# A Logical Piano Keyboard

**Silicon Valley Forth Interest Group**

**October 23, 2010**

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# A Wrong Keyboard Design

- **The keyboard design put the scale of C into hardware**

- **It makes shifting to other scales very difficult**

- **Placing white and black keys should be done in software, not in hardware**

# A Logical Keyboard

- **A logical keyboard should be designed as shown on the screen**
- **All 12 keys in an octave are equally spaced**
- **Black keys are assigned logically, and can be shifted at will**

# How to Shift Scale

- **Lowering B to A#, shift to scale of F, then to A#, …**
- **Raising F to F#, shift to scale of G, then to D, …**

# F# and Windows

- **F# is the simplest FORTH for Windows**
- **It is based on eForth Model**
- **It is optimized for X86 processors**
- **It can call all Windows API**

# Projects in F#

- When F# is booted up, it opens a window so user can select a .FEX file to load

- .FEX files loads all application files

- Projects can be organized using .FEX files

# Load Windows Libraries

```
LoadLibrary kernel32.dll CONSTANT kernel32
LoadLibrary user32.dll CONSTANT user32
LoadLibrary gdi32.dll CONSTANT gdi32
LoadLibrary comdlg32.dll CONSTANT comdlg32
```

# Load Windows Functions

**$3 kernel32 WINAPI: GetModuleFileNameA**

**$2 kernel32 WINAPI: GetCurrentDirectoryA**

**$4 user32 WINAPI: GetMessageA**

**$5 user32 WINAPI: CallWindowProcA**

**$1 gdi32 WINAPI: GetStockObject**

**$5 gdi32  WINAPI: Ellipse**

**$5 gdi32  WINAPI: Rectangle**

# Use Windows Functions

```
: ellipse ( x1 y1 x2 y2 -- )
 >R >R >R >R
 MEMDC R> R> R> R> Ellipse DROP
;
: circle ( x y r -- )
 >R PAD ! DUP R@ - SWAP R@ +
 PAD @ R@ - SWAP PAD @ R> +
 ellipse
 ;
: rectangle ( x1 y1 x2 y2 -- )
 >R >R >R >R
 MEMDC R> R> R> R> Rectangle DROP
;
```

# Mouse Interface

See CanvasE.f file for
   CANVASPROC

See Music.f for
   MouseMove
   LButtonDown
   RButtonUp

# Beep Function

```
2 kernel32 WINAPI: Beep
: PlayTone ( frequency duration )
  Beep drop ;
: LButtonDown
  MouseKey dup -1 = if drop exit
  then
  cells NOTES + @ 1000 PlayTone
  ;
```

# Demonstrations

- Start Music.fex project
- Play in scale of C
- Shift to scale of F
- Shift to scale of D
- Restore to scale of C
- Shift to scale of G

# Questions?

Thank you very much!