

Technical Note PT535

MacBug Q&As

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This Technical Note contains a collection of archived Q&As relating to a specific topic--questions sent the Developer Support Center (DSC) along with answers from the DSC engineers. Current Q&A's can be found on the [Macintosh Technical Q&A's web site](#).

[Oct 01 1990]

Determining whether MacsBug debugger is installed

I'm attempting to determine whether a debugger is installed, and if so, to find a THz pointer to its heap zone. Is this possible?

The MacsBug debugger is loaded into high memory above the value found in the global variable `BufPtr` (\$10C). Since it's loaded into the memory that's not managed by the Memory Manager, it's not in a heap. The global variable `MacJump` (\$120) points to the debugger's entry point.

There's also a flags byte in low memory that contains the following information:

```
Bit 7 Set if debugger is running.
Bit 6 Set if debugger can handle system errors.
Bit 5 Set if debugger is installed.
```

The flags byte may be in one of two places: the high-order byte of the long word at `MacJump`, or the address `$BFF`. When MacsBug is loaded, it examines the value at address `$BFF`. If the value at `$BFF` is `$FF`, the system is using the 24-bit Memory Manager and the flags byte will be the high-order byte of the long word at `MacJump`. If the value at `$BFF` isn't `$FF`, the system is using the 32-bit Memory Manager and the flags byte will be at address `$BFF`.

For information on debuggers other than MacsBug, you'll need to contact the publishers of those products.

Macintosh IIfx MacsBug requirements

Date Written: 7/6/90

Last reviewed: 6/14/93

What version of MacsBug is required for a Macintosh IIfx?

The Macintosh Technical Note "IIfx: The Inside Story" gives you Macintosh IIfx hardware and software details, including what version of MacsBug you need to use. You must have MacsBug 6.2 or later, as earlier versions are incompatible with the new hardware. You can get the latest MacsBug from APDA, the current *Developer CD Series* disc, and on AppleLink (in the Tools folder of Macintosh DTS). You can download this Technote from AppleLink if you don't have a copy.

Macintosh 'dcmd' resource format

Date Written: 7/25/90

Last reviewed: 6/14/93

What is the format of a 'dcmd' resource?

The following information is taken from the MacsBug Reference manual, available from APDA:

A 'dcmd' resource begins with a 4-byte segment header, followed immediately by the program code. Since a 'dcmd' is limited to single segment, the segment header is used to specify a 'dcmd' version number and the amount of global variable space MacsBug needs to allocate for the 'dcmd' (that is, the size of its "A5 world")--word of version followed by word of size.

MacsBug heap check/scramble/purge dcmd

Date Written: 1/18/91

Last reviewed: 6/14/93

Is there a way to get MacsBug to do a heap purge in the same way that `TMON` does? I would like to be able to run my programs with a heap check/scramble/purge performed automatically after each trap. Would it help to write a dcmd?

Both the Product Manager and Engineer on the product said MacsBug can't do a heap purge, so I tried the alternative you suggested, writing a dcmd.

This solution seems to work out well. I patch `NewPtr`, `NewHandle`, `SetPtrSize`, `SetHandleSize`, `ReallocHandle`, and `MoveHHI`. Whenever one of these is called, and the user has turned on heap purge (with "hp" in MacsBug), all purgeable handles are dumped by calling `EmptyHandle`.

I've included the MPW C source code below for you to play around with. I've also suggested to the Product Manager that heap purge be something we put into MacsBug in the future.

```
-----
File: HP.c
-----

/* HP.c
```

The following MPW commands will build the dcmd and copy it to the Debugger Prefs file in the System folder. The 'dcmd' s name in MacsBug will be the name of the file built by the Linker. You must first copy dcmd.h, dcmdGlue.a.o and DRunTime.o from the C Samples folder into this folder.

```
Asm hp.a
C -r -b hp.c #-sym on,novars,notypes -mbg off # for UltraSlimFast
Link dcmdGlue.a.o hp.c.o hp.a.o put.c.o DRunTime.o "{Libraries}"Interface.o
-o hp
BuildDcmd hp 1235
#Echo 'include "hp";' | Rez -a -o "{SystemFolder}TMON Folder:DCMD Holder"
Echo 'include "hp";' | Rez -a -o "{SystemFolder}Debugger Prefs"

DumpObj hp.c.o > hp.dumpObj
UltraSlimFast hp.dumpObj >hp.UltraSlimFast

*/

#include <Types.h>
#include <Memory.h>
#include <OSUtils.h>
#include <Files.h>
#include <Menus.h>
#include <Traps.h>

#include "dcmd.h"
#include "put.h"

extern pascal void NewNewPtr();
extern pascal void NewNewHandle();
extern pascal void NewReallocHandle();
extern pascal void NewSetPtrSize();
extern pascal void NewSetHandleSize();
extern pascal void NewMoveHHI();
extern pascal void SaveOldTrapAddress (long address, short addressKind);
extern pascal void SaveMyA5();
extern pascal long GetMyA5();

#define kOldNewPtr 0
#define kOldNewHandle 1
#define kOldReallocHandle 2
#define kOldSetPtrSize 3
#define kOldSetHandleSize 4
#define kOldMoveHHI 5

#define sysZoneMask 0x0400

Str255 pDumpString;
char ch;
Boolean purgingOn;

pascal void PurgeIt(long blockAddress, long blockLength, long addrOfMasterPtr,
short blockType, Boolean locked, Boolean purgeable,
Boolean resource)
{
#pragma unused (blockAddress, blockLength, addrOfMasterPtr, resource)

if ((blockType == relocatableBlock) && (!locked) && (purgeable)) {
EmptyHandle((Handle)addrOfMasterPtr);
}
}

Boolean IsSysZone(unsigned short TrapWord)
{
return( (TrapWord & sysZoneMask) != 0);
}

pascal void PurgeAllBlocks(unsigned short TrapWord)
{
THz oldZone;
long oldA5;

oldA5 = SetA5(GetMyA5());
if (purgingOn) {
```

```

        if (IsSysZone(TrapWord)) {
            dcmdSwapWorlds();
            oldZone = GetZone();
            SetZone(SystemZone());
            dcmdSwapWorlds();
        }

        dcmdForAllHeapBlocks(PurgeIt);

        if (IsSysZone(TrapWord)) {
            dcmdSwapWorlds();
            SetZone(oldZone);
            dcmdSwapWorlds();
        }
    }
    (void) SetA5(oldA5);
}

TrapType GetTrapType(short theTrap)
{
    // OS traps start with A0, Tool with A8 or AA.
    return((theTrap & 0x0800) ? ToolTrap : OSTrap);
}

void PatchTrap(short trapNumber, short saveOffset, long newAddress)
{
    // Use NGetTrapAddress since it is always safer on current machines. Take
    // the result it gives me, and save it off in asm land, for future
    // reference. Then, move in the new address of the routine, my asm glue.

    SaveOldTrapAddress(NGetTrapAddress(trapNumber, GetTrapType(trapNumber)),
        saveOffset);
    NSetTrapAddress(newAddress, trapNumber, OSTrap);
}

void InstallPatches()
{
    // Patch the traps... These are being patched in the world, not in the
    // debugger world. Switch over to the real world, in case the debugger
    // does world swaps. TMon Pro.

    dcmdSwapWorlds();

    PatchTrap(_NewPtr, kOldNewPtr, (long) NewNewPtr);
    PatchTrap(_NewHandle, kOldNewHandle, (long) NewNewHandle);
    PatchTrap(_ReallocHandle, kOldReallocHandle, (long) NewReallocHandle);
    PatchTrap(_SetPtrSize, kOldSetPtrSize, (long) NewSetPtrSize);
    PatchTrap(_SetHandleSize, kOldSetHandleSize, (long) NewSetHandleSize);
    PatchTrap(_MoveHHi, kOldMoveHHi, (long) NewMoveHHi);

    // Switch back to debugger world.
    dcmdSwapWorlds();
}

pascal void CommandEntry(dcmdBlock* paramPtr)
{
    switch (paramPtr->request)
    {
        {
            case dcmdInit:
                SaveMyA5();
                purgingOn = false;
                InstallPatches();
                break;

            case dcmdHelp:
                dcmdDrawLine("\php");
                dcmdDrawLine("\p Toggle Heap Purge on and off. When on, heap
purge purges purgable blocks");
                dcmdDrawLine("\p on NewPtr, NewHandle, ReallocHandle,
SetPtrSize, SetHandleSize, and MoveHHi");
                dcmdDrawLine("\p calls.");
                break;

            case dcmdDoIt:
                dcmdDrawLine("\pHeap purge is ");
                if (purgingOn)
                    dcmdDrawString("\poff.");
                else
                    dcmdDrawString("\pon.");
                purgingOn = !purgingOn;
                break;

            default:
                PutPStr("\pUnknown request ");
                PutUDec(paramPtr->request);
        }
    }
}

```

```

        PutLine();
        break;
    }
} // CommandEntry

-----
File: HP.a
-----

        include      'SysErr.a'
        include      'SysEqu.a'
        include      'Traps.a'

allRegs      REG          D0-D7/A0-A5

        proc

        import      PurgeAllBlocks

; -----
;

        export      SaveMyA5, GetMyA5

pMyA5        dc.l      0

SaveMyA5
        lea         pMyA5,A0
        move.l      A5,(A0)
        rts

GetMyA5
        move.l      pMyA5,4(SP)
        rts

; -----
;
; Storage for the old patch addresses, used to call through once the patch
; code executes. These are essentially globals, used by the asm code. They are
; specifically not exported, so that the Pascal code cannot access them
; directly. There are a number of interface routines I set up so that Pascal
; can get and set them, but has to go through this file. You know, sort of
; object like.
;
pFirstSavedTrap      equ      *
pOldNewPtr           dc.l      0
pOldNewHandle        dc.l      0
pOldReallocHandle    dc.l      0
pOldSetPtrSize       dc.l      0
pOldSetHandleSize    dc.l      0
pOldMoveHHI         dc.l      0

; -----
; When I'm am setting up the world, I call NGetTrapAddress to get the old
; version of the traps. I need to save that dude off so I can get back there
; when needed. This routine is a handy interface to the high-level world,
; isolating this asm junk from the code. All these routines are the same, just
; a different variable being affected. This hunk uses the PC-Relative
; addressing mode in order to get the address of the variable being set. This
; allows the code to function without any explicit global space, since the
; code acts like globals here.
;
; The interface is:
;
;   PROCEDURE SaveOldTrapAddress (address: LongInt; addressKind: Integer);
;
        export      SaveOldTrapAddress

SaveOldTrapAddress
        MOVE.L      (SP)+,A0          ; get the return address
        move.w      (SP)+,D0
        asl.w      #2,D0
        LEA         pFirstSavedTrap,A1      ; the variable to be setting

        MOVE.L      (SP)+,(A1,D0.w)      ; save it, pulling parameter too
        JMP         (A0)                ; it's saved, return to high-level

        export      NewNewPtr, NewNewHandle, NewReallocHandle
        export      NewSetPtrSize, NewSetHandleSize, NewMoveHHI

NewNewPtr
        move.l      pOldNewPtr,-(SP)
        bra.s      Common

```

```

NewNewHandle
    move.l    pOldNewHandle,-(SP)
    bra.s    Common

NewReallocHandle
    move.l    pOldReallocHandle,-(SP)
    bra.s    Common

NewSetPtrSize
    move.l    pOldSetPtrSize,-(SP)
    bra.s    Common

NewSetHandleSize
    move.l    pOldSetHandleSize,-(SP)
    bra.s    Common

NewMoveHHI
;
    move.l    pOldMoveHHI,-(SP)
    bra.s    Common

Common
    movem.l  allRegs,-(SP)
    move.w   D1,-(SP)
    bsr     PurgeAllBlocks
    movem.l  (SP)+,allRegs
    rts

    ENDP

```

MacBug Heap Zone "!" flag

Date Written: 4/10/91

Last reviewed: 6/14/93

What does the "!" mean when I use the MacBug Heap Zone (HZ) command? It appears in front of one of the zone names listed, or just after the address if the zone doesn't have a name.

MacBug's HZ command does a quick-and-dirty heap check, and if it thinks something is wrong with a heap, it puts the exclamation point after the address range of the heap. If you select the heap flagged with a "!" with the Heap Exchange (HX) command and then use the regular Heap Check (HC) command, MacBug tells you what it thinks is wrong with that heap.

Trick for accessing MacBug TargetZone variable

Date Written: 8/12/91

Last reviewed: 6/14/93

How can I get the target heap for my MacBug `dcmd`? My command currently operates on whichever heap is in `TheZone`. It seems better to be operating on the target heap as that is what other currently available heap commands do.

In recent versions of MacBug, there's a predefined variable that contains the target heap zone; as you might guess, it's "TargetZone." Currently there's no call-back to allow your `dcmd` to access this variable, but here's a workaround: Write your `dcmd` as though the first parameter is always `TargetZone`, and the second parameter is an optional override for the first. Then, always call your `dcmd` through a macro; name the `dcmd` "htx," and create a macro "ht" that expands to "htx TargetZone." This will give your `dcmd` access to the `TargetZone` variable.

X-Ref:

MacBug User's Guide and Reference--for MacBug 6.2, Addison-Wesley

Byte-wide accesses for db, dw, and dl commands

Date Written: 10/3/91

Last reviewed: 6/14/93

MacBug uses byte accesses when I issue the `dw` command in slot space to display a word.

MacBug always makes byte-wide accesses to fetch data for the `db`, `dw`, or `dl` commands. This is to avoid errors that might be caused if you supplied an odd address on a 68000-based Macintosh.

To accomplish what you need to do, write a tiny '`dcmd`' which explicitly fetches and displays a word. This should only need to be a couple of lines long. How to write a '`dcmd`' is documented in the files accompanying MacBug on the *Developer CD Series* discs.

How to tell whether a Macintosh debugger is installed

Date Written: 11/12/91

Last reviewed: 12/11/91

What is a robust way to tell if a debugger is installed? According to the MacBug Reference, a low-memory global, `MacJmp`, contains the address of any debugger, but the manual doesn't say (1) whether this address is NIL or garbage if no debugger is installed, and (2) what the actual address of `MacJmp` is.

To determine if a debugger is installed, you do want to examine the low-memory global `MacJmp` vector; it is at address \$120 and is 4 bytes long. When a debugger is not installed, the value there is 0. When a debugger is installed, the value

there is non-zero. This is true for MacsBug and TMON, and probably for The Debugger. This is the standard way to determine if a debugger is installed; third-party debuggers should set this up properly.

X-Ref: "How MacsBug Installs Itself," *MacsBug Reference*, page 412.

MacsBug and DebugStr documentation

Date Written: 3/12/91

Last reviewed: 7/25/91

Where can I find documentation on the Debugger and DebugStr calls? Also, I'm fairly certain I've seen a MacsBug manual somewhere, but I've checked the Dev CD (Vol. VI: Gorillas) and find only a beta copy, and delta documentation. I've checked the TN stack, but there doesn't seem to be anything there on it.

Yes, there actually is a MacsBug manual. I'm looking at the manual for MacsBug 6.1 right now, and on pages 107-109 are brief examples of how to use DebugStr in C, Pascal, and Assembly. MacsBug 6.2 hasn't really changed any of this since 6.1 (to my knowledge), but the MacsBug 6.2 manual might be a little more verbose if you can wait a little while to get it. MacsBug 6.2 is final, so the manual shouldn't be too far behind. You can purchase it from APDA. They can be reached at 800-282-2732.

As for other documentation on this, the only other thing I could find is a little piece of sample code using DebugStr in the Technote "Bugs in MacApp? Yes, But I Love It!," and a brief mention of how to properly exit debuggers in *Inside Macintosh* Volume VI on the System 7.0b4 CD.

Disable Virtual Memory when using MacsBug Step Spy

Date Written: 4/3/92

Last reviewed: 6/14/93

Step Spy seems to work less reliably with later versions of MacsBug. I get what acts like a double bus fault a lot--that is, the interrupt key is as effective as pressing the Apple logo on the front. I like the feature and would like to see it supported in the future. Any feedback?

MacsBug Step Spy command does not currently work with Virtual Memory enabled. Please avoid using it with VM, at least until such time as the release notes for a future MacsBug state that this has been corrected.

Building MacsBug dcmds

Date Written: 2/25/92

Last reviewed: 5/21/92

I'm having trouble building the dcmd samples on the E.T.O. CD-ROM. What am I doing wrong?

There are a number of problems with the build instructions for dcmd samples, mostly stemming from the fact that they have never been updated for MPW 3.2.

There are several things to note:

When you compile `Printf.c`, you may get a warning about `p2cstr()` being a function with no prototype. You can eliminate that by adding a `"#include <Strings.h>"` statement.

`DRuntime.o` is no longer needed. It was basically a copy of the old `CRuntime.o`, which like `CInterface.o` is not needed with MPW 3.2.

For `BuildDcmd` to work correctly, all code must be in segment `Main`. This requires several more `"-sg"` options in the `Link` command line. If `BuildDcmd` complains about too many segments, use the `-map Link` option to see which segments need to be remapped into segment `Main`.

I have put together a `Makefile` that solves these problems. It is included below. It is called `Printf.Make` and should be placed in the folder with `Printf.c`. It assumes all the files it needs are in the same relative folder positions as they are on ETO.

```
# File:      printf.make
# Target:    printf
# Sources:   Printf.c
# Created:   Wednesday, January 22, 1992 4:17:33 PM

# dcmdGlue.a.o must be first in the object list
OBJECTS = [[partialdiff]]
          '::dcmd Libraries:dcmdGlue.a.o' [[partialdiff]]
          '::dcmd Libraries:put.c.o' [[partialdiff]]
          Printf.c.o

printf [[florin]][[florin]] printf.make {OBJECTS}
Link -msg nodup -t APPL -c '????' [[partialdiff]]
     -sg Main=STDIO -sg Main=SANELIB -sg Main=STDCLIB[[partialdiff]]
     {OBJECTS} [[partialdiff]]
     #{CLibraries}"CSANELib.o [[partialdiff]]
     #{CLibraries}"Math.o [[partialdiff]]
     #{CLibraries}"Complex.o [[partialdiff]]
     #{CLibraries}"StdClib.o [[partialdiff]]
     {Libraries}"Runtime.o [[partialdiff]]
     {Libraries}"Interface.o [[partialdiff]]
     -o printf
::BuildDcmd Printf 1004
# If you want the dcmd to be loaded directly into Debugger Prefs,
# uncomment the following line
#Echo 'include "Printf";' | Rez -a -o "{systemFolder}Debugger Prefs"

Printf.c.o [[florin]] printf.make Printf.c
```

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