

THE FISHEYE CALENDAR SYSTEM

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Abstract

This documentation is for an experimental calendar display program that dynamically reallocates screen real-estate to implement a “fisheye” display strategy: It gives the most space, and shows the most details about, appointment information for the focal date (e.g., the current date); less for the the rest of the focal week, and still less for the rest of the month. As the focal date changes the display is correspondingly modified. The software can also display several other layouts including several different scales of zoom.

***Note:** (1) This is research prototype software, written in Zeta-Lisp to run on a Symbolics Lisp Machine (currently for Genera 8.1). (2) Most of the software was originally written several years ago and is only now being packaged, documented and made more generally available at the request of some client companies.*

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I. Introduction to the Fisheye Calendar Project

This work was part of an effort to explore FISHEYE-style interfaces to large structures. (For general references, see [1] and [2]; for other related references see [3]-[6].) This particular project explored its use in a calendar application. The specific motivation is as follows:

As the end of each year rolls around the time comes to get an appointment calendar for the following year. The question always arises: what format is most suitable? A “Month-at-a-Glance” layout (Figure 1) has the advantage that one can see major events and deadlines in

advance, allowing nicely for planning -- today's efforts can reflect possibly remote but important future needs.

April 1986							
	S	M	T	W	Th	F	S
Apr 6	6	7 *Prepare e terminal *Frank Hal arrives *J.A.B. ru	8 *GWF runs 3-5pm *DEPT WORK *Dinner w/ *J.A.B. ru	9 *FRANK HAL visiting *HALASZ TR *TKLGP Mtg *J.A.B. ru	10 *GWF@CHI-L rehearsa *Infoscale *J.A.B. ru	11 *TOM MALON visiting *MALONE TR *Diane Lar *J.A.B. ru	12 *MLS leave For texa around
Apr 13	13	14 *FLY TO BO 9:20pm Piedmor *Check in Park Pla	15 *BOSTON-CH *DEMO REHE *Contact S *models wo *Register	16 *BOSTON-CH *GWF CHI86 11am Salon F	17 *BOSTON-CH *GWF DEMO 1:30-2pm Regis S	18 *BOSTON-CH *DonMitche 2pm Non-uni image rm 2L	19
Apr 20	20	21 *PHIL BARN visiting *Bill Jone visiting *DINNER	22 *Bill Jone 11am *Phil Barn visiting *EZRothkop At Colum	23	24 *JFPaterso pictoria	25	26 *Dupont D *STD uses car for
Apr 27	27	28 *To Texas For MCC	29 *MCC PTAC MMI proj 8am-5pm *C.Wilson From te	30 *MCC PTAC MMI sum part 2 *C.Wilson	1 *MCC Plann *C.Wilson	2 C.Wilson	3 C.Wilson *NYC w/Hil
May 4	4 C.Wilson	5 *Car Repai 609 Spri 464-406	6	7 *Hilary Le	8	9 *10:30 Tal *10am alle *1pm Ryan	10 *Fix plant *Garden/FI

Figure 1. Month-at-a-Glance format for a calendar shows context well, but no room for details.

The disadvantage is that there is seldom enough space in the necessarily small squares to write needed detailed information; maybe space for noting there is a meeting at 3pm, say, but not who will be there, what room number the meeting is in, etc. On the other hand one could use a "Day-at-a-Glance" format, with plenty of room for today's details, but no support for the larger view (See FIGURE 2)..

In the paper world, one must commit to a single format, after weighing the trade-offs (e.g., many compromise at a week-at-a-glance and write small...) In the electronic world, however, the layout can be dynamic and one can achieve a balance of global and local views.

One of the principal results of our previous research on making small views of large worlds is that people need a "fisheye balance" of information in their views: local details as well as more global context. It is useful to note that there are several ways to present such a fisheye balance. One follows the "zoom lens" metaphor, where the different scales are presented in different views. It has the disadvantage of requiring view-switching for integration of the different scales, but the advantage of introducing no significant geometric distortions. A second approach follows the "fisheye lens" metaphor, where the different scales are nested in a single view, but with geometric distortions.

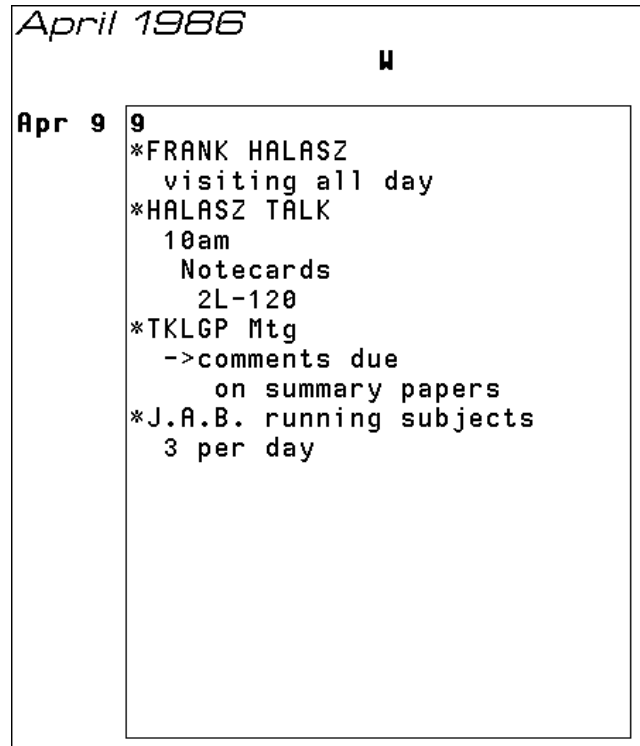


Figure 2. Day-at-a-Glance format for a calendar shows detail well, but no context.

The fisheye calendar software was built originally to investigate the possibility of achieving this sort of balance. It originally emphasized the “fisheye lens” metaphor for a calendar view (Figure 3),.

but it actually supports many different presentation formats including zoom views (e.g., Figures 1 and 2 above).

II . How to use the Fisheye Calendar Software - Basics

The software is set up as a standard Symbolics DEFSYSTEM system, and is distributed and loaded accordingly (see section IV., below). Once the system has been loaded, the calendar, which has its own window and associated process, is accessed either by the two-key sequence, <SELECT>-<SQUARE>, or from the system menu.

A. GETTING STARTED

Get the fisheye calendar started by pressing <SELECT>-<SQUARE>.

The program will come up in a default configuration that gives a standard fisheye lens presentation format, focussed at the current date. Most likely, at this point the calendar will be empty -- it needs some data about dates and appointments, and needs to be focussed near those relevant dates.

April 1986		S	M	T	W	Th	F	S
Apr 6	6	7		8	9	10	11	12
		*Prepare experiment terminal for expt/demo check f.e. tree pgn on ambassador terminal *Frank Halasz arrives in NE call about: dinner w/him&mo *J.A.B. running subjects 3 per day		*GWF runs subject 3-5pm in lab *DEPT WORK REVIEW Monma & Lee 10am 2q309 *Dinner w/ Frank & Mo? *J.A.B. running sub 2 today	*FRANK HA visitin in lab *HALASZ T 10am Noteca 2L-12 *TKLGP Mt ->comme on s *J.A.B. r 3 per d	*GWF re (*MAL 11 (*Dia 2: T *J.A 3	*TOM vi *MAL 11 (*Dia 2: T *J.A 3	*MLS Fo a
Apr 13	13	14		15	16	17	18	19
	*FLY 9: P *Che Pa R	*BOSTON-CHI86 *DEMO REHEARSAL dont yet know where *Contact SYMBOLICS get demos ready *models workshop (place unkn.) *Register for conference		*BOSTON-CHI86 *GWF CHI86 talk 11am Salon F	*BOSTON-C *GWF DEMO 1:30-2p Regis	*BOS *Hil in H	*Don 2p N	
Apr 20	20	21		22	23	24	25	26
		*PHIL BARNARD visiting *Bill Jones *DINNER		*Bill Jones Talk 11am *Phil Barnard visit *EZRothkopf talk		*JFP pi		*Dup *STD ca
Apr 27	27	28		29	30	1	2	3
		*To Texas		*MCC PTAC	*MCC PTAC	*MCC C.	*NYC	
May 4	4	5		6	7	8	9	10
May 11	11	12		13	14	15	16	17

Figure 3. Fisheye format for a calendar shows a balance of local detail, as well as surrounding context

For exploratory purposes, there is some calendar data from the summer of 1986 in the default calendar data file:

fisheye-calendar: fisheye-calendar;calendar-data.text

To use this, first (1) change the calendar focus date, by clicking the right mouse button anywhere over the calendar, and select the "Change Start Date" option from the OPTIONS menu which pops up. To actually change the date, click left on the existing date string, and enter some date in the summer of '86, e.g., "Jul 1 1986", hit <END> or <Return>, and click the EXIT box. Then (2) to load the relevant calendar data in, click right again anywhere over the calendar and choose the "Read from file" option from the OPTIONS menu. In the resulting prompt window, leave the default file name as is, and simply click on the "READ IT" box.

There should now be text in the calendar, ready for interactive viewing.

B. BASIC VIEWING OPERATIONS:

A double-left (or equivalently sh-left) mouse click on another date's square will move the focus (or "fovea") to that date. A single left click will only partially shift the focus to the

new location, allowing for a kind of two-focus view. (Repeated single left clicks, will gradually shift the focus more and more to the new location.)

Note that the calendar entries on a given day have a particular structure that affects how they appear as the date boxes change size. An individual entry (there may be several on a given day) can have up to 5 lines of information that are assumed to be ordered by decreasing importance. When the calendar has space for only a few lines in the box displaying that particular date, it drops out the lowest-importance lines of each entry on that day. If it has limited width it truncates the entries (we've also played some with automatic abbreviation strategies). If there is not enough room to display text, a dot is printed in the box next to the date number, to indicate that unseen entries exist.

As you move the focus around, the geometry of the calendar changes, the vertical and horizontal lines move about, the box sizes vary, and as a result, varying detail is shown for different dates. The number and spacing of lines can be controlled by various parameters, and whole configurations of parameters saved. In the default fisheye configuration, a lot of space is given to the current row and column of the calendar, so that the current day gets lots of real estate, the rest of the week less so, and the rest of the month even less. Note that in the current version of the software, time is made asymmetric - the days after the current focus are given much more space than the days before.

To move the focus date beyond the displayed range of the calendar, either change the date by hand using the Start Date menu option again, or click above the top line of the calendar to scroll back one week, or below the bottom line to scroll forward one week. (A more fisheye-type navigation would be a useful addition to the software.)

To try some other pre-defined configurations, click right over the calendar and choose "Change Display Parameters" from the OPTIONS menu. This will bring up a menu of variables that can be set. Section III describes some of these in more detail, but for now simply select any of the *asterisked* options from the *CONFIG* line, and then click the EXIT box.

C. BASIC EDITING OPERATIONS:

To add or alter contents of a date box, simply click middle over a box. This will pull up a menu of 5 possible entries for that date. Click on the one you want to alter. Click on the text you want to change, at the indicated importance level. Add the new text, then hit <End> or <Return>. When you are done, click on the Exit box.

After editing or adding things to the calendar, you can save its full contents by clicking right anywhere and choosing "Write to file" from the OPTIONS menu. Edit the file name if desired, and click on the WRITE IT box.

NOTE: This editing interface was not a primary research interest and is rather crude.

III . How to use the Fisheye Calendar Software - Advanced Features

A. SUMMARY OF THE "OPTIONS" MENU.

Clicking the right button anywhere over the calendar brings up a menu with the following choices:

REDRAW ALL - Redraws the calendar window.

CHANGE START DATE - Brings up a dialog box for changing the date at the upper left of the calendar.

CHANGE DISPLAY PARAMETERS - Brings up the menu for changing variables which control the structure of the views.

CHANGE DISPLAY CHARACTER STYLES - Allows switching to a larger font for demo purposes.

WRITE TO FILE - Writes the current contents of the calendar to the file specified with a dialog box.

READ FROM FILE - Reads a file specified with a dialog box and adds its contents to the calendar.

ABOUT THE FISHEYE CALENDAR - Brings up an ASCII version of this documentation.

B. MAKING YOUR OWN DISPLAY CONFIGURATIONS.

The various predefined display configurations were defined by altering various parameters of the software. To experiment with other layouts you can alter these parameters yourself. Select the "Change Display Parameters" option from the OPTIONS menu. This will pull up a list of variables and their current values, which you can alter (FIGURE 4)..

```
Change Calendar Parameters
*START-DATE*: Apr 6 1986
*FILE-OF-BOXES-OF-ENTRIES*: fisheye-calendar: fisheye-calendar; calendar-data.text
*WEEKS-IN-DISPLAY*: 6
*DAYS-IN-DISPLAY*: 7
*HEIGHT-DISTRIB-CONTROL-LIST*: (80 40 20 10 5)
*WIDTH-DISTRIB-CONTROL-LIST*: (8 4 2 1)
*VIEW-CHANGE-FRACTION*: 0.25
*FILL-METHOD*: DAY-BY-DAY BY-HASH
*CONFIG*: *FISHEYE-CONFIG* *1DAY* *2DAYS* *COL-WEEK* *ROW-WEEK* *MONTH* *FISH-2MONTHS* *YEAR* MISC SAVE-CURRENT
Exit 
```

Figure 4. Menu of variables that may be changed to control the display

Below is a list of these, with explanations:

START-DATE has as its value a string for the date of the first (upper-left-most) date to appear on the calendar. This variable is the variable altered by the "Change Start Date" selection in the OPTIONS menu.

FILE-OF-BOXES-OF-ENTRIES has as its value a string that is the name of the default file for reading and writing calendar data.

WEEKS-IN-DISPLAY has as its value the number of rows to appear in the calendar layout.

DAYS-IN-DISPLAY has as its value the number of columns to appear in the calendar layout. Typically this is 7, but there are some cases where fewer might be needed.

HEIGHT-DISTRIB-CONTROL-LIST has as its value a list of numbers whose relative sizes determine the relative spacing of successive ROWS in the display. The first number is taken to be the relative height of the focal row, the next that of the following row, etc. If the list is shorter than the number of rows currently in the display, the final value is used repeatedly. Note that only relative sizes matter, so the list (5 3 1) is the same as (50 30 10). It follows from these conventions that any constant list is equivalent to (1), and will produce equal spacing. In this implementation, to reflect the asymmetry of time and a forward-looking (planning?) focus, the rows preceding the focus are typically quite small, since they are automatically given the width of the last number in the list.

WIDTH-DISTRIB-CONTROL-LIST is analogous, having as its value a list of numbers whose relative sizes determine the widths of successive COLUMNS in the display. The first number is taken to be the relative width of the focal column, the next that of the following column, etc. Since calendar numbers wrap around from one row to the next the width values are used in a wraparound fashion. Thus, for example if the current focus is on Saturday Apr 12, 1986, it will be given a large square in a fisheye view, and Sunday Apr 13, 1986 will be given the next smaller size square from the with list, even though it is at the other end of the table.

VIEW-CHANGE-FRACTION has as its value a floating point number between 0.0 and 1.0 which tells how much to change the fovea to a new location on a single left click. If this value is .25 for example, a left click on a new focus will result in a view whose spacings are a weighted average of the whatever the previous spacing was (75%), and what a complete change of focus would dictate (25%). Repeated single clicks on the same location give a Zeno's-paradox-like approach (geometric progression) to the final, single-focus view.

FILL-METHOD is a more obscure variable that has as its value one of the two indicated choices. It dictates how the calendar entries will be taken from the database that holds them (a hashtable) and put into the display. The usual value is DAY-BY-DAY which tells the program to go through each visible calendar day and check the hash table for data, putting up whatever it finds. In the rare case that there is very little data and many boxes in the calendar (e.g., in a year-at-a-glance view of a sparse set of calendar data), it can sometimes be faster to use the BY-HASH option to do the converse: go through everything in the hash table, and check whether things it finds belong in the current view, and put them up as appropriate. With fast machines (XL-400 or faster) this is rarely necessary.

CONFIG is a variable that saves configurations of the other parameters and their values, so they can be restored later within the session (they are lost upon reboot). To save a new configuration with the parameters currently displayed, click on SAVE-CURRENT, then enter a configuration name as prompted (then clicking on DOIT), then exit

the parameters menu by clicking on the EXIT box. By convention, compiled-in, pre-defined configuration names begin and end with astrisks. To use an existing defined configuration, click on it, then click on the EXIT box.

IV . Installing the “Fisheye-Calendar” System

A. CREATE THE SYSTEM TRANSLATIONS FILE.

Create the file “sys:site;fisheye-calendar.translations”, and make it look as shown below (putting the machine name and pathname for where you want the code to go, as indicated):

```
;;; -*- Mode:LISP; Package: user; Base: 10-*-  
(fs:set-logical-pathname-host “fisheye-calendar”  
 :physical-host “machinename_where_code_is_installed”  
 :translations ‘((“fisheye-calendar;” “pathname>for>code>here>”)))
```

e.g., mine looks like this:

```
;;; -*- Mode:LISP; Package: user; Base: 10-*-  
(fs:set-logical-pathname-host “fisheye-calendar”  
 :physical-host “ittidu”  
 :translations ‘((“fisheye-calendar;” “>gwf>fisheye-calendar>”)))
```

Then evaluate the form to actually define the logical pathname.

B. RESTORE THE SYSTEM FROM TAPE. To do this say, to a lisp listener:

Select Activity Restore Distribution

In the resulting frame, click on “Initialize Restoration”. After it scans the tape, it should indicate that the system “fisheye-calendar” is on the tape. Then simply click on “Perform Restoration”.

C. COMPILE THE SYSTEM. If you are running on an XL1200, you can skip this step, the binaries are already there. Otherwise, say, to a lisp listener:

Compile System fisheye-calendar

D. LOAD THE SYSTEM. To do this say, to a lisp listener:

Load System fisheye-calendar

E. START THE SYSTEM RUNNING. Say <select>-<square>, and continue as indicated in section II. above.

V . Disclaimers about the Code

This code is pretty ugly. It evolved over the course of a year or two, with a lot of the structural flaws of incremental design that arise in concept exploration. Also it was essentially the first substantial code I wrote in any lisp dialect or any object oriented language or in the Symbolics operating system. There is a lot of awkwardness; software rot may be lurking anywhere. I have not tried substantially to clean it up.

If you are authorized to twiddle with the code, do so as you wish, but you've been warned...

VI . References

- [1] Furnas, G. W., "The FISHEYE view: A new look at structured files." *Bell Laboratories Technical Memorandum*, 1982.
- [2] Furnas, G. W., "Generalized fisheye views" *Human Factors in Computing Systems CHI '86 Conference Proceedings*, Boston, April 13-17, 1986, 16-23.
- [3] Arias, J. P. and Furnas, G. W., "FISHEYE: a program implementing fisheye viewing for hierarchically structured files." *Bell Laboratories Technical Memorandum*, 1982.
- [4] Lochbaum, K.E. and Furnas, G.W., "Additions to the FISHEYE software," *Bell Communications Research Technical Memorandum*, 1984.
- [5] Fairchild, K.M., Poltrock, S.E. and Furnas G.W., "SEMNET: Three-Dimensional Graphic Representations of Large Knowledge Bases." in Guindon, R. (Ed.) *Cognitive Science and Its Applications for Human Computer Interaction*, Hillsdale, New Jersey: Lawrence Erlbaum, 1988, pp. 201-233.
- [6] Furnas, G. W., "The Fisheye List-Sampler System", *Bellcore Technical Memorandum*, 1991.