AndroWish – 963 days later

or

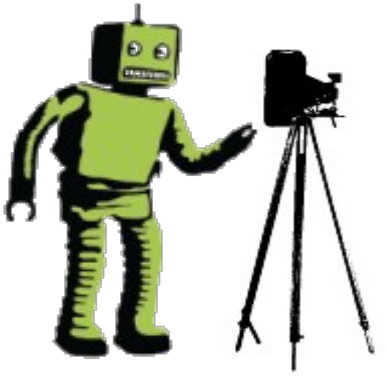
the Good, 

the Bad, 

and

the Ugly. 

`borg camera ...`



- Tcl interface to deal with `android.hardware.camera`
- Capture images into Tk photo images since this is the most universal format
- Operations to start and stop continuous capture for live video display
- Operation to take a real photo with higher resolution in JPEG format
- Report availability of a new captured (live) image by virtual event `<<ImageCapture>>` to toplevel windows
- Report availability of a captured JPEG image by virtual event `<<PictureTaken>>`
- Facility to control properties/parameters of the camera(s)

`borg camera` commands (overview)

Minor command	Description
`close`	Close currently open camera
`current`	Return index of currently open camera (usually 0=rear, 1=front)
`grayimage`	Retrieve last captured image in gray scale
`image`	Retrieve last captured image in RGB
`info`	Retrieve current camera orientation relative to screen
`jpeg`	Retrieve last captured image as JPEG byte array
`mirror`	Flip captured image horizontally and/or vertically
`numcameras`	Return number of cameras
`open`	Open camera given index (usually 0=rear, 1=front)
`orientation`	Rotate captured image by 0, 90, 180, or 270 degrees
`parameters`	Get and/or set camera parameters (e.g. image size)
`start`	Start image capture
`stop`	Stop image capture
`takejpeg`	Initiate capture of a JPEG image (with higher resolution)

borg camera (a small Webcam #1)

```
proc init {} {
  image create photo img -width 640 -height 480
  borg camera open
  borg camera parameters preview-size 640x480 \
    picture-size 640x480 jpeg-quality 80
  bind . <<ImageCapture>> {
    borg camera image img
  }
  borg camera start
  pack [label .label -image img]
  socket -server request 8080
}
```

borg camera (a small Webcam #2)

```
proc request {sock args} {
  chan configure $sock -translation binary -blocking 0 \
    -buffering none
  after 100
  catch {chan read $sock 1000} err
  chan configure $sock -blocking 1
  if {![borg camera takejpeg]} {
    chan close $sock
    return
  }
  bind . <<PictureTaken>> [list send_jpeg $sock]
  chan puts -nonewline $sock "HTTP/1.0 200 OK\r\n”
  chan puts -nonewline $sock \
    “Connection: close\r\nContent-Type: image/jpeg\r\n\r\n"
}
```

borg camera (a small Webcam #3)

```
proc send_jpeg {sock} {
  bind . <<PictureTaken>> {}
  catch {
    chan puts -nonewline $sock [borg camera jpeg]
  }
  catch {chan close $sock}
  borg camera start
}

init
```

zbar/dmtx commands

- Decode barcodes, QR codes etc. from photo images or byte arrays
- If the Tcl core supports threads, decode process can be carried out asynchronous, i.e. in the background using true concurrency

Examples:

```
zbar decode nameOfPhotoImage
```

returns a list of number of milliseconds for decoding, symbology literal, and result as byte array

```
zbar async_decode nameOfPhotoImage callback
```

carries out decoding asynchronously and invokes callback with arguments like in the synchronous example above

zbar/dmtx commands

Documentation on www.androwish.org:

dmtx command

zbar command

Unfortunely, the implementations of both commands don't have a TEA build infrastructure yet.

Examples:

androwish:///assets/dmtx0.1/demos/android_demo%2Etcl

androwish:///assets/zbar0.1/demos/android_demo%2Etcl

These links would work on an Android tablet, if this document were HTML and viewed in Firefox or Chrome

Emojis (Unicode 8.0)

```
package require tkpath

pack [::tkp::canvas .c -width 400 -height 400 -background white]

.c create ptext 200 200 -fontfamily Symbola -fontsize 70 \
  -fill gray70 -stroke black -strokewidth 1 -textanchor c \
  -text "\U1F601\U1F602\U1F603\n\U1F604\U1F605\U1F606\n\U1F607\U1F608\U1F609"
```

- Inspired by Jan Nijtman's Unicode 8.0 presentation at EuroTCL 2015
- Currently, two approaches are possible in Tcl core
- TCL_UTF_MAX=4: Tcl_UniChar is a 16 bit data type, codepoints beyond BMP are expressed as surrogate pairs
- TCL_UTF_MAX=6: Tcl_UniChar is a 32 bit data type, all codepoints correspond to a single Tcl_UniChar
- AndroWish chose TCL_UTF_MAX=6 since this fits font rendering with AGG/freetype which take 32 bit codepoints

Emojis, things to consider

- AndroWish might work with TCL_UTF_MAX=4, but this is untested
- On Win32 many OS interfaces use the WCHAR data type (16 bit) thus an additional/another translation has to take place when dealing with the OS
- Text input on both Android (SDL2) and Win32 translate key events to 16 bit quantities with surrogate pairs
- Text input in X11 and MacOSX is still terra incognita and needs further investigation
- Font mapping in Tk/SDL, Tk/WIN32, and Tk/X11 (Xlib, not Xft) is memory hungry regarding subfonts
- Need for a comparison of run-time costs of TCL_UTF_MAX=6 vs. TCL_UTF_MAX=4

tkpath and pdf4tcl

- With René Zaumseil's help: tkpath items output PDF primitives directly to pdf4tcl, conventional canvas items still use the pdf4tcl approach
- pdf4tcl now has additional interfaces for tkpath (for text output, image objects, extended graphics states)
- tkpath PDF generation calls into pdf4tcl
- Almost all tkpath item properties implemented, i.e. alpha transparency, gradient fills, images with tinting
- Unfinished: text/font w.r.t. encodings, rendering, and font substitution, but basic Latin 1 with standard fonts works
- Unfinished: repeating gradient fills

undroidwish

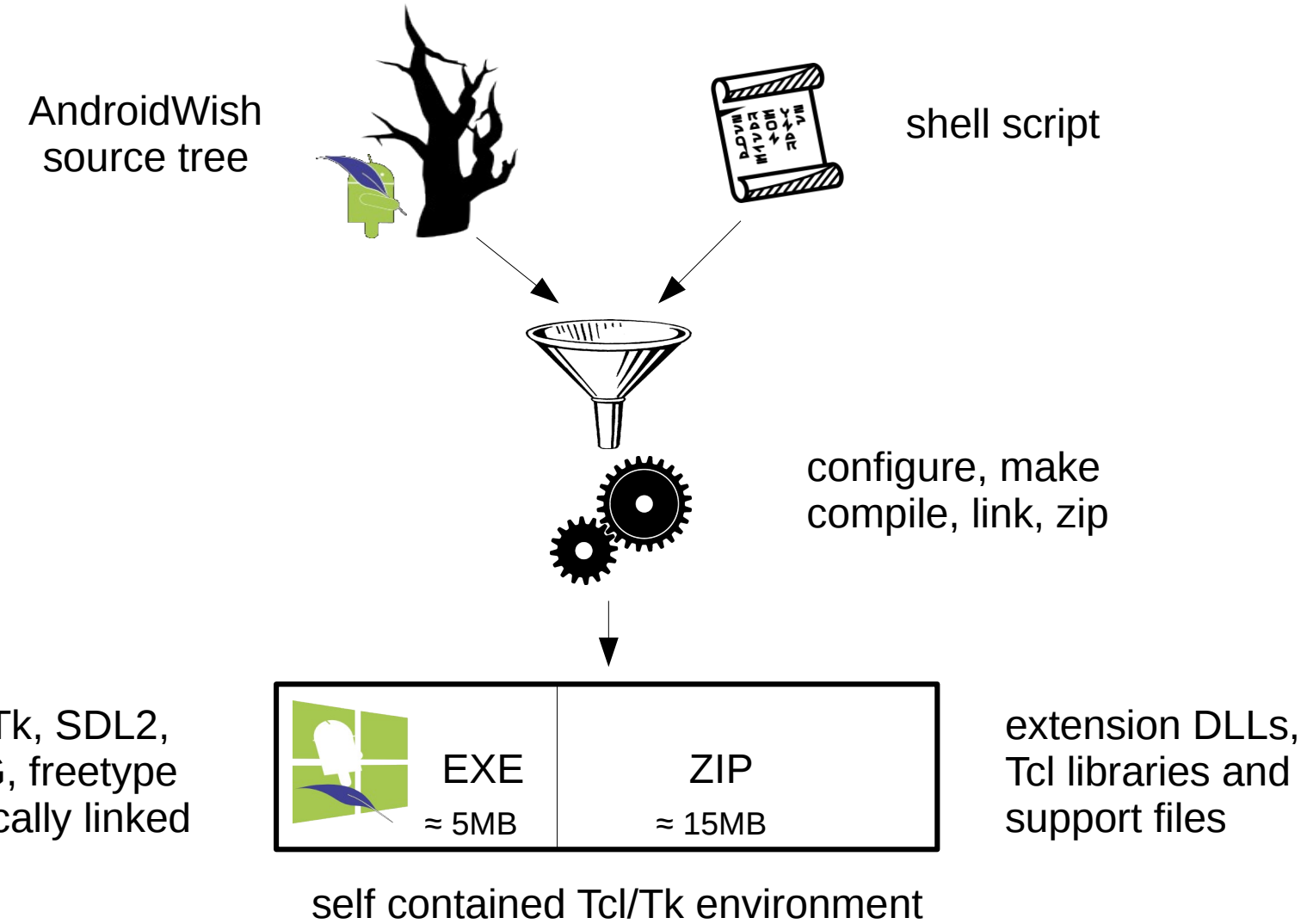
AndroWish sans the borg – a project just for pun

undroidwish

~~AndroWish sans the borg – a project just for pun~~

Wishful thinking for underdogs

undroidwish (making of)



undroidwish

- AndroWish source tree plus few extras
- Renders like AndroWish using SDL2/AGG/freetype
- Unicode 8.0 enabled (using TCL_UTF_MAX=6 like AndroWish)
- Shell script to control configure/make/install
- For Linux target: standard compiler (gcc)
- For Win32/64 targets: MinGW64 cross compiler
- As in AndroWish many packages and extensions are built in
- Binary undroidwish{,.exe} is self contained
- No installation required, all packages and extensions in ZIPFS
- Alternative build using native windowing system (X11 or GDI) available (called vanillawish{,.exe})

undroidwish, DLL hell avoidance etc.

- undroidwish (i.e. the Tcl/Tk executable part) are compiled and linked statically
- C++ code can introduce dependencies on libstdc++, fortunately, AGG can avoid this by using a custom memory allocator based on `Tcl_Alloc()` instead of new
- MinGW64 relies on MSVCRT only, thus Win32 undroidwish'es should work on Windows XP or newer
- For Linux, use a distro with older glibc for building, e.g. RHEL/CentOS 5, this allows to generate binaries which run on most Linuxen of the last 8 years
- Where more recent (read unsupported on older systems) DLLs are required, use runtime linking like `Tcl_LoadFile()`

undroidwish, continued

Documentation (rudimentary)

http://www.androwish.org/index.html/wiki?name=undroidwish

List of packaged extensions and libraries

http://www.androwish.org/index.html/wiki?name=Batteries+Included

Downloads of pre-built undroidwish'es for Windows and Linux

http://www.androwish.org/download/index.html

TWAPI in undroidwish

- Emmanuel Frécon: Wouldn't it be nice to have TWAPI in undroidwish?
- Tcl Windows API: a nontrivial Windows specific extension originally requiring MSVC tools for building
- Now available in Win32/64 undroidwish'es
- Built using MinGW64 cross compiler into a single DLL
- Ashok P. Nadkarni added support for Unicode 8.0 based on TCL_UTF_MAX=6 in a few days (big thank you!)
- WITS (Windows Inspection Tool Set) included

v4l2 (and tcluvc)

- “Video for Linux 2” Tcl interface to video devices, e.g. webcams
- Tcl command very similar to “`borg camera...`”
- tcluvc similar to v4l2, interface to UVC type USB cameras (still early alpha state)
- `v4l2 devices` returns list of video devices from `/dev` directory or `udev` information
- `v4l2 listen...` establishes callback which is triggered by udev when USB cameras are plugged/unplugged
- `v4l2 open...` opens a video devices and establishes a callback to be invoked when an image was captured
- In the callback `v4l2 image...` transfers the captured image into a normal Tk photo image
- Images are captured and converted to RGB thanks to libv4l2 and its built in converters

tclwmf (WIP)

- Tcl interface to Windows Media Framework to use video capture devices, e.g. webcams
- Tcl command very similar to “`v4l2...`”
- `wmf devices` returns list of video devices pair wise as symbolic link (WMF terminology) and friendly name
- `wmf open...` opens a video device given symbolic link name and establishes a callback to be invoked when an image was captured
- In the callback `wmf image...` transfers the captured image into a normal Tk photo image
- Images are captured in NV12 or YUY2 format and internally converted to RGB for `Tk_PhotoPutBlock()`

Questions?