e 1"
.cshrc : .cshrc : 2:10am[Normal] $
Aborted.

```

```
head -3 1$
head -3 miscellaneous.bunny.tn0
PopupTarget
"miscellaneous.bunny"
c -.05 -.07 1.4
[benjun:/bensun/guest/ties/doc/obj 15]
```

```
Can't find target name "miscellaneuos.bunny" in master index!
[tmum:/bensun/guest/cties/src/interpreter 21]
!!
format foo
COMMAND: .include
print: You should however notice this ..
[tmum:/bensun/guest/cties/src/interpreter 22]
```

```
.init-index
.init-formatter
.contents-font times normal 18
.button-font times bold 18
.definition-font times italic 16
.controls-font screen bold 18
.pile-pos 576 220
.pile-size 576 680
.new-pile <TIESContentsWindow>
.name-pile <RightBrowser>
.name-pile <LeftBrowser>
.pile-pos 576 100
.pile-size 576 120
.new-pile <TIESDefinitionWindow>
.setup-definition-pile
.use-parent-pile
.pile-pos 576 0
.pile-size 576 100
.new-pile <TIESControlsWindow>
.setup-controls-pile
.use-parent-pile
.setup-content-pile
.top-margin 10
.bottom-margin 10
.left-margin 10
.right-margin 10
.para-indent 50
-- amanda:/bensun/guest/cties/src/interpreter/style_top_style (Fundamental)
.end-controls
```

```
.start-contents
.set-title <Some stuff about the Space Telescope>
```

```
This is a link to foo: .link <foo> .n1
Well, did it work?
```

```
.para
The "Space Telescope Science institute", opened in 1983 and operated
under contract to .link <Goddard Space Flight Center>, will be the center for
all aspects of science activities associated with the "observatory". The
Space Telescope Science Institute will manage the "planning" and
"implementation" of research projects, provide a facility for astronomers
using the "Hubble Space Telescope", and collect, analyze, and disseminate
the data obtained.
```

```
.para
rect 400 200 .picture founders
.target <orbital view - shape telescope> <space telescope>
.target sun3160c.keyboard keyboard
.target miscellaneous.bunny bunny
.target founder.larry larry
.target founder.moe moe
.target founder.curly curly
```

```
.para
-- amanda:/bensun/guest/cties/src/interpreter/fo0 17% fo0 (Fundamental) 4 0
```

This is a link to foo: **foo**
Well, did it work?

The **Space Telescope Science institute** opened in 1983 and operated under contract to **Goddard Space Flight Center** will be the center for all aspects of science activities associated with the **observatory**. The Space Telescope Science Institute will manage the **planning** and **implementation** of research projects, provide a facility for astronomers using the **Hubble Space Telescope** and collect, analyze, and disseminate the data.



Following a nationwide competition, management responsibility for the **Space Telescope Science Institute** was given to the association of Universities for Research in Astronomy (**AURA**), a federation of 17 major U.S. universities. Under this arrangement, the **Institute** is operated by an independent agent outside of **NASA**.

Good grief!

Good grief! What am I doing down here in the definition window?

	NEXT	LAST			
RETURN	TOPICS	INDEX	HOME	SHOW	QUIT
REFRESH	FREE				

A19 terminal emulator

```

title
<Why the Hubble Space Telescope?>

.synonyms <
<Introduction article>
<Intro>
>

.definition <
A short description of the telescope and its purpose.
>

.ram <These are macro definitions:>
.set big <.size 24>
.set top <.top-margin .q1>

.contents <
.top SB
<
.size 18
(.big WHY A SPACE TELESCOPE ?)

Imagine trying to see the clouds from the bottom of a muddy pond.
That is how astronomers describe their view of the stars and planets
through the Earth's atmosphere. As advanced as astronomical
technology has become, our capabilities will be forever limited by the
turbulence and brightness of our atmosphere. Even the finest ground
observatories, such as the one at Mt. Palomar, California, are
restricted by these conditions. In addition, the selective absorption
of the atmosphere, which lets in visible light and radio waves emitted
by stars and planets, but excludes most other forms of energy, limits
our knowledge of celestial bodies.

<
.style italic
Now, for the first time, a ground-sized observatory will be placed in
orbit to view the universe in visible and ultraviolet light unobscured
by Earth's atmosphere.

<
.size 14
Called the "Edwin P. Hubble Space Telescope", the new observatory is a
NASA-wide and international "cooperative effort". Its name honors
Edwin P. Hubble (1889-1953), who discovered that the universe extends
far beyond the Milky Way galaxy.

The "Hubble Space Telescope" will weigh about 25,000 pounds (11,300
kg) and will have a length of 43 feet (13.1 m) and a diameter of 14
feet (4.26 m). Its { .style plain .size 24 major}
components are an "optical telescope
assembly", five "scientific instruments", and a "support systems
module".

To open the universe to observation in infrared, ultraviolet, x-ray,
gamma-ray, and cosmic ray energies, NASA launched numerous satellites,
each helping to explain different processes behind astronomical
phenomena.

But, to date, the value of these orbiting observatories
has been limited by their relatively small size and limited spectral
capability.

<
.size 12
Enter: introduc.td File: introduc/introduc.td

```

WHY A SPACE TELESCOPE ?

Imagine trying to see the clouds from the bottom of a muddy pond. That is how astronomers describe their view of the stars and planets through the Earth's atmosphere. As advanced as astronomical technology has become, our capabilities will be forever limited by the turbulence and brightness of our atmosphere. Even the finest ground observatories, such as the one at Mt. Palomar, California, are restricted by these conditions. In addition, the selective absorption of the atmosphere, which lets in visible light and radio waves emitted by stars and planets, but excludes most other forms of energy, limits our knowledge of celestial bodies.

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Hubble Space Telescope - Main View

A diagram of the telescope with major components labelled.

FULL ENTRY

NEXT PAGE LAST PAGE

RETURN TOPICS INDEX HOME SHOW SEARCH QUIT

On the right: a Hyperties article

On the left: The corresponding storyboard showing scoped variables and macros

.left-margin 1
 .top-margin 1
 .home
 .picture <telescope - main view>
 .target <Main view - shape FOS> <Faint Object Spectrograph - exploded view>
 .target <Main view - shape FOC> <Faint Object Camera - exploded view>
 .target <Main view - shape HRS> <High Resolution Spectrograph - exploded view>
 .target <Main view - word Support System module> <Support Systems Module>
 .target <Main view - word Faint Object Spectrograph> <Faint Object Spectrograph>
 .target <Main view - word High Resolution Spectrograph> <High Resolution Spectrograph>

The Support Systems Module ~ (fig. 7)~ will enclose the ~Optical Telescope Assembly~ and ~scientific instruments~ and will provide all interfaces with the Shuttle orbiter.

The module has four main sections: the light shield, the forward shell, the equipment section, and the aft shroud. These four pieces fit together like stacked canisters to enclose the telescope assembly and scientific instruments.

The ~aperture door~, which also serves as a light shield, is located at the front of the Support Systems Module. The telescope must be

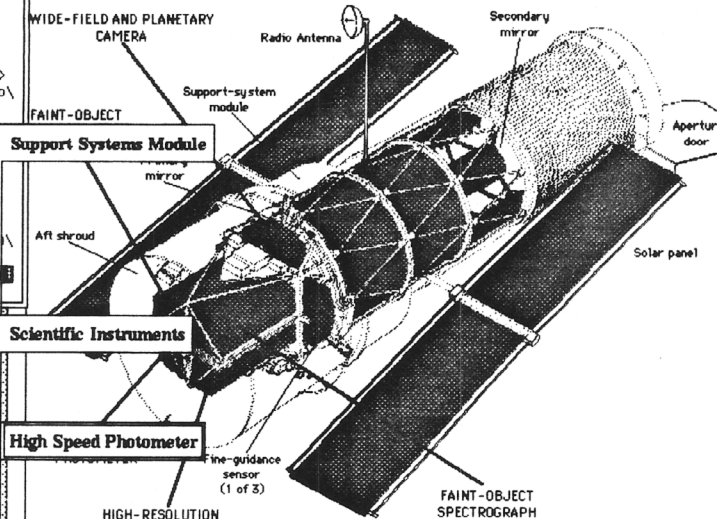
The five scientific instruments, four American and one European, are located behind the primary mirror, at the focal plane, where they can pick up light reflected from the telescope. They are the ~wide field/planetary camera~, the ~faint object spectrograph~, the ~high resolution spectrograph~, the ~high speed photometer~, and the ~faint object camera~, the latter provided by the ~European Space Agency~.

In addition, the ~fine guidance sensors~, part of the ~support systems module~, because of their ability to accurately locate stars, could be considered a sixth scientific instrument.

Each instrument is housed in a separate module and will draw 110 to 150 watts of power. All are exchangeable during maintenance visits by the Space Shuttle.

Hubble Space Telescope - Main View

Hubble Space Telescope



Support Systems Module

Scientific Instruments

High Speed Photometer

High Resolution Spectrograph - exploded view

High Speed Photometer - exploded view

Faint Object Camera - exploded view

Faint Object Spectrograph - Exploded view

Frame 8: front.image.pn0

Frame 9: front.telescope.tn0

Optical Telescope Assembly - diagram

A diagram of the Optical Telescope Assembly.

FULL ENTRY

Articulate Storyboard Edit New Link Picture Define Target

transmit accurate time. Detection of s will be possible, as re of the fine spikes or telescope/highspee/highspee.tn0

front.telescope.tn0 : /rumtum/quest/cthes/database/telescope/orbview/front.te



```

Articulate:      bindpoint: storyboard-point-select
New...:          hyperties-new:
Define:          bindpoint: storyboard-point-define
Edit...:         hyperties-edit:
IPFPA:  Brow...  (menu)hyperties 6: 37am  6%  --More--

```

```

documents/~ched.ps~
A Tour Through a NeWS Application (~ched~)
~James Gosling~

documents/~monterey86.ps~
Object Oriented Programming in NeWS (USENIX Monterey Graphics Conf.)
~Owen Densmore~

documents/~newsclass~
Description of NeWS Class offered by the Sun Education Division
~news-archive~

```

```

demos/~journalpanel.ps~
Bring up a journaling control panel without adding a menu to
~Steve Isaac~

demos/~kanji.ps~
Explore the Kanji font
~Stan Switzer~

demos/~kaysee.ps~
demos STD : /tuum/don/db/contents/demos STD : rstoryboard : 44%

```

```

demos/~eye.ps~
NeWS "Big Brother" implementation
~Jeremy Huxtable~
~Mark Fenty~

demos/~fixedstartup.ps~
Example user.ps file with fixed size window startup
~Paul Haar~

demos STD : /tuum/don/db/contents/demos STD : 6: 37am(storyboard)

```

```

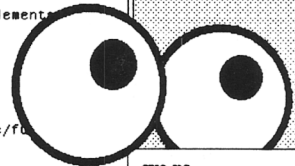
.file news-tape/fun/eye.ps

NeWS "Big Brother" implement
~Jeremy Huxtable~
~Mark Fenty~

no notice
news-makers

.button <Run it!> psh news-tape/fu
Works on MacNeWS R/UX 1.1.
eye.ps STD : /tuum/don/db/files/eye.ps.01

```



eye.ps

Huxtable, Jeremy

Jeremy Huxtable is a contributor to the NeWS tape. **FULL ENTRY**



(menu)hyperties **Browsing**

~Contrib

Directories full

~Documen

~Fixes~

~Games~

~Demos~

~Tools~

~Applica

~Post, Rehm~

~Powers, Mike~

~Pratt, John~

~Reid, Brian~

~Richards, E~

~Roberts, E~

~Rosentha~

~Samuel~

~Schau~

~Schne~

~Schwa~

~Siege~

~Singer~

~Steinb~

~Switz~

~Thaeler,~

~Van Camp, Ken~

~Vincent, Keith~

~Wold, Saul~

~Woods, Don~

NEWS Application

NEWS Docum

NEWS Game

NEWS Tools

NEWS Fixes

Contributors, alphabetically

The NeWS Tap

Articulate

Storyboard

Edit... Link Picture

Define Target

Next Page Prev Page Up Half Page Down

313,254 訪 豐 邦 鋒 飽 鳳 凰

313,266 剖 坊 妨 帽 忘 忙

313,300 棒 冒 紡 肪 膨 謀

313,312 吠 頰 北 僕 卜 墨

313,324 穆 釦 勃 沒 殆 壩

313,336 凡 盆 摩 磨

313,350 每 哩 模 幕

313,362 亦 俣 又 抹

313,374 万 慢 滿

314,246 已 箕 岬 密

314,260 耗 民 眠 務

314,272 棕 婿 娘 冥 名 命 明 盟 迷 銘

314,304 鳴 姪 牝 滅 免 棉 綿 緬 面 麵

314,316 摸 模 茂 妄 孟 毛 猛 盲 網 耗

314,330 蒙 儲 木 默 目 杳 勿 餅 尤 戾

314,342 糝 賞 問 悶 紋 門 匆 也 冶 夜

314,354 爺 耶 野 弥 矢 厄 役 約 藥 詛

314,366 躍 靖 柳 藪 鍵 愉 愈 油 癒

315,240 諭 輸 唯 佑 優 勇 友 宥 幽

.file news-tape/fun/kanji.ps

Explore the Kanji font

~Stan Switzer~

unrestricted

news-makers

.button Run! psh news-tape/fun/kanji.ps

kanji.ps STD : /tuum/don/db/files/kanji.ps

kanji setfont

/C ColB def

nCols { C R moveto /C C ColWidth add store

N maxOrdinal gt {

/More? false store

} {

pair2char show

nextpair

kanji.ps : /tuum/don/db/files/news-tape/fun/kanji.ps : 6: 31

kanji.ps Page 1 of 2

news-tape/fun/kanji.ps

Explore the Kanji font

Stan Switzer

unrestricted

```
eye.ps      paint.ps      viewport.ps
fish.ps     panel         visualize.ps
floorNSW.ps panel.ps     windowclasses.ps
gadgets.ps  pieMenu.ps  windowclasses.ps.CKP
garden.ps   ps.ps       zippy.ps
gks.ps      psdemo.ps

[tuatum:/usr/unimacs/lib/emacs/ps 22]
psh eye.ps
[tuatum:/usr/unimacs/lib/emacs/ps 23]

shell* [None] 4:28am(shell-mode) Bottom
```

```
.title
News Hacks

.synonyms
hacks
kludges
Rube Goldberg devices
```

```
.title
News HyperTIES

-rw-rw-rw- 1 don 32900 May 6 2
-rw-rw-rw- 1 don 155 Jul
-rw-rw-rw- 1 don 9598 Feb
drwxrwxrwx 2 don 1024
-rw-rw-rw- 1 don 11274
-rw-rw-rw- 1 don 1127
-rw-rw-rw- 1 don 5
```

```
.title
The NeWS Interactive Program

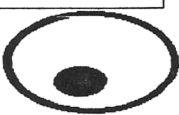
.synonyms
NeWS environment
NeWS Interactive Programming

.definition
The NeWS window server is a g
programming environment.

.contents
~ The PostScript Program
~ The Object Oriented Progr
~ X11/News~ .n1
```

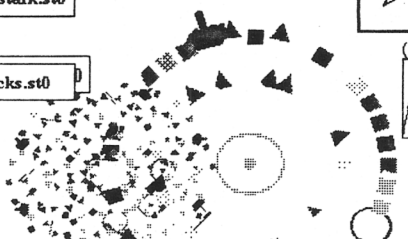
```
v1
[execfile /bye /
random random eq
false
zip zip zip zip zip zip zip zip zip zip zip zip zip zip
psn* [None] 4:38am(listener-mode) 86%
```

Frame 1: shell



Frame 5: newstalk.st0

Frame 11: hacks.st0



Frame 10: hyperties.st0

Frame 8: environment.st0

dictionary[98]

/bensun/don/n

/bensun/don/n/NeWS

Frame 12: psh

brillg

bensun

Courier Oblique

24 point

Bold BoldOblique

Font...

Color...

Command...

Style...

Buffer...

File...

/EmacsParentCanvas

/BottomCanvas : canvas(1152x...

/Canvas Above : null

/Canvas Below : null

/Color : false

Events Consumed : /AllEvents

/Interests : array[3]

/Mapped : true

dictionary[66]

dictionary[44]

dictionary[3150]

dictionary[44]

dictionary[326]

dictionary[44]

Error

DictionaryStack : array[4]

/Error : undefined

/Executing : oops

/ExecutionStack : array[2]

/Interests : array[0]

/OperandStack : array[0]

/Process : process(1636)

/MainMenu

/MapMenuEvent : null

/MapShortDelay : 0.0041

/MenuActions : array[8]

/MenuCanvas : canvas(235x235,u

/MenuEventMgr : null

/MenuHeight : 234

/MenuInterests : array[11]

/MenuItems : array[8]

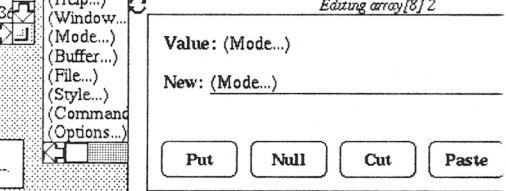
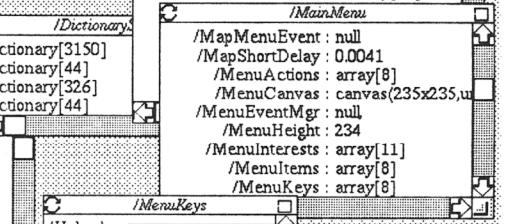
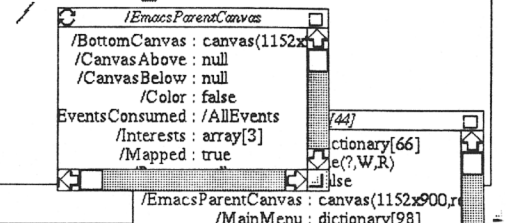
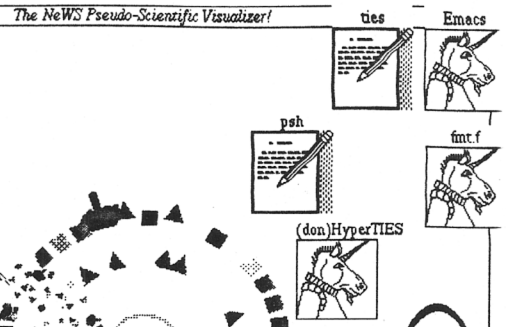
/MenuKeys : array[8]

Editing array[8] 2

Value: (Mode...)

New: (Mode...)

Put Null Cut Paste



Jabberwocky

And as in w
 The Jabber
 Came whiff
 And burbled

One-two! O
 The vorpal bl
 He left it de
 He went gal

"And hast
 Come to n **Bold**
 Oh frabjoi
 He chortled

'Twas brillig
 Bid gyre and
 All mimsy were
 And the mome raths

Lewis Carroll

Helvetica

Hershey

Courier

Times-Roman

18 point

Bolditalic

- Cmd1 _____ exec!
- Cmd2 _____ exec!
- Cmd3 _____ exec!
- Cmd4 _____ exec!

NEXT-> LAST

RETURN REFRESH SHOW QUIT

Jabberwocky

Long time the manxome foe he sought
So rested he by the Tumtum tree
And stood a while in thought.

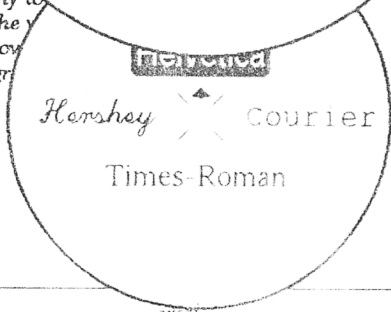
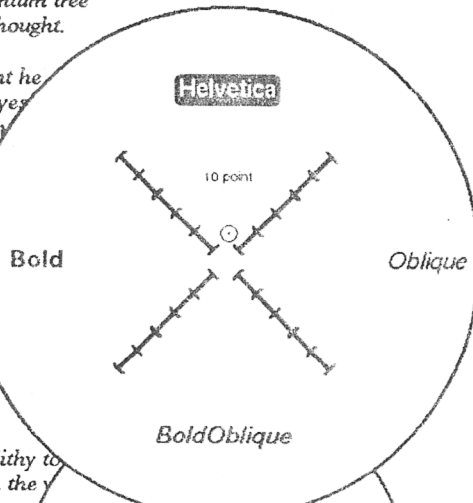
And as in uffish thought he
The Jabberwock with eyes
Came whiffling through
And burbled as it came

One-two! One-two!
The vorpal blade we
He left it dead, and
He went galumphing

"And hast thou slain
Come to my arms, my
Oh frabjous day - call
He chortled in his joy.

'Twas brillig and the slithy to
Did gyre and gymbale in the y
All mimsy were the borgrove
And the mome raths outr

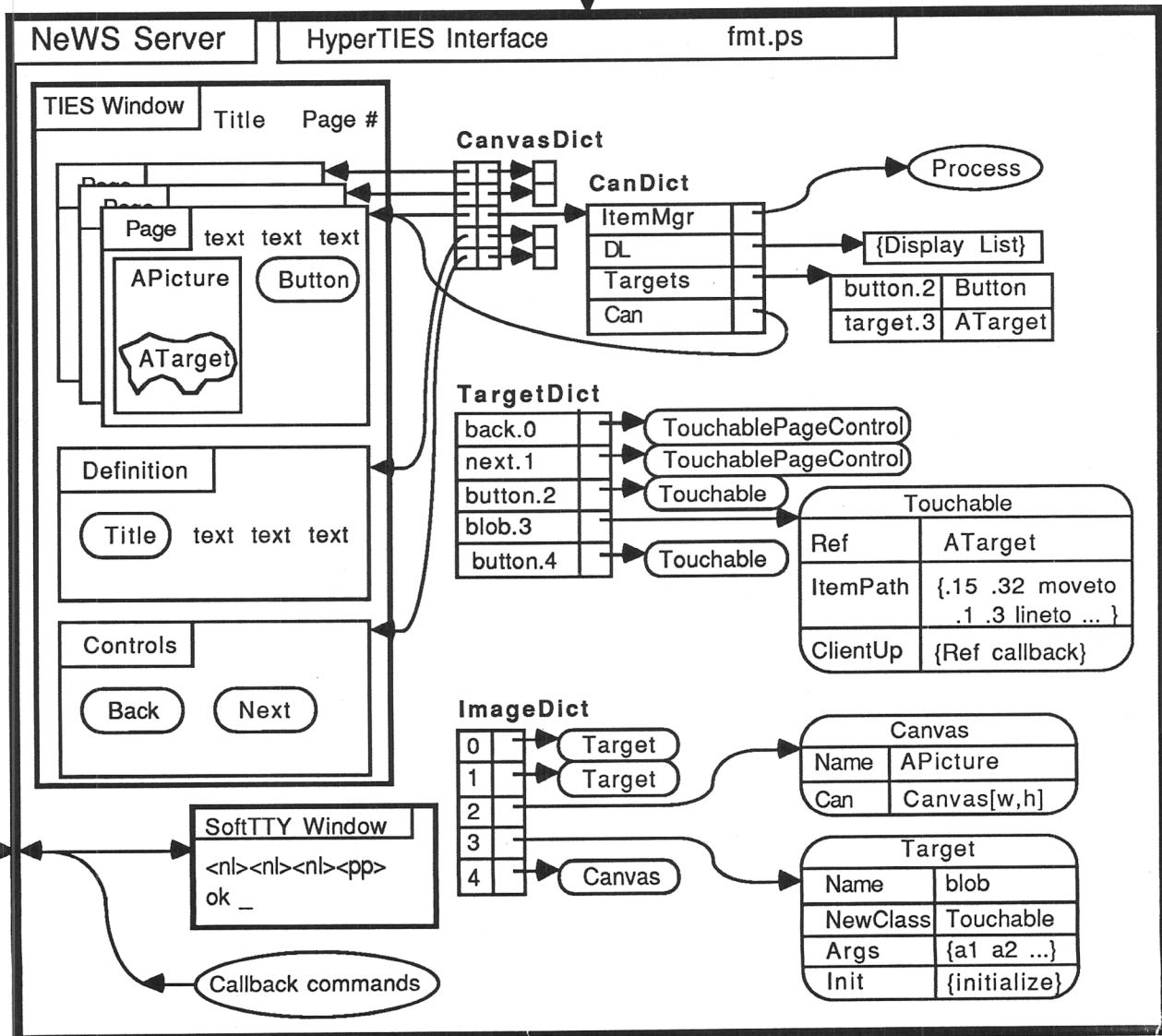
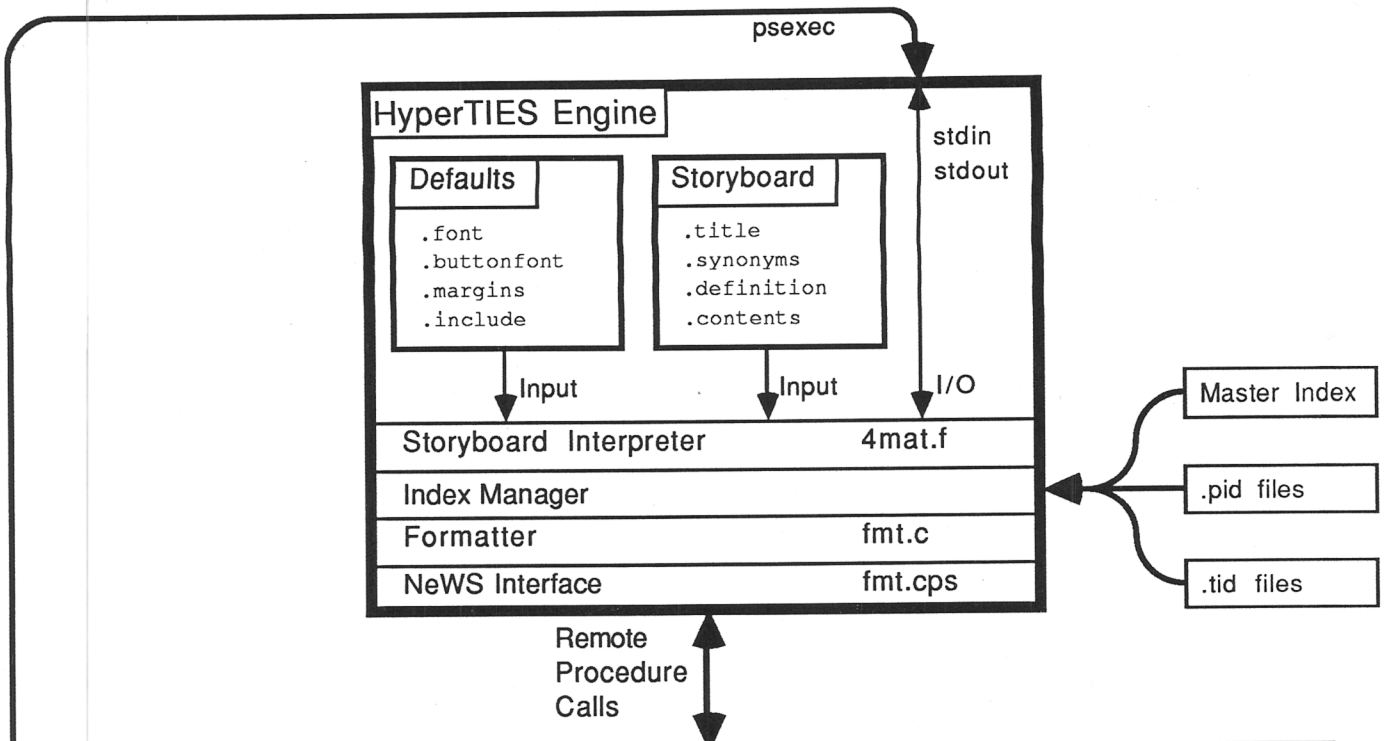
Lewis Carroll

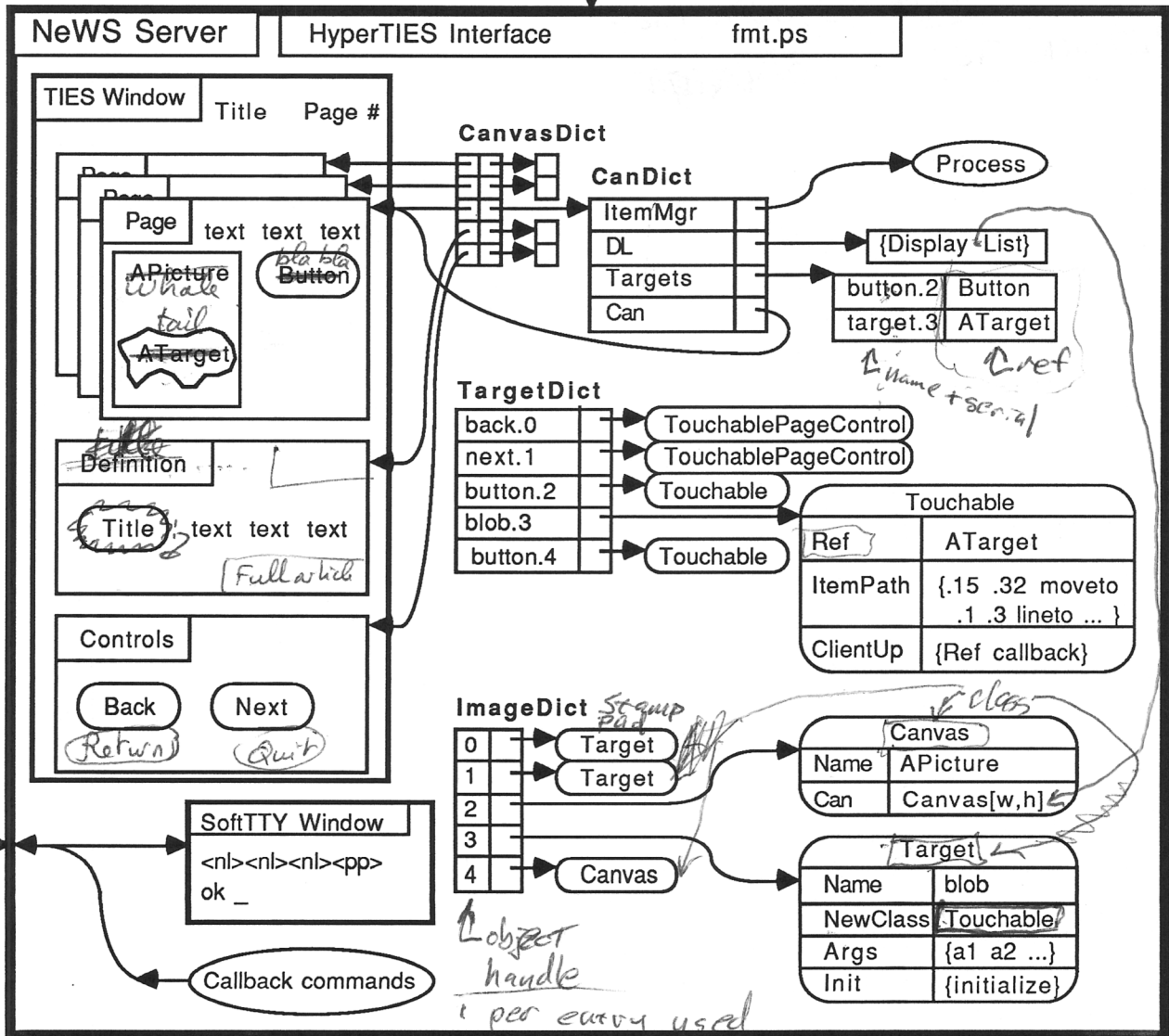
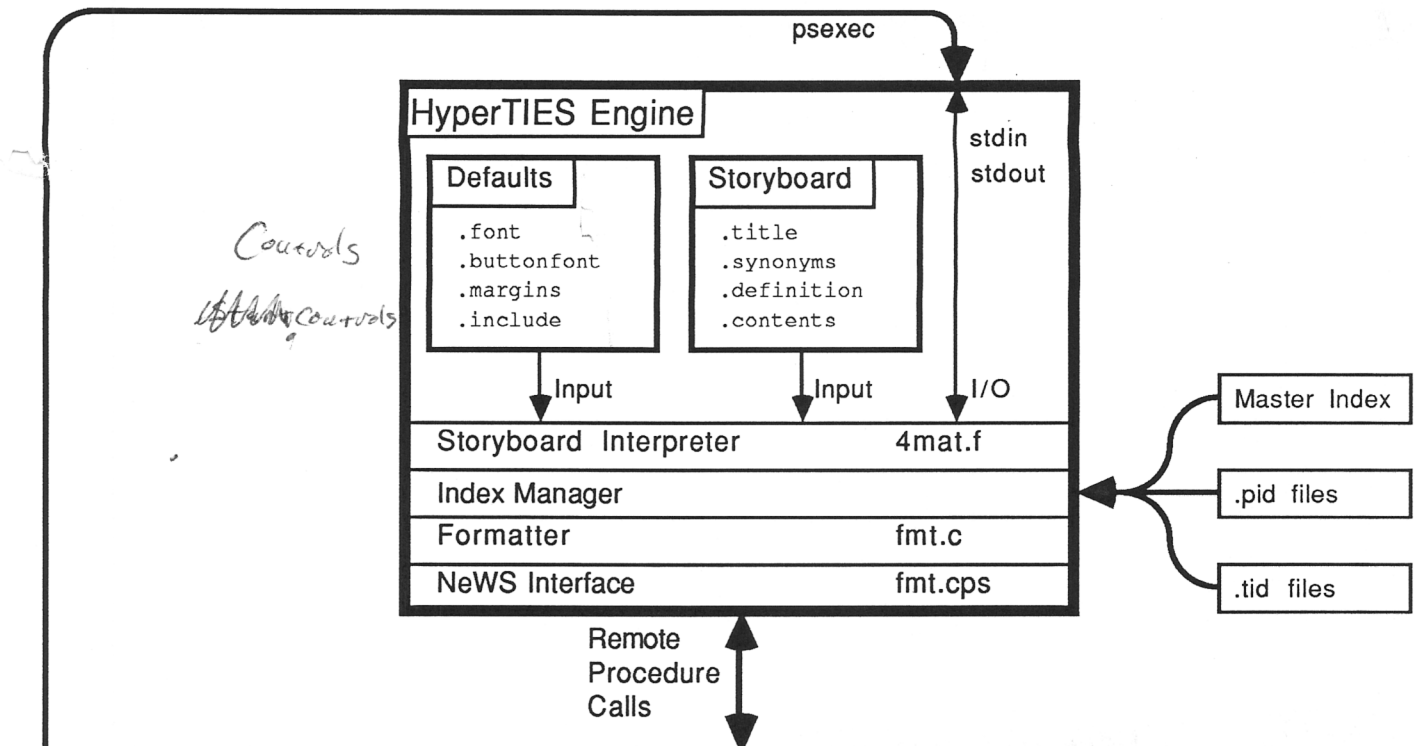


- Cmd1 _____ exec!
- Cmd2 _____ exec!
- Cmd3 _____ exec!
- Cmd4 _____ exec!

NEXT=> LAST

RETURN REFRESH SHOW QUIT





Touchable classes

Touchable

Ref TID filePos ParentCanvas /new object

Ref - the article title or synonym
this touchable refers to.

TID - this touchable's unique Target

The TID's are stored with the Ref's in the Targets dictionary of the ParentCanvas's information dictionary.

ID - in form of $\langle \text{name} \rangle, \langle \text{serial} \rangle$ where $\langle \text{name} \rangle$ is what the author calls this touchable but $\langle \text{serial} \rangle$ is the count of times of this name. The TID is compared with the keys in TouchDict.

filePos - the path in the file system that the touchable name came from. It's back into TID file. Consists of an array of 2 strings and 2 integers. $[\langle \text{directory} \rangle, \langle \text{file} \rangle, \text{offset}, \text{len}]$ -1 if all

ParentCanvas

The canvas that contains this touchable. The ParentCanvas is associated in CanvasDict with a dictionary of information about the canvas.

- Start Item
- Stop Item
- Select Item Event
- Release Item Event
- Tap Item Ref
- Active Canvas
- Local Canvas
- Client Up
- Client Down
- Client Enter
- Client Exit
- Client Drag
- Item Path
- Hit?
- Client Button

unit-scale
callback
finder over
here
rr

Double Click Time

CanvasDict

Associates canvases (drawable surfaces on the screen) with dictionaries, containing information about them.

Canvases entered in CanvasDict:

Pages - one canvas for each page of the document being viewed

Definition - one canvas for the definition window

Controls - one canvas for the control panel

Keys of the dictionaries in CanvasDict:

ItemMgr - a light weight PostScript process that manages this canvas.

It listens for the start events of any items on its canvas, and takes care of activating the item, and it listens for damage events on its canvas, and executes the canvas's display list to update the screen.

DL - The canvas's display list. It is an array of PostScript code, that paints the canvas when executed.

Targets - A dictionary that associates the targets on a canvas with their references. This is used mainly to keep track of what targets are on a canvas, and the associated referenced are not currently used.

Can - A reference back to the canvas that this dictionary describes.

The canvas of the currently active page (between "start_{page,definition,controls}" and end_page) is stored in the variable Can.

That canvas's information dictionary is stored in the variable CanDict.

TargetDict

ImageDict

picture \sqsubset name of picture (nl)

target \sqsubset name of target (nl)
reference (nl)

~~Canvas~~
- ~~name~~
- ~~file path~~
- ~~relative to master index~~
- ~~read ties canvas~~
- ~~for the picture pid~~

Touchable Popup
name
{ dx dy scale
image to use (name)
tid

I will put the right name in your
tid & pid
and put the file name relative to
the master index.

Touchable MenuItem

Touchable PageControl

Touchable Popup

Touchable Scrollbar

Touchable Slider

Touchable Text

TextCanvasItem

AnimatedTouchable

Canvas Dict - Associates canvases w/ dictionaries of
into about them.

Canvases:
- Pages
- Definition
- Controls

Item Mgr -
DL -
Targets -
Can -

Target Dict - Associates target ID's with target objects

[Classes of target objects]

- Target ID is <name>.<serial>

- Messages that targets respond to
/new /startItem /stopItem /select

- Functions operating on targets
unit-scale

- Functions oper
unit-scale

name author called it
count of objects
of this name.

Image Dict - Associates entry instance ID's

- Correspond to instantiated entries in the HyperTies
engine.

- Instance ID is a number, assigned by Ties.

- Messages that images respond to
/new /

Redesign of News Hypertext Scopes in News server.

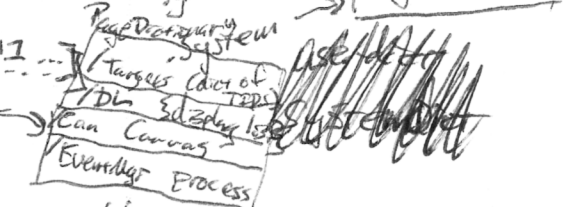
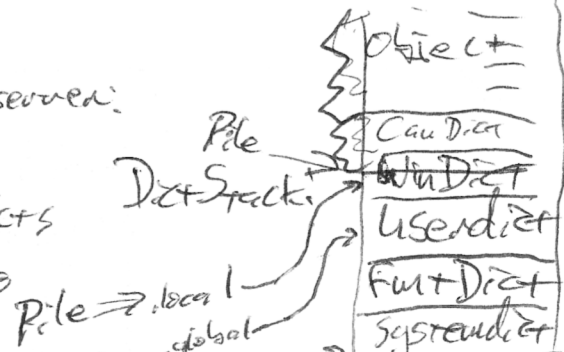
How can we provide a convenient & powerful way for the individual instances of objects (touchables), on the pages, identify & talk to each other?

PileDict
WinDict
 PileID → Pile
 WinID → WinDict

0	
1	
2	
⋮	⋮

/Win	Class TIESWindow
PageDict	can PageDict
/PageWidth	ht?
/PageHeight	322
/NextButton	Local?

local variables to a window frame. Pile



After putting down a touchable you can give it a name in some scope, with local, global, or system.

How we can refer to it to turn it on & off, instead of sending events!

NEXT target next-button
 local NextButton !Option-Key

target name ref

local foo

Associates foo with last TargetID in ~~WinDict~~ PileDict of current window. (Can Dict stack).

uses stamp-pad "name" instances target. associates tid w/ target in TargetDict

target name ref

global bar

Associates bar with last TargetID in userdict, global to all windows.

init-procedure of the the body of next-button
 can add itself to the local Win's /PageTrackers dict.
 Changing pages sends each member a /Page msg. PageTrackers

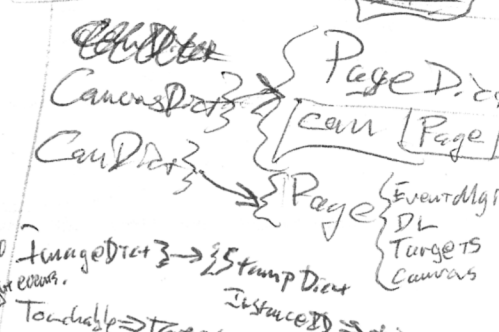
target flagmg-scroller flagmg

system flagmg

Defs in systemdict.

PS:

foo → gettarget → {object} ← instance of class Touchable, etc
 is mapped to (in userdict or Pile)



Implement Background pages - Bring button canvas to ClientCanvas & page. to Peer-let pages pass messages ClientCanvas's DL