C Workshop

Extending Modal Dialogs

THINK C

Paul Potts
Wooster, OH

The Gauntlet Is Thrown Down

A few months ago I was developing a program that used a modal dialog. I showed the results to my roommate. He ran the program and brought up the dialog, but was then interrupted. When he got back, the screen saver had come on. He moved the mouse to refresh the screen, and then scrutinized my display.

"Which button is default?" he asked .

"That one. The program drew the outline, but it got erased."

"It should be there."

"Oh, come on! The *Finder* doesn't even keep the outline around its default buttons when you use a screen saver!"

"If it's in *Inside Macintosh*, it should be there. Go fix it. Here, make me a copy first." He popped in a blank disk. Nothing happened.

"How come it didn't ask if I want to initialize the disk?"

"That doesn't work when a modal dialog is active," I explained lamely.

He then pressed the "Q" key. Nothing happened. "There's a dialog button called Quit — why didn't it quit?" he asked. "What kind of user-friendly program is this, anyway?"

The Gauntlet Is Picked Up

My roommate was right. We are used to putting up with the limitations of modal dialogs, but ModalDialog can be extended using **filter procedures**. The parameters of ModalDialog can be declared in C as follows:

```
void ModalDialog (filterProc, itemHit)
    ProcPtr filterProc;
    int     *itemHit;
```

The address of your filter procedure gets passed by casting it to a **procPtr**. If you don't want to use a filterProc, you pass NIL as your first parameter. If you do use a filterProc, Modal dialog then gets each event for you, using a mask which excludes disk events, and sends them to your filterProc. It is then up to your filterProc to decide what to do with them. ModalDialog expects your filterProc to be declared as follows:

```
pascal Boolean FProc(Dialog, Event, itemHit)
    DialogPtr       theDialog;
    EventRecord     *theEvent;
    int     *itemHit;
```

A dialog filterProc is actually a function that returns a Boolean value. This value should be TRUE if you want ModalDialog to exit, and FALSE otherwise. ModalDialog passes your filterProc a pointer to the current event. You then can do what you want with it. If your function returns FALSE, ModalDialog will handle the event after you. Thus, you can get a crack at each event even before ModalDialog does. Your filterProc can then do any of the following:

1) Handle the event, then send it to ModalDialog
2) Handle the event and tell ModalDialog to exit
3) Change the event and return to ModalDialog
4) Read the event queue itself and act on it.

My filterProc uses the first technique to handle updateEvents before ModalDialog gets them. This allows me to redraw the default box around a button and then tell ModalDialog to do its own updating. I use the second technique to exit ModalDialog if my filterProc receives a key event that it understands. I use the third technique to handle the <return> key by changing the event from a keypress to a click in the default button. You don't actually have to do this for <enter> and <return> keypresses, since ModalDialog handles key events, but I wanted to illustrate the technique of altering an event.

Scott Knaster, in *Macintosh Programming Secrets*, suggests that command-key equivalents be provided for buttons in modal dialog boxes whenever possible. Command-key equivalents aren't always necessary, however. Some popular applications, such as Microsoft Word, provide single-key equivalents for button clicks, if no editable text fields are present in the dialog, such as in the *Save Changes Before Closing* dialog. I suggest that commnad-key equivalents be used in modal dialogs with editable text fields, and single-key equivalents (or both single-key and command-key equivalents) be used when no editable text fields are present. My code illustrates both techniques, but your application should use only one. Even though my modal dialog has an editable text field, I allows the user to press a 1, 2, or 3 to choose one of my three buttons. The user can also use <command>-F, S, and T to choose the first, second, and third dialog items, respectively. NOTE: You must make certain that the editText item(s) in the DITL resource that you use are set to Disabled, or else my technique will not work.

When drawing your dialogs with ResEdit, keep in mind that the command-key character is ASCII 17 in the Chicago font, but cannot be typed directly from the keyboard. Microsoft Word will generate this character if you use the Change function to replace a specified character with a ^17. You can then copy this character and paste it into your ResEdit fields. RMaker can generate this character by using \11.

Since ModalDialog does not pass disk events to the filterProc, I use the fourth technique to allow the user to insert a blank disk while the ModalDialog is active. It gets initialized by DIBadMount, which then mounts it (or ejects it, if initialization failed). This might be useful in a modal dialog which displays online volumes. SFPutFile uses this technique to allow disks to be mounted while its dialog is active.

There are other ways you can handle events in a modal dialog using filterProcs. You can do anything you want during null events. You can plot a series of icons in your dialog to give the appearance of animation, or draw the current time using DrawString. After all, you have the current grafPort, and can draw directly with QuickDraw. Remember, though, that your drawing operations should be as fast as possible, and must take much less than a single tick to work effectively. Also, remember your poor end-user: don't make your dialogs overly confusing or complex. We want to extend the Macintosh interface, not bury it.

If you like my code, you are welcome to use it "as-is," modify it, or completely rewrite it. I'd appreciate it if you'd put my name somewhere in your application, but you can drop me a postcard instead.

Listing: driveDialog.c

```
/* This Think C 3.02/4.0 code should be compiled with MacHeaders turned on.  Create a new project called FilterProc.π, and add this file, driveDialog.c, along with HandleDialog.c and MacTraps.  Prototypes are provided. Compile the resource file, FilterProc.r, with RMaker and put it in the folder with the FilterProc project.*/

/*********************************************/
/* File: driveDialog.c */
/* A simple driver application for the dialog
handler.  Your own application would call
it instead. */

void main (void);
int HandleDialog(short ID);

void main()
{
  int itemHit,
/* Dialog item hit, returned by HandleDialog */
    counter;

  InitGraf(&thePort);
  InitFonts();
  InitWindows();
  InitMenus();
  TEInit();
  InitDialogs(0L);
  FlushEvents(everyEvent, 0);
  InitCursor();

/* Now send the HandleDialog function the resource ID of the
DLOG to use */
  itemHit = HandleDialog ((short)1);

/* Now beep to tell us what item number the HandleDialog call
sent back (i.e., what item was hit to exit ModalDialog */
  for (counter = 1; counter<= itemHit;   counter++)
  SysBeep(40);
}
```

Listing: HandleDialog.c

```
/******************************************/
/* File HandleDialog.c */
/******************************************/
/* Prototypes */

int HandleDialog(short Dialog_ID);
/* Called whenever you want to put up a modal dialog */

pascal Boolean FProc(DialogPtr theDialog,
      EventRecord *theEvent,
      int *itemHit);
/* Filter procedure called by ModalDialog to screen dialog
events */

Point CenterDialogItem(DialogPtr theDialog,
int item_number);
/* Returns the center of the rect of a dialog item, to be
called from a filter proc while a modal dialog is active. */

void FlashDialogItem(DialogPtr theDialog, int
  item_number);
/* Flashes an item of a dialog, to be called from a filter
proc while a modal dialog is active. */

void HandleUpdate(DialogPtr theDialog);
/* Used to handle update events while a modal
dialog is active, called from a filter proc.*/

/*******************************************/
/* This procedure returns the center of a dialog item as a
point.  It is designed to be used with buttons, but will work
with any type of dialog item.  */
/* Input: theDialog (a DialogPtr), item number (an integer) */
/* Output: a point */

Point CenterDialogItem(theDialog, item_number)
  DialogPtr  theDialog;
  int    item_number;

{
  Point  the_center; /* Center of item, to return */
  int    itemType; /* Returned by GetDItem but not used */
  Handle theItem; /* Returned by GetDItem but not used */
  Rect the_Rect; /* Returned by GetDItem */

GetDItem(theDialog, item_number, &itemType,
&theItem, &the_Rect);
the_center.h = the_Rect.left + ((the_Rect.right -
the_Rect.left)/ 2);
the_center.v = the_Rect.top +((the_Rect.bottom -
the_Rect.top)/ 2);
return the_center;
}

/*******************************************/
/* This procedure returns the center of the rectangle of the
default dialog item as a single point.  */
/* Input: theDialog (a DialogPtr), item_number (an integer) */
/* Output:  none */

void FlashDialogItem(theDialog, item_number)
  DialogPtr  theDialog;
  int    item_number;
{
  long tickScratch; /* returned by Delay, unused */
  int  itemType; /* Returned by GetDItem but not used */
  Handle the_item; /* Handle to default button */
  Rect controlRect; /* Returned by GetDItem but not used */

GetDItem(theDialog, item_number, &itemType, &the_item,
&controlRect);
HiliteControl(the_item, 1);
Delay(6, &tickScratch);
}

/*******************************************/
/* The following function handles update events for your
dialog box.  It is called whenever the filterProc receives an
update event.  You can put whatever you want to be drawn in
the dialog in it.  Right now it redraws the rounded rect
around the default button (number one). */

 /* Constants for drawing roundRect */
```

```
#define edgeCurve  16
#define gapBetween   -4
#define lineSize  3

void HandleUpdate(theDialog)
  DialogPtr theDialog;
{
  RectcontrolRect; /* rectangle of the default control.  We
need this to draw the round rect. */
  int   itemType; /* Returned by GetDItem but not used */
  Handle the_item; /* ditto */
  Rectborder; /* Rect of the thick border */

PenSize(lineSize, lineSize);
/* Get control #1's rectangle and grow it a little bit, then
call FrameRoundRect to draw it. */
GetDItem(theDialog, (int)1, &itemType,      &the_item,
&controlRect);
border = controlRect;
InsetRect(&border, gapBetween, gapBetween);
FrameRoundRect(&border, edgeCurve, edgeCurve);
}

/*********************************************/
/* The following filterProc is used to handle extra events
during the modal dialog loop, such as update events.  Its
original purpose was to keep the default round-rect drawn
around the control even after a screen saver has redrawn the
screen. It also handles insertion of blank disks and button-
keyboard equivalents.
NOTE:  If you have one or more editable text fields within
your modal dialog, your key equivalents should use the command
key.  If you don't have any editable text fields, your key
equivalents can be handled straight.  The names of your
buttons should all begin with unique first letters, and if you
use command-key entry you should provide a legend of command-
key equivalents next to the buttons. */

pascal Boolean FProc(theDialog,  theEvent, itemHit)
  DialogPtr  theDialog;
  EventRecord*theEvent;
  int   *itemHit;
{
  longkey; /* Holds the key code */
  Point ctr;  /* where the mouse click will go */
  int DIResult; /* Returned by DIBadMount */
  EventRecorddiskEvent; /* Returned by EventAvail, below */

/* Since ModalDialog doesn't handle bad disk mounts, we have a
handler that will allow the user to format new disks with a
modal dialog still on the screen. */

if (GetNextEvent(diskMask, &diskEvent) == TRUE)
{
  if (HiWord(diskEvent.message) != 0)
  {
    diskEvent.where.h = ((screenBits.bounds.right
  - screenBits.bounds.left)/ 2) - (304 / 2);
    diskEvent.where.v = ((screenBits.bounds.bottom
  - screenBits.bounds.top)/  3) - (104 / 2);
    InitCursor();
    DIResult = DIBadMount(diskEvent.where,
    diskEvent.message);
  }

} /* end of if GetNextEvent test for disk events */

switch (theEvent->what)
{
  case(updateEvt):
  HandleUpdate(theDialog);
  return FALSE;
/*Do not return an item hit value.  Returning
FALSE tells modalDialog to handle the update
event.  We have just added our own handling of the event. */
  break;

  case (keyDown):
  key = theEvent->message & charCodeMask;
  switch(key)
  {
/* key has been pressed, we want to interpret it properly. */
    case 13: /* Return key */
    {
    FlashDialogItem(theDialog, 1);
    ctr = CenterDialogItem(theDialog, 1);

/* We can do it this way: change the event record to fool
ModalDialog.  ModalDialog doesn't flash the button long enough
for my taste, so I flash it some more myself. */
    theEvent->what = mouseDown;
    LocalToGlobal (&ctr);
    theEvent->where = ctr;
    theEvent->message = 0;

/* Now we tell ModalDialog to handle the
event.  It doesn't suspect a thing! */
    *itemHit = 1;
    return FALSE;
    break;
  }

    case 3: /* the Enter key */
    {

/* Or we can do it our own way by flashing the button and
telling ModalDialog to exit. */
    FlashDialogItem(theDialog, 1);
    *itemHit = 1;
    return TRUE;
    break;
    }

/* These key equivalents do not rely on the use of the command
key.  You would use these in your modal dialog only if you had
no editable text fields. */
    case 49: /* 1 key */
    {
    FlashDialogItem(theDialog, 1);
    *itemHit = 1;
    return TRUE;
    break;
    }

    case 50: /* 2 key */
    {
    FlashDialogItem(theDialog, 2);
    *itemHit = 2;
    return TRUE;
    break;
    }

    case 51: /* 3 key */
    {
    FlashDialogItem(theDialog, 3);
    *itemHit = 3;
    return TRUE;
    break;
    }

/* These key equivalents for buttons use
the command key, and are appropriate even
for use in a modal dialog with editable text. */

    case 102:  /* ASCII F */
    {
    if (theEvent->modifiers & cmdKey)
      {
```

```
    FlashDialogItem(theDialog, 1);
    *itemHit = 1;
    return TRUE;
    break;
    }
  }

  case 115:  /* ASCII S */
  {
  if (theEvent->modifiers & cmdKey)
    {
    FlashDialogItem(theDialog, 2);
    *itemHit = 2;
    return TRUE;
    break;
    }
  }

  case 116:  /* ASCII T */
            (
  if (theEvent->modifiers & cmdKey)
    {
    FlashDialogItem(theDialog, 3);
    *itemHit = 3;
    return TRUE;
    break;
    }
  }

  default:
  {
  return FALSE; /* Do nothing if another key is chosen. */
  break;
  }
} /* end of key code switch */
```

```
case (mouseDown):

/* You can insert your own mouse click
handlers here.  ModalDialog takes care of mouse events, but
you can do do special processing.  For example, ModalDialog
does nothing if a mouse click
occurs inside a modal dialog but outside of a control, but you
could do something.  */

  return FALSE;
  break;
case (mouseUp):
    return FALSE;
    break;
default:
    return FALSE;
    break;
/* We don't handle any other types of events, so these get
sent to ModalDialog unchanged. */
  } /* end of switch */
} /* end of filterproc function */

/*******************************************/
/* HandleDialog is a function to draw and dispose of a simple
modal dialog.  It tells ModalDialog to use a filter proc to
screen events for the dialog.

Input: short Dialog_ID - the resource ID
Output: item number of the control that was hit to exit
ModalDialog. */

int HandleDialog(dialog_ID)
    short dialog_ID;
{
  int itemHit; /* returned by ModalDialog */
  DialogPtr  theDialog; /* The dialog we will work with */
  GrafPtr  oldWindow; /* Saves the previous window */
```

Real-time multitasking for Macintosh®

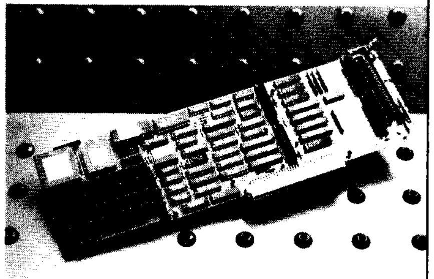
We are GreenSpring Computers, offering products to the Macintosh development community for real-world I/O intensive applications. In the areas of NuBus coprocessing and real-time multitasking with Apple's new MR-DOS operating system, we are providing the means for Macintosh to be used in new and demanding applications—means such as ruggedized, rack-mounted Macintcsh II computers, color displays and keyboard drawers, and I/O interfaces called IndustryPacks.™

Ask us about SpringBoard, our 68020-based NuBus board designed for real-time processing in a Macintosh environment. With one or four Mbytes of RAM, a floating point coprocessor option, a full 32-bit NuBus master/slave interface, compatible with MR-DOS and MPW, with space for two plug-in IndustryPacks, this $1,450 processor is ideal for I/O supervision.

Our IndustryPacks support such interfaces as A/D, D/A, serial, OPTO-22, digital I/O, and GPIB. And our four channel serial card provides very low cost Mac serial port expansion.

Speak to us today about your application. We're GreenSpring Computers, leading the Macintosh away from the desktop.

Authorized Value Added Reseller



GREENSPRING
COMPUTERS

1204 O'Brien Drive
Menlo Park, CA 94025
(415) 327-1200
FAX (415) 327-3808

Macintosh is a registered trademark of Apple Computer, Inc.
IndustryPack is a trademark of GreenSpring Computers.

Modula-2

metrowerks

MODULA-2 COMPILERS IN BOTH STANDALONE AND MPW VERSIONS

Metrowerks Compilers are one-pass optimizing compilers generating native-code for the Motorola 68000, 68020 and 68030 micro-processors.■Metrowerks SP™, PSE™ and MPW™ compilers generate 32-bit clean code and are source-code compatible in their support of the Modula-2 language and the Macintosh toolbox and OS calls.

- ■ Metrowerks *Modula-2 SP™* $39
  The StartPak™, an introductory-level programming system published by Macmillan.
- ■ Metrowerks *Modula-2 PSE™* $179
  The Professional Standalone Edition™, an integrated environment consisting of a specialized text editor, a one-pass optimizing compiler for 680x0 processors and a source-level debugger.
- ■ Metrowerks *Modula-2 MPW™* $150
  The optimizing compiler generating MPW Linker format code for 680x0 processors.

Metrowerks, Inc.
The Trimex Building, Rte 11
Mooers, NY 12958, USA
Phone 514.458.2018 Fax 514.458.2010

Visa, MasterCard, Institutional POs accepted. Shipping US & Canada $6, International $30. Dealer and Distributor enquiries welcome.

MPW v 3.0 may be ordered with MPW package $125 extra. Shipping US&Canada $6, International $30.

Metrowerks Modula-2 is a trademark of Metrowerks, Inc. Macintosh, MPW are registered trademarks of Apple Computer, Inc.

```
GetPort(&oldWindow); /* save current grafPort */
SetDAFont(0);  /* use system font */
/* First, get the dialog from the resource and prepare to
execute ModalDialog */
theDialog = GetNewDialog(dialog_ID, (Ptr)0, (WindowPtr)-1);
if (ResError() != noErr)
/* Called if GetNewDialog returns an error.  You can put your
own error handler here.  In this example we are assuming that
the dialog is available in the application resource fork */
  {
  SysBeep(40);
  ExitToShell();
  }

ShowWindow(theDialog);
SetPort(theDialog);
FlushEvents(everyEvent, 0);

/*Modaldialog call should wait until event in active control*/
ModalDialog((ProcPtr)FProc, &itemHit);
DisposDialog(theDialog);
FlushEvents (everyEvent, 0);
SetPort(oldWindow);
/* restore drawing state */
return itemHit;
}
```

Listing: Filterproc.r

```
**************************
* RMaker source file for
* filterProc application
**************************

Filterproc.π.RSRC
RSRCRSED

Type DITL  ;;Text for dialog
,1      ;;Resource number
5 ;;Number of items

Button Enabled
17 27 37 95
First \11F ;;The non-printable character is * ASCII 17 (see
text)

Button Enabled
17 108 37 182
Second \11S

Button Enabled
17 200 37 262
Third \11T

editText Disabled
137 86 157 222
This is editable text

staticText Enabled
61 43 115 246
This is an example of a modal dialog with command-key equiva-
lents for buttons.
* The above text should be all on one line

Type DLOG  ;;modal dialog
,1

90 120 266 420
Visible NoGoAway
5 ;;proc id
0 ;;refCon
1 ;;DITL
```