GEOS plain boot

14 files, 0 selected 113 Kbytes used 53 Kbytes free

Introduction to GEOS Programming

ShadowM
ECCC 2015

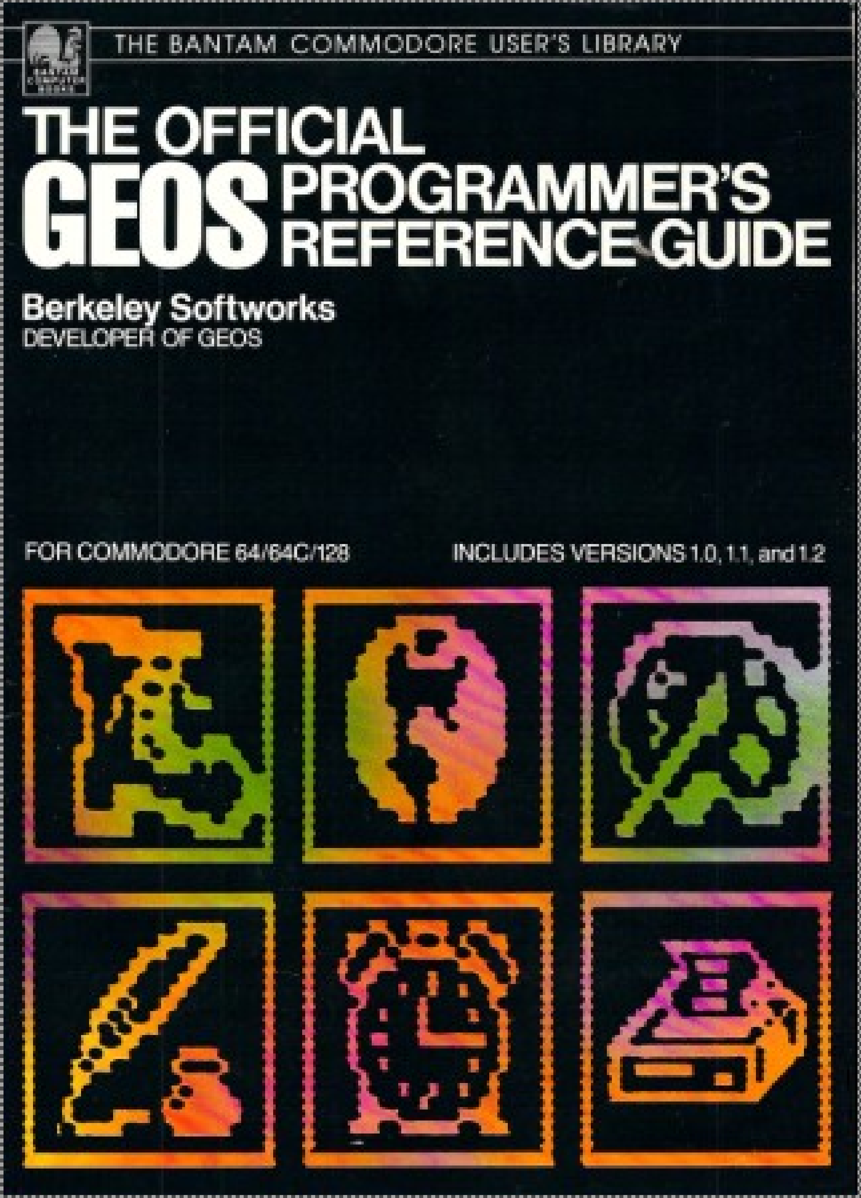
Speaker Bio

- GEOS user since 1987
- several released applications including geoLink, geoSnap, ulecSwitch
- author of the infamous “Shadow Virus”
- GEOS pages at lyonlabs.org

Agenda

- familiarity with GEOS assumed
- knowledge of 6502 assembly assumed
- only “classic” geoProgrammer; no 128
- geoProgrammer build process
- using the main GEOS APIs
- demo program used for illustration

Learning Resources



THE BANTAM COMMODORE USER'S LIBRARY

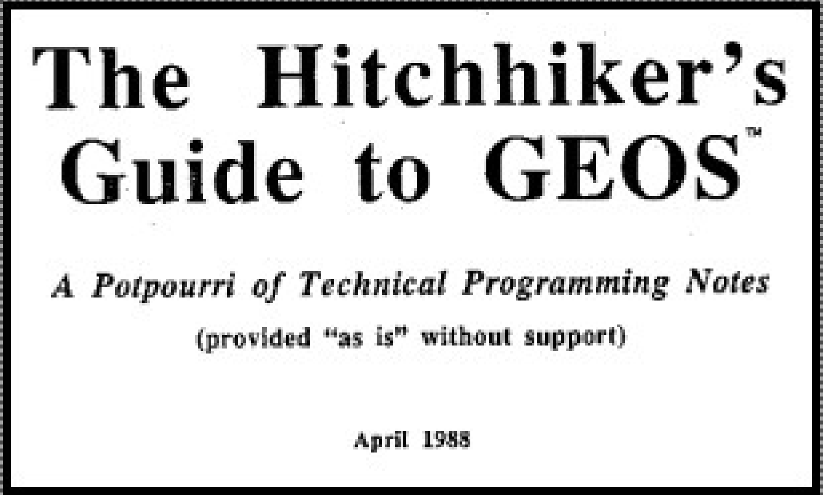
THE OFFICIAL GEOS PROGRAMMER'S REFERENCE GUIDE

Berkeley Softworks
DEVELOPER OF GEOS

FOR COMMODORE 64/64C/128

INCLUDES VERSIONS 1.0, 1.1, and 1.2

Make sure to check out my PRG errata sheet.



The Hitchhiker's Guide to GEOS™

A Potpourri of Technical Programming Notes

(provided "as is" without support)

April 1988

You can also learn a lot from Maciej Witkowiak's disassembly of the GEOS kernal.

geoProgrammer

- make sure to use 1.1
- geoAssembler (macro assembler)
- geoLinker (linkage editor)
- geoDebugger (symbolic debugger)
- 400-page manual

GEOPROGRAMMER™

ASSEMBLY LANGUAGE ENVIRONMENT FOR USE WITH GEOS™

```
;****       Super Draw       ****
.include macroFile
.include constants


              .psect      StartAc
ProgStart:    LoadW       r0, Gra
              jsr         Graphi
              LoadW       r0, Mai
              jsr         DoMer
              rts
BrushIcon:
```

geoAssembler

- pseudo-ops, conditional assembly, macros
- local labels for branches
- pseudo-registers for zero-page locations
- source files are geoWrite documents
- bitmaps can be pasted into source
- errors written to a geoWrite file
- does not produce traditional listings

geoLinker

- directives in geoWrite file
- specifies whether SEQUENTIAL or VLIR
- produces executable and symbol file(s)

```
.output        geosDemo
.header        geosDemoH.rel
.seq
geosDemoS.rel
geosDataS.rel
```

geoDebugger

- you *really* want to use an REU
- RESTORE hotkeys into debugger
- F7 to display hi-res screen and back again
- enter addresses as symbols in commands
- has its own macro language

```
.macro sc ;"show coordinates"
print"top/bottom: ",@r2L:.,@r2H:.[cr]
print"left/right: ",@@r3:.,@@r4:.[cr]
.endm
```

Files Needed to Create an Executable

- assembly source files
- include files (e.g. geosSym, geosMac)
- GEOS header file
- linkage directives file

Output files:

- executable program file
- debugger symbol table
- geoWrite symbol table (if requested)

Typical Program Initialization

- clear screen
- initialize menus, icons
- draw initial screen
- rts (to MainLoop), wait for events

Interrupt vs. MainLoop (simplified)

during interrupt handler:

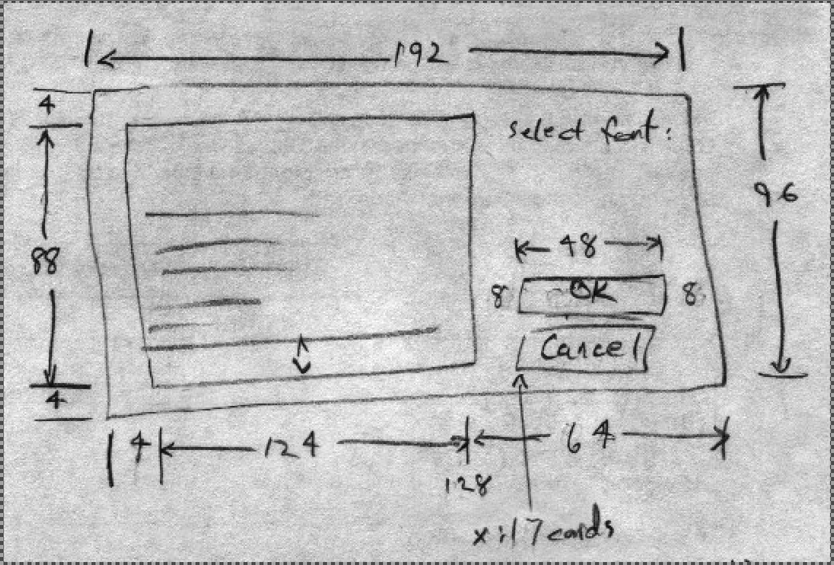
- update mouse position and click status
- scan keyboard and populate queue
- update process/sleep timers

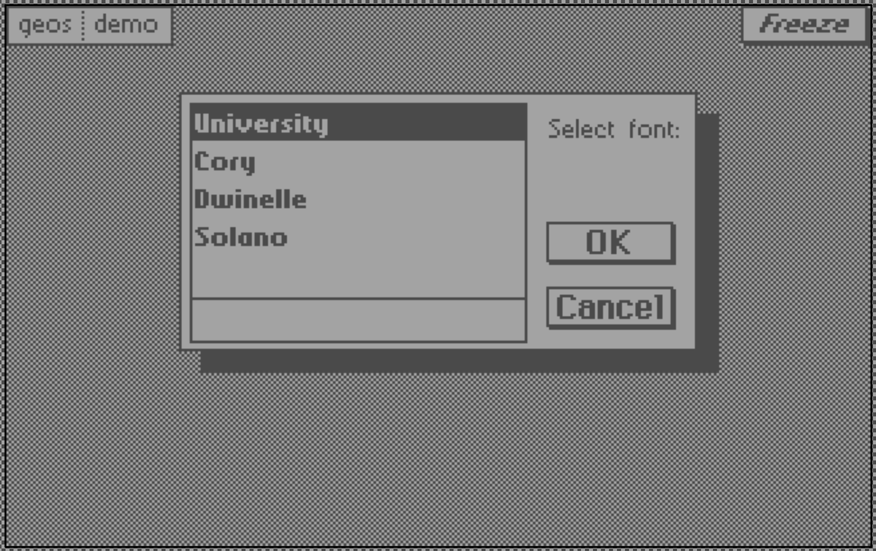
during MainLoop:

- service clicks: menus, icons, “otherPress”
- service keyboard events (e.g. GetString)
- service process/sleep timeouts

Planning Your GUI

Sorry folks, no layout manager!





Clearing the Screen

- SetPattern
- Rectangle vs. FrameRectangle
- background screen / RecoverRectangle

```
lda    #2            ;50% stipple
jsr    SetPattern
LoadB  r2L,0
LoadB  r2H,199
LoadW  r3,0
LoadW  r4,319
jsr    Rectangle     ;clear screen
```

Setting up Menus

- sizing: trial & error, geoPaint, ruler DA

```
LoadW  r0,mainMenu
lda    #0
jsr    DoMenu
```

```
mainMenu:  .byte      0,14
           .word      0,61
           .byte      HORIZONTAL | 2
;          ------------------------------
           .word      geosText
           .byte      SUB_MENU
           .word      geosMenu
;          ------------------------------
           .word      demoText
           .byte      SUB_MENU
           .word      demoMenu
;          ------------------------------
geosText:  .byte      "geos",0
demoText:  .byte      "demo",0
           [submenu definitions...]
```

Setting up Icons

- create your own in geoPaint
- system icons use University 12pt bold
- always call DoIcons, even if no icons!

```
LoadW  r0,frzIcons
       jsr DoIcons
```

```
frzIcons: .byte  1        ;number of icons
          .word  296      ;X-pos. to leave cursor
          .byte  7        ;Y-pos. to leave cursor
;         -------------------------------------------
frzBmp:   .word  frzIcon  ;address of bitmap
          .byte  34       ;X-position in bytes (left)
          .byte  0        ;Y-position in pixels (top)
          .byte  6,15     ;size (X: cards, Y: pixels)
frzPtr:   .word  svcRtn   ;address of service routine
```

Dialog Boxes

- more than modal: state saved & restored
- DBTXTSTR, DBICON, DBGETFILES...

```
LoadW   r0,badPntDB
        jsr DoDlgBox
```

```
badPntDB:  .byte   DEF_DB_POS | 1
;          ----------------------------
           .byte   DBTXTSTR
           .byte   TXT_LN_X      ;16 pixels
           .byte   TXT_LN_2_Y    ;32 pixels
           .word   badPtMsg
;          ----------------------------
           .byte   OK
           .byte   DBI_X_2       ;17 cards
           .byte   DBI_Y_2       ;72 pixels
           .byte   0
;          ----------------------------
badPtMsg:  .byte   "Invalid point size.",0
```

String Handling

- PutString, GetString (baseline vs. top)
- string escapes for styles, location...

```
LoadW       r11,#XPOS
LoadB       r1H,#YPOS
LoadW       r0,string
jsr         PutString
```

```
LoadW       r11,#XPOS
LoadB       r1H,#YPOS
LoadB       r2L,#MAX_CHARS
LoadB       r1L,0 ;no fault
LoadW       r0,string
LoadW       keyVector,handler
jsr         GetString
```

loading a font:

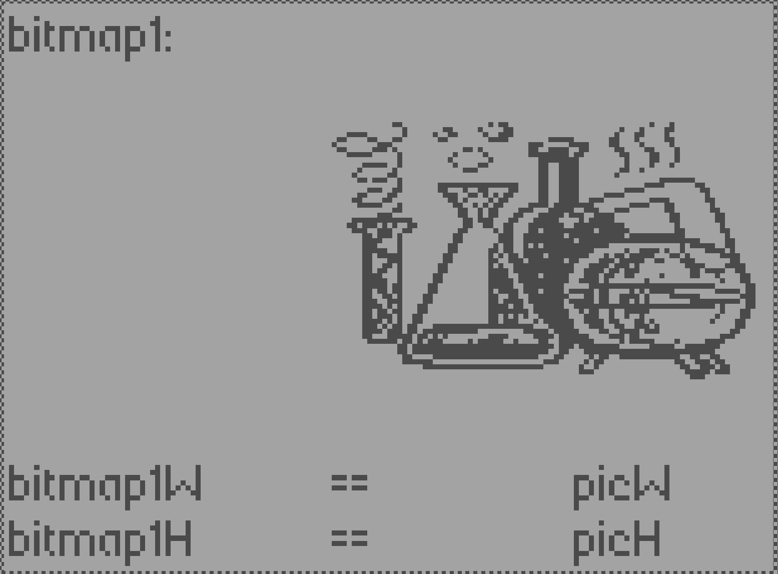
```
LoadW       r0,fontName
jsr         OpenRecordFile
lda         #12
jsr         PointRecord
LoadW       r2,$6000-fontLoad
LoadW       r7,fontLoad
jsr         ReadRecord
LoadW       r0,fontLoad
jsr         LoadCharSet
```

geos ⋮ file ⋮ view ⋮ disk ⋮ select ⋮ page ⋮ options

Bitmap Display

- can be decompacted from memory or disk
- static bitmaps can be pasted into source
- assembler assigns values of picW, picH

```
LoadW       r0,bitmap1
LoadB       r1L,#XPOS     ;in cards
LoadB       r1H,#YPOS     ;in pixels
LoadB       r2L,bitmap1W  ;in cards
LoadB       r2H,bitmap1H  ;in pixels
jsr         BitmapUp
```



```
bitmap1:

bitmap1W        ==          picW
bitmap1H        ==          picH
```

Processes

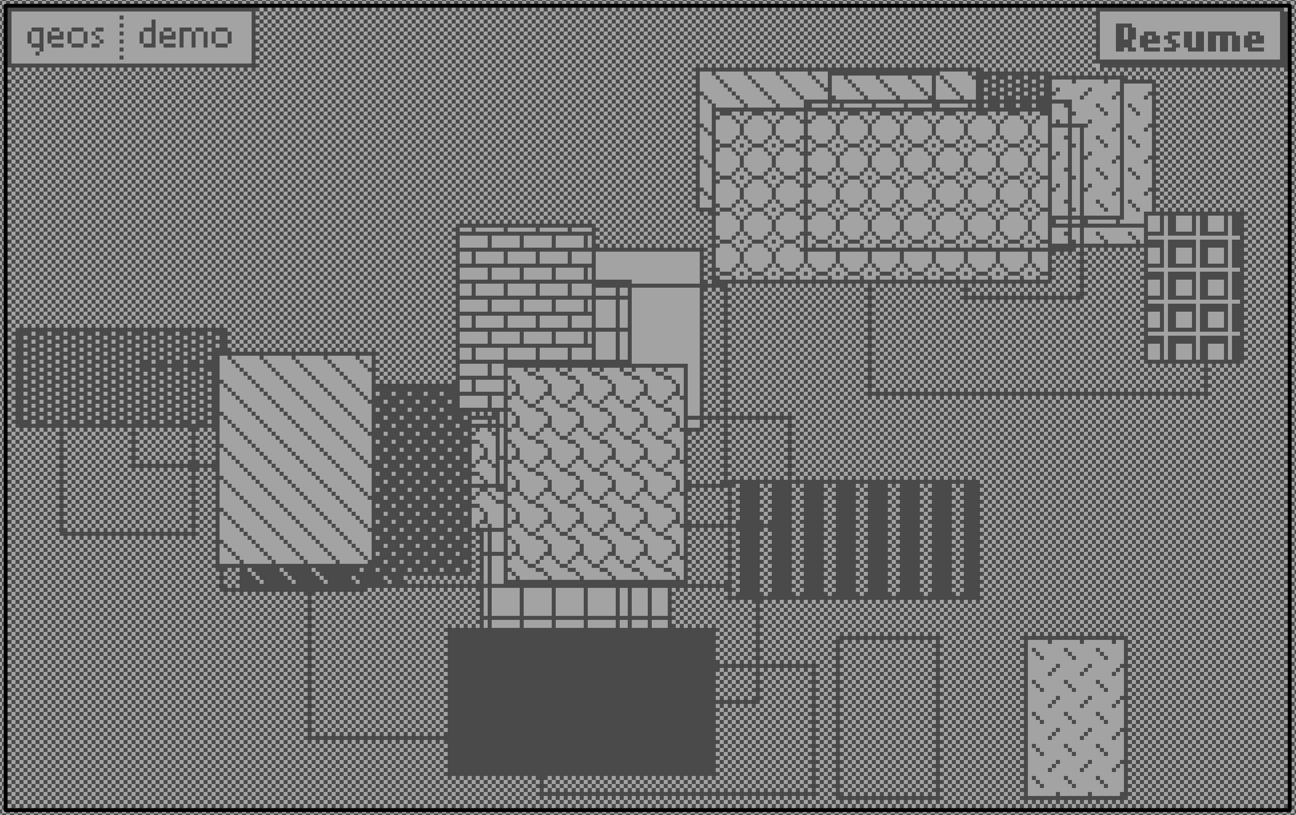
- "cooperative multi-threading"
- process handlers called during MainLoop
- call EnableProcess to start a process
- processes can be frozen or blocked

```
LoadW  r0,procTbl
lda    #NUM_PROC
jsr    InitProcesses
```

```
procTbl:  .word   showRct
          .word   15
          .word   showGfx
          .word   30
          .word   showStr
          .word   45
```

geos ⁞ file ⁞ view ⁞ disk ⁞ select ⁞ page ⁞ options

DEMO PROGRAM



Resources

my GEOS page:

http://www.lyonlabs.org/commodore/onrequest/geos.html

- operating system, apps, programming tools
- reference manuals, programming “tips 'n' tricks” page
- reverse-engineered GEOS source (Maciej Witkowiak)
- source code for some apps I wrote

“Commodore GEOS” Google group

##geos IRC channel on Freenode