

#### Deploying Modern Solutions on the Mac

Kevin Walzer

## Overview

- About myself
- Brief history of Tcl/Tk on the Mac
  - Carbon port
  - Cocoa port
  - Tk-Cocoa 2.0

- State of Tk/Mac at present
  - Tk/Mac applications
  - Best practices for developing Tk on the Mac
- Optimizing a Tk app on OS X: A case study
  - Looking to the future

## About me



- Kevin Walzer
- www.codebykevin.com
- Developing Tcl/Tk apps on Mac since 2004
  - Developing Tcl/Tk extensions since 2006
  - Took over as Tk-Mac maintainer in 2011

# Brief history of Tcl/Tk

- Created by John Osterhout at UC-Berkeley in late 1980s on Unix
- Osterhout left academe for Sun Microsystems in mid-1990s; Tk ported to Mac and Windows
  - Unix (X11) and Windows ports highly stable;
     Mac has gone through several major transitions

# Mac port: Classic

• Tk GUI on Classic Mac OS

	Open Connection	
Open a n	ew FTP connection	
Hostname:		
Username:		
Password:		
Directory:		Up
Data Mode:	Binary	Ascii
Rem	ote Directory	
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Connect	Cancel	

Tk ported to Mac by Roy Johnson using Toolbox API

• Mid-1990s





- Called "Tk Aqua"
- Ported by Jim Ingham and Ian Reid, sponsored by Apple
  - October 2001

Relatively-quick "Carbonizing" of Tk with updated Toolbox API for OS X

# Carbon port

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Selection Color: Active Over Color:	-compound none		
Grid Background: Frame Background:	-default disabled		
Workspace Grid:	-disabledforeground #a3a3a3		
Show Grid Lines Default Grid Spacing: 40	-height 0		
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	-justify center		
	OK	Cancel Apply	
OK Cancel Apply			

#### Daniel Steffen takes over as lead maintainer

April 2007: Completes major modernization of Carbon port, removing deprecated "Classic" API's

June 2007: Apple announces deprecation of Carbon API's in favor of Cocoa API's: Carbon will be supported as 32-bit API only, Cocoa will be supported as 64-bit

Many developers unhappy



- Apple hires Daniel Steffen to port Tk from Carbon to Cocoa
- Begins work September 2008, announces release April 2009
- Ensures Tk's viability on OS X with 64-bit support

## Benefits of Cocoa port



- Can do things Carbon port cannot
  - Better UI integration
  - Native icons/bitmaps
  - Native window behavior
  - Easier to integrate with other Cocoa API's
  - 64-bit support/long term viability

## 2010-2013: Cocoa issues



- More complex design than Carbon
- High-level widgets and event loop do not map neatly to Tk's low-level, draw-everything model
- Tk often freezes at random intervals, especially when event loop overloaded
- Drawing sometimes displays artifacts

#### 2010-2013 Cocoa issues



- Use of private API's prevents deploying Tk-Cocoa apps in Mac App Store
- Author of port, Daniel Steffen, hired by Apple full time and can no longer works on Tk
- Other developers lack expertise to address issues

#### Tk-Cocoa 2.0

- Decided to remove private API's
- Removal revealed numerous flaws; Tk was seriously broken
- Re-implementing several Tk widgets with alternative API solved many of these issues
- Converted button, menubuttons and scrolling to HITheme

#### Tk-Cocoa 2.0

- Cocoa design: NSWindow (toplevel) wraps NSView (window content/client area)
- Tk uses single NSView for drawing child windows in a toplevel
- Buttons and scrolling were additional NSViews with their own hierarchy of subviews
- Tk could not handle this complexity
- HITheme is a drawing-only API; ttk themed widgets already use it
- Much simpler to render widgets only and delegate widget behavior to Tk
- HITheme is a relic of Carbon that was not removed because it is useful for custom drawing

#### Tk-Cocoa 2.0

- Marc Culler, Python and Tkinter developer, began contributing numerous patches to fix and improve various aspects of Cocoa port: image rendering, event processing, scrolling, memory management
- Did not keep every one of his changes but there was so much iteration that he earned a co-author credit on Tk-Cocoa

#### **Tk-Cocoa at present**

- Finally stable: 8.6.5 will mark point release of stable Tk/Mac
- Rapid, heavy development phase complete



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 Bitrock uses Tcl/Tk for its Installbuilder product and Bitnami open-source distributions

• www.bitrock.com



ClassHierarchies::ProhibitAutoloading [unconfigured in profile]

- ActiveState uses Tcl/Tk for the GUI on its developer tools
- www.activestate.com



- Farmer's Wife, a facilities management application
- www.farmerswife.com

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 All of my own applications at www.codebykevin.com use Tk GUI's

#### Tcl/Tk apps on OS X – Open Source

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- https://github.com/zdia/g
- Password manager

#### Tcl/Tk apps on OS X – Open Source



SnapPy, a
 scientific/molecular
 visualizer
 http://www.math.uic.
 edu/t3m/SnapPy/

#### Tcl/Tk apps on OS X – Open Source

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 IDLE, Python's IDE bundled with the programming language

 Probably the most widely-used Tk application on OS X: source of many bug reports against Tk

- Mac users place a premium on the user experience and user interface
- Mac platform has interface guidelines that most apps conform to
- While Tk is cross-platform, a little extra work will make your app work much better in the Mac environment and will make Mac users more comfortable using it.

- Use a Mac application structure starpack
  - -- StarkitApp.app
    - -- Contents

      - -- Info.plist <----XML file with app configuration data
      - -- MacOS
      - `-- starpack <----executable
        - - -- StarkitApp.icns

 Use a Mac application structure – standalone build of Wish



More information on app bundles and deployment:

http://www.codebykevin.com/tutorial.html

- Keyboard accelerators: use Command instead of Control
- Menu items:

```
if { [tk windowingsystem] == "aqua"} {
```

```
proc ::tk::mac::ShowPreferences {} {
    prefs_dialog_command
}
proc ::tk::mac::Quit {} {
    exit
}
proc tk::mac::ShowHelp {} {
    user_help_cmd
}
```

#### Optimizing a Tk app on OS X: A case study

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- Manpower, a man page viewer
- Similar functionality to TkMan: provides tools for searching, browsing, and viewing man pages, using the rman tool wrapped by a Tk GUI
- No source code in common; design similarities end with use of rman

#### Optimizing a Tk app on OS X: A case study

- Manpower makes use of many Mac-specific API's: scriptable via AppleScript and Services interfaces, supports native printing, supports native fullscreen API via window manager
- Tk extension packages for these API's at http://fossil.codebykevin.com -- look for tkcomponents repo

#### Looking to the future

- Main priorities for Tk: Keep up to date with Mac API churn
- Now that it is reasonably stable, I do not anticipate making radical changes
- Tk will likely continue to require more maintenance on Mac than Windows or X11

#### Change in programming languages



- Apple has added a new language, Swift, that they are positioning as the development language of the future
- They likely will continue to support Objective-C and C indefinitely as millions and millions of lines of code are written in these languages
- Objective-C will likely not undergo further enhancement

#### Implications of Swift for Tcl/Tk

- The move to Swift does not present as many issues for Tk as the switch from Carbon to Cocoa, which was an existential threat
- Cocoa vs. Carbon was an API shift; Swift is still Cocoa
- Swift seems more analogous to C-Sharp on Windows

#### **Questions and thanks**

- I am happy to answer any questions.
- Thanks for your interest.