

Exec

```

/* Execute me to compile with SASC 5.10a
lc -b1 -cflist -d0 -O -v -j73 ispy.c
asm -iINCLUDE: ispy_stubs.asm
blink from lib:c.o ispy.o ispy_stubs.o lib:lib:amiga.lib lib:lcmb.lib lib:debug.lib SC
SD ND DEFINE __main=__tinymain
quit
**
**      ISPY. AmigaMail SetFunction() example.
**
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**
*/

#include <exec/types.h>
#include <exec/execute.h>
#include <exec/memory.h>
#include <exec/semaphores.h>
#include <dos/dos.h>
#include <libraries/gdtools.h>
#include <string.h>
#include <dos.h>

#include <clib/dos_protos.h>
#include <clib/exec_protos.h>
#include <clib/intuition_protos.h>

#ifdef LATTICE
int CXBRK(void) { return(0); } /* Disable Lattice CTRL/C handling */
int chabort(void) { return(0); }
#endif

#define ASM __asm __saveds
#define REG(x) register __## x

#ifdef PARALLEL
#define dprintf dprintf
extern void dprintf(STPTR,...);
#else
#define zprintf kprintf
extern void kprintf(STPTR,...);
#endif

#ifdef DEBBUG
#define D(x) x
#else
#define D(x) ;
#endif

/* Local Protos */
VOID main(VOID);
BOOL InstallWedge(VOID);
BOOL RemoveWedge(VOID);
struct JumpTable *GetJumpTable(UBYTE *);

/* Assembler stubs will return a pointer to the caller's stack in a4.
 * The only system function at this moment using a4 is the workbench.library
 * AddAppIconX() function.
 */
#define ACALLER (0) /* StackPtr[0] = ACaller, StackPtr[1] = saved A6 in
stub */
#define CCALLER (2) /* StackPtr[2] = CCaller */

/* The number of 'replacement' functions */
#define NUMBEROFFUNCTIONS (4)

/* Prototypes for the functions to be SetFunction()'ed. */

/* intuition.library */
struct Screen *(*ASM oldOpenscreen) (REG(a0) struct Newscreen *,
REG(a6) struct Library *);
struct Window *(*ASM oldOpenWindowTagList) (REG(a0) struct NewWindow *,
REG(a1) struct TagItem *,
REG(a6) struct Library *);
struct Screen *ASM newOpenscreen(REG(a0) struct Newscreen *,
REG(a4) ULONG *,
REG(a6) struct Library *);

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struct Window *ASM newOpenWindowTagList(REG(a0) struct NewWindow *,
REG(a1) struct TagItem *,
REG(a4) ULONG *,
REG(a6) struct Library *);

/* exec.library */
VOID(*ASM oldFreeMem) (REG(a1) VOID *,
REG(a0) ULONG,
REG(a6) struct Library *);
VOID ASM newFreeMem(REG(a1) VOID *,
REG(a0) ULONG *,
REG(a4) ULONG *,
REG(a6) struct Library *);

/* graphics.library */
VOID(*ASM oldSetFont) (REG(a1) struct RastPort *,
REG(a0) struct TextFont *,
REG(a6) struct Library *);
VOID ASM newSetFont(REG(a1) struct RastPort *,
REG(a0) struct TextFont *,
REG(a4) ULONG *,
REG(a6) struct Library *);

/* Assembler Stubs */
extern struct ScreenStub();
extern struct OpenWindowTagListStub();
extern struct FreeMemStub();
extern struct SetFontStub();

/* The IWO's to use from amiga.lib */
extern struct LVOOpenscreen;
extern struct LVOOpenWindowTagList;
extern struct LVOFreeMem;
extern struct LVOSetFont;

extern struct ExecBase *SysBase;
extern struct IntuitionBase *IntuitionBase;
struct GfxBase *GfxBase;

/* Use a table and an array to make it a little more generic and easier to
 * add functions.
 */
struct LVOTable
{
    LONG l_t_IWO;
    struct Library *l_t_LibBase;
    ULONG l_t_oldFunction;
    ULONG l_t_newFunction;
};

struct LVOTable lVOArray[] =
{
    {&LVOOpenscreen, (struct Library *) &IntuitionBase,
    {&LVOOpenscreen,
    {&LVOOpenWindowTagList, (struct Library *) &IntuitionBase,
    {&LVOFreeMem, (struct Library *) &SysBase, &oldFreeMem, &newFreeMemStub},
    {&LVOSetFont, (struct Library *) &GfxBase, &oldSetFont, &setFontStub},
    };
    };
    struct JumpTable
    {
        struct SignalSemaphore jL_Semaphore;
        WORD pad_word;
        struct Task jL_Owner;
        UBYTE jL_Function[NUMBEROFFUNCTIONS * 6];
    };
};

/* Strings */
/* The name this JumpTable/Semaphore will get. */
static UBYTE *JName = "ISPY-MiscJumpTable";

static UBYTE *VerStrag = "\05VER: ISPY 37.4 (21.3.91)";
static UBYTE *VerTilte = "IsPy 37.4";
static UBYTE *Copyright = "Copyright (c) 1991 Commodore-Amiga, Inc.\n";
static UBYTE *CBreak = "CTRL-C or BREAK to exit...\n";

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VOID
main(VOID)
{
    Write(Output(), (STRPTR) VerTitle, strlen((STRPTR) VerTitle));
    Write(Output(), Copyright, strlen(Copyright));

    if (SysBase->LibNode.lib_Version > 36)
    {
        if (IntuitionBase = OpenLibrary("intuition.library", 37))
        {
            if (GfxBase = OpenLibrary("graphics.library", 37))
            {
                if (InstallWedge())
                {
                    Write(Output(), CBreak, strlen(CBreak));
                    Wait(SIGBREAKF_CTRL_C);
                    RemoveWedge();
                }
                CloseLibrary(GfxBase);
            }
            else
                Write(Output(), "Couldn't open graphics.library\n", 31);
            CloseLibrary(IntuitionBase);
        }
        else
            Write(Output(), "Couldn't open intuition.library\n", 32);
    }
    else
        Write(Output(), "Requires at least Kickstart 2.04\n", 33);
}

BOOL
InstallWedge(VOID)
{
    struct JumpTable *jumptable;
    ULONG *addressptr;
    UCOUNT i, j;

    Forbid();

    /* Get pointer to JumpTable. Create it if necessary */
    if (jumptable = GetJumpTable(JTName))
    {
        /* Try to get exclusive lock on semaphore, in case it already existed. */
        if (AttemptSemaphore((struct SignalSemaphore *) jumptable))
        {
            /* Make sure nobody else has function addresses in the jumtable */
            if (jumptable->jt_Owner == NULL)
            {
                jumptable->jt_Owner = FindTask(0);
                /* Don't want to disable any longer than necessary */
                Disable();

                for (i = 2, j = 0; i < NUMBEROFFUNCTIONS * 6; i += 6, j++)
                {
                    /* Replace addresses in the jumtable with my own. */
                    addressptr = (ULONG *) ((UBYTE *) jumptable->jt_Function + i);
                    *((ULONG *) LVOArray[j].lt_oldFunction) = (ULONG) * addressptr;
                    *addressptr = (ULONG) LVOArray[j].lt_newFunction;
                    D(zprintf("setting table to Function: 0x%lx\n", *addressptr));
                }
                Enable();
            }
            else
                Write(Output(), "Already running.\n", 16);
            ReleaseSemaphore((struct SignalSemaphore *) jumptable);
        }
        else
            Write(Output(), "Can't lock table.\n", 18);
    }
    else
        Write(Output(), "Can't create jumtable\n", 23);
    Permit();
    return ((BOOL) jumptable);
}

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BOOL
RemoveWedge(VOID)
{
    struct JumpTable *jumptable;
    ULONG *addressptr;
    UCOUNT i, j;

    Forbid();

    if (jumptable = GetJumpTable(JTName))
    {
        D(zprintf("jumtable @ 0x%lx\n", jumptable));

        /* Check if this task owns this jumtable */
        if (jumptable->jt_Owner == FindTask(0))
        {
            /* Get the semaphore exclusively.
             * Depending on what got SetFunction()'ed this could take some time.
             * Also note that shared locks are used to indicate the code is
             * being executed and that shared locks can jump ahead of queue'ed
             * exclusive locks, adding to the waittime.
             */
            ObtainSemaphore((struct SignalSemaphore *) jumptable);

            Disable();

            /* Restore old pointers in jumtable */

            for (i = 2, j = 0; i < NUMBEROFFUNCTIONS * 6; i += 6, j++)
            {
                addressptr = (ULONG *) ((UBYTE *) jumptable->jt_Function + i);
                *addressptr = *((ULONG *) LVOArray[j].lt_oldFunction);
                D(zprintf("setting table to oldFunction: 0x%lx\n", *addressptr));
            }

            Enable();

            jumptable->jt_Owner = NULL;
            ReleaseSemaphore((struct SignalSemaphore *) jumptable);
        }
    }

    Permit();

    return (TRUE);
}

struct JumpTable *
GetJumpTable(UBYTE * name)
{
    struct JumpTable *jumptable;
    ULONG *addressptr;
    UWORD *jmpinstr;
    UBYTE *jtname;
    UCOUNT i, j;

    /* Not really necessary to forbid again, just to indicate that I don't
     * want another task to create the semaphore while I'm trying to do the
     * same. Here GetJumpTable() is only called from InstallWedge(), so it
     * will just bump the forbid count.
     */
    Forbid();

    if (!(jumptable = (struct JumpTable *) FindSemaphore(name)))
    {
        if (jumptable = AllocMem(sizeof(struct JumpTable), MEMF_PUBLIC | MEMF_CLEAR))
        {
            if (jtname = AllocMem(32, MEMF_PUBLIC | MEMF_CLEAR))
            {
                for (i = 0, j = 0; i < NUMBEROFFUNCTIONS * 6; i += 6, j++)
                {
                    jmpinstr = (UWORD *) ((UBYTE *) jumptable->jt_Function + i);
                    *jmpinstr = 0x4EF9;
                }
            }
        }
    }
}

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        addressptr = (ULONG *) ((BYTE *) jmpTable->jc_Function + i + 2);
        *addressptr = (ULONG) SetFunction(
            (struct Library *) (*((ULONG *) LVOArray[j].lvc_LibBase)),
            LVOArray[j].lvc_LVO,
            (VOID *) ((BYTE *) jmpTable->jc_Function + i));
    }

    jmpTable->jc_Semaphore.ss_Link.lh_Pri = 0;

    strcpy(jname, name);
    jmpTable->jc_Semaphore.ss_Link.lh_Name = jname;
    AddSemaphore((struct SignalSemaphore *) jmpTable);
    /* In 1.2/1.3 AddSemaphore() didn't work properly.
    ** Under 1.2/1.3, change it to:
    ** InitSemaphore(jmpTable);
    ** Forbid();
    ** Enqueue(&SysBase->SemaphoreList, jmpTable);
    ** Permit();
    */
    }
    else
    {
        FreeMem(jmpTable, sizeof(struct jmpTable));
        jmpTable = NULL;
    }
}

Permit();

/* If succeeded, you now have a jmpTable which entries point to the original
** library functions. If another task SetFunction()'ed one or more of those
** already, that task can never go away anymore.
*/
return (jmpTable);
}

/* Note: if you'd want this to work with 1.3, you wouldn't/couldn't lock the
** semaphore, but instead would have to use a global to in- and decrement.
** When exiting, you'd spin around the global counter, waiting for it to reach
** zero. At that point you'd Disable(), reset the pointers in the jmpTable and
** Enable() again.
*/

struct Screen *ASM
newOpenScreen(REG(a0) struct NewScreen * newscreen,
              REG(a4) ULONG * stackptr,
              REG(a6) struct Library * base)
{
    struct SignalSemaphore *jt;
    struct Screen *screen = NULL;

    /* Find the semaphore to lock shared, indicating the routine is being run. */
    /* For speed reasons you may want to cache the pointer to the semaphore
    ** in a global variable */
    if (jt = FindSemaphore(jtName))
    {
        /* Lock shared in 2.0. In 1.3 you'd increment a global counter */
        ObtainSemaphoreShared(jt);
        /* Simple test for valid argument. Could check all the fields too. */
        if (newscreen != NULL)
        {
            screen = (*oldOpenScreen) (newscreen, base);
        }
        else
        {
            ULONG          ACaller = stackptr[ACALLER];
            ULONG          CCaller = stackptr[CCALLER];

            Forbid();
            /* To make sure the output isn't garbled */
            zprintf("OpenScreen(NULL) by '%s' (at 0x%x) from A:0x%x C:0x%x\n",
                SysBase->ThisTask->rc_Node.lh_Name,
                SysBase->ThisTask,
                ACaller,

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        CCaller,
        stackptr);
        Permit();
    }
    /* Release shared lock. In 1.3 you'd decrement the global pointer */
    ReleaseSemaphore(jt);
}

return (screen);
}

struct Window *ASM
newOpenWindowTagList(REG(a0) struct NewWindow * newWindow,
                    REG(a1) struct TagItem * tags,
                    REG(a4) ULONG * stackptr,
                    REG(a6) struct Library * base)
{
    struct SignalSemaphore *jt;
    struct Window *window = NULL;

    if (jt = FindSemaphore(jtName))
    {
        ObtainSemaphoreShared(jt);
        if (newWindow != NULL || tags != NULL)
        {
            window = (*oldOpenWindowTagList) (newWindow, tags, base);
        }
        else
        {
            ULONG          ACaller = stackptr[ACALLER];
            ULONG          CCaller = stackptr[CCALLER];

            Forbid();
            zprintf("OpenWindowTagList(NULL, NULL) by '%s' (at 0x%x) from A:0x%x\n",
                SysBase->ThisTask->rc_Node.lh_Name,
                SysBase->ThisTask,
                ACaller,
                CCaller,
                stackptr);
            Permit();
        }
        ReleaseSemaphore(jt);
    }
    return (window);
}

VOID ASM
newFreeMem(REG(a1) VOID * memptr,
           REG(a0) ULONG size,
           REG(a4) ULONG * stackptr,
           REG(a6) struct Library * base)
{
    struct SignalSemaphore *jt;

    if (jt = FindSemaphore(jtName))
    {
        ObtainSemaphoreShared(jt);
        if (memptr != NULL && size != 0L)
        {
            (*oldFreeMem) (memptr, size, base);
        }
        else
        {
            ULONG          ACaller = stackptr[ACALLER];
            ULONG          CCaller = stackptr[CCALLER];

            Forbid();
            zprintf("FreeMem(0x%x, %ld) by '%s' (at 0x%x) from A:0x%x C:0x%x\n",
                memptr, size,
                SysBase->ThisTask->rc_Node.lh_Name,
                SysBase->ThisTask,
                ACaller,

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        CCaller,
        stackptr);
    }
    Permit();
}

ReleaseSemaphore(jt);
}

VOID ASM
newSetFont(REG(a1) struct RastPort * rp,
           REG(a0) struct TextFont * font,
           REG(a4) ULONG * stackptr,
           REG(a6) struct Library * base)
{
    struct SignalSemaphore *jt;

    if (jt = FindSemaphore(JTName))
    {
        ObtainSemaphoreShared(jt);
        if (rp != NULL && font != NULL)
        {
            (*oldSetFont) (rp, font, base);
        }
        else
        {
            ULONG          ACaller = stackptr[ACALLER];
            ULONG          CCaller = stackptr[CCALLER];

            Forbid();
            zprintf("SetFont(0x%lx,0x%lx) by '%s' (at 0x%lx) from A:0x%lx C:0x%lx",
                SP:0x%lx\n",
                rp, font,
                SysBase->ThisTask->tc_Node.ln_Name,
                SysBase->ThisTask,
                ACaller,
                CCaller,
                stackptr);
            Permit();
        }
        ReleaseSemaphore(jt);
    }
}

```

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**
**      Ispy stubs
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**
**
INCLUDE "exec/types.i"

SECTION CODE

XREF    _SysBase

XREF    _LVOForbid
XREF    _LVOPermit

XREF    _newOpenScreen
XREF    _newOpenWindowTagList
XREF    _newFreeMem
XREF    _newSetFont

XDEF    _OpenScreenStub
XDEF    _OpenWindowTagListStub
XDEF    _FreeMemStub
XDEF    _SetFontStub

_OpenScreenStub:
    movem.l    a4,-(sp)
    lea        4(sp),a4
    jsr        _newOpenScreen
    movem.l    (sp)+,a4
    rts

_OpenWindowTagListStub:
    movem.l    a4,-(sp)
    lea        4(sp),a4
    jsr        _newOpenWindowTagList
    movem.l    (sp)+,a4
    rts

_FreeMemStub:
    movem.l    a4,-(sp)
    lea        4(sp),a4
    jsr        _newFreeMem
    movem.l    (sp)+,a4
    rts

_SetFontStub:
    movem.l    a4,-(sp)
    lea        4(sp),a4
    jsr        _newSetFont
    movem.l    (sp)+,a4
    rts

END

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