Writing Really Rad GTK+ & GNOME Applications in C, Python or Java

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Who Are We?

Andrew Cowie

spends an awful lot of time programming for someone who is actually a suit. He started with C in the early 80s, picked up Java in 1997, and now, 10 years later, is the maintainer of the `java-gnome` project.

Davyd Madeley

is a professional software engineer and electronic engineering student. By night he is the `gnome-applets` maintainer and a contributor to GNOME. He plays the tenor saxophone.

An Overview

- Why choose GTK+ for your application?
- GTK+ Fundamentals
  - Building a UI
  - Box packing
  - The main loop & signals
- Getting started (in C)
- Window tricks (in Java)
- Complex data models (in Python)

Why Would You Choose GTK+?

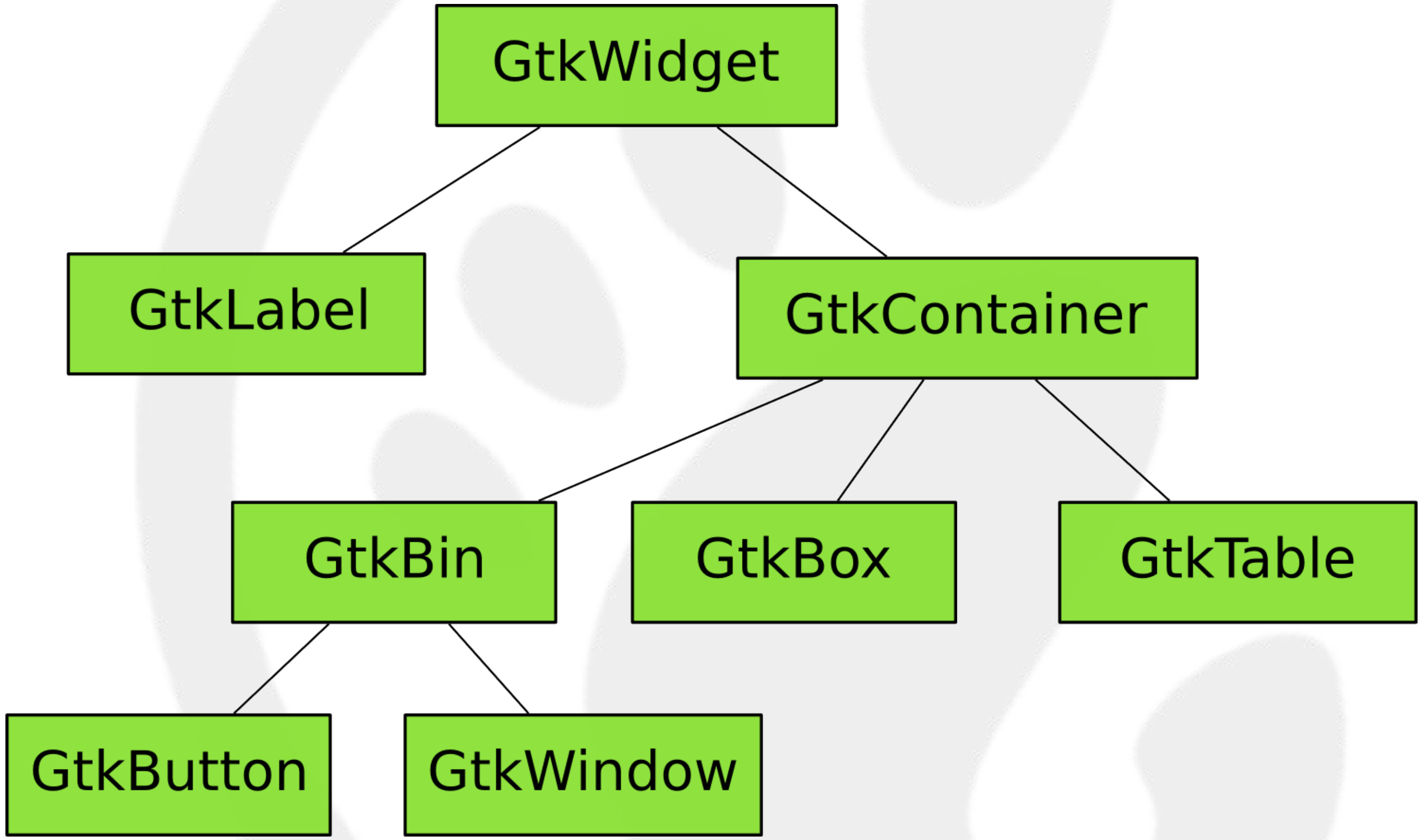
- Fast, flexible, ubiquitous
- Multi-platform
  - **Linux**, Unix, Mac OS, Win32, and more
- Many languages
  - **C**, **Python** and **Java**
  - Perl, C++, Ruby, Haskell, C#, PHP, OCml, Eiffel, Erlang, Guile/Scheme/Lisp, Lua, Octave, D, TCL, Smalltalk, and more!
- LGPL

A Word on Versions

- Today we're using the following:
  - gcc 4.1.x
  - GTK+ 2.10.x
  - Python 2.4
  - pyGTK 2.10
  - Sun Java 1.5 (& Free Java too!)
  - Eclipse 3.2.x
  - java-gnome 4.0
  - Glade 3.1.x

Widgets 'n stuff

- all displayed items are a `GtkWidget`; all interfaces are built down from a “top level”, inevitably `GtkWindow`



Building a UI

- You can write code …
  - Programmatically create elaborate custom content, dynamic layouts, and smaller Widgets

C Demo!

A `GtkWindow` with a `GtkButton` in it!

Compiling

```
gcc -o demo \
`pkg-config --cflags --libs \
 gtk+-2.0` demo.c
```

Building a UI

- You can write code ...
  - Programmatically create elaborate custom content, dynamic layouts, and smaller Widgets
- or use Glade ...
  - Great for big, complex windows with lots of Layout

C Demo!

A `GtkWindow` with a `GtkButton` with Glade!

Building a UI

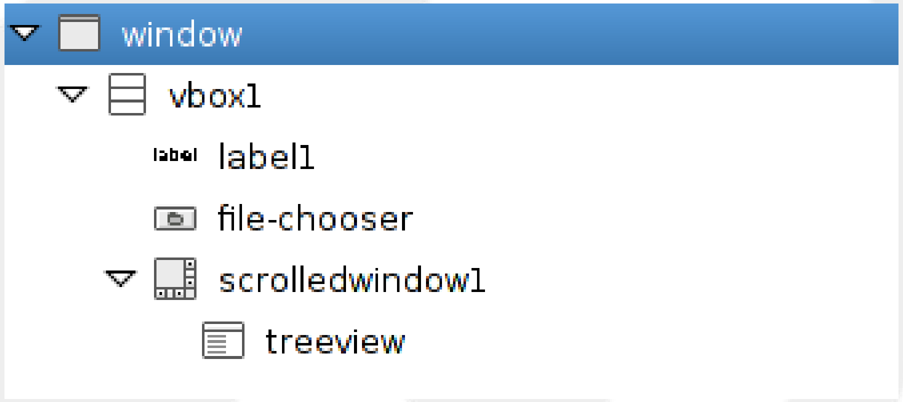
- You can write code ...
  - Programmatically create elaborate custom content, dynamic layouts, and smaller Widgets
- or use Glade ...
  - Great for big, complex windows with lots of Layout
- or do both simultaneously!
  - no point using Glade if coding it directly is less lines of code
  - Use Glade for most of Window (ie, Labels) and code for the dynamically generated bits

Box Packing

GTK+ uses a “box packing” model.

Box Packing

- Start a `GtkWindow`
- Pack a `GtkVBox` into the Window
- Pack a `GtkLabel` into the VBox
- Pack a `GtkScrolledWindow` into the VBox
- Pack a `GtkTreeView` into the ScrolledWindow


```
▽ window
    ▽ vbox1
        label1
        file-chooser
        ▽ scrolledwindow1
            treeview
```

Glade Demo!

Using
Glade
to do complex
Box packing
layouts

The Main Loop

- GUI programming is ***event driven*** programming
- The main loop polls *sources* for events
- events include user activity (keyboard or mouse), I/O, or a timeout
- events issued as named signals; register callbacks for signals you want to react to

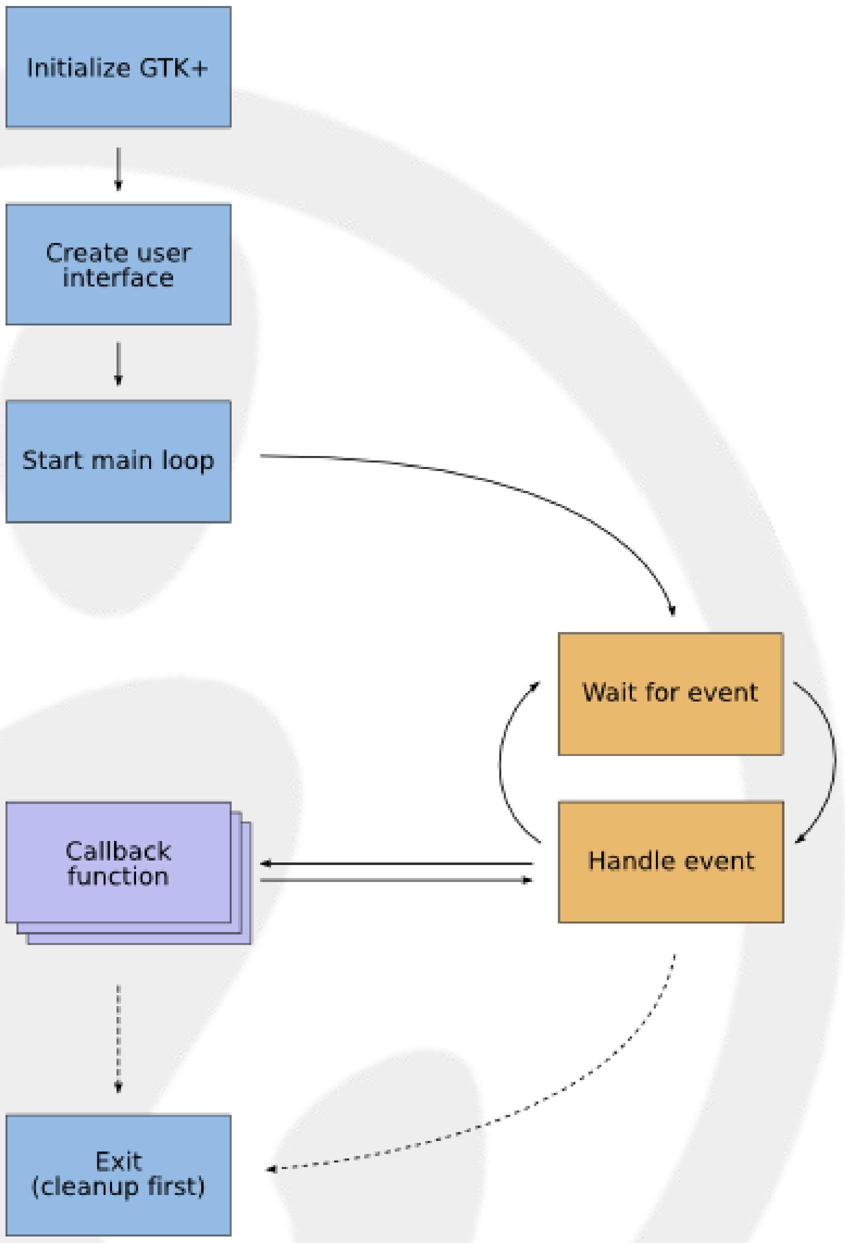
The Main Loop

Callbacks for events are issued from the main loop...

... one at a time

... and it's single threaded!

DON'T BLOCK THE MAIN LOOP!



Signals

- Signals are connected to `GObject`s
- Often you pass 4 things:
  - object
  - signal name
  - callback function
  - optional free-form “user data”
- Prototype for each callback in API docs
- Some callbacks return information to GTK+ (eg a `gboolean`)

Signals – C

```
g_signal_connect(my_gobject,
                 “notify::parent”,
                 G_CALLBACK(notify_parent_cb),
                 NULL);



void notify_parent_cb(GObject *my_gobject,
                      GParamSpec arg1,
                      gpointer user_data)
{

   ...

}
```

C Demo!

Hooking up a signal

Signals

- Some signals already have handlers registered
  - eg. expose-event
- Some signals are passed up the widget tree from your widget all the way to the toplevel
  - eg. expose-event, enter-notify-event
  - You can choose whether or not to stop these in your signal handler by returning True or False

Java Demo!

Same code,
different language:
Java

delete-event

Closing a Window

!=

Terminating application

Beware the main loop!

GtkFileChooser

Choose a file,

any file

Python Demo!

Same code,
different language:

Python

GtkTreeView

- Can display trees or lists of data
- Uses an model, view, control (MVC) paradigm
- You need three things:
  - a `GtkTreeView`
  - a `GtkTreeModel` (`GtkTreeStore`, `GtkListStore` or write your own)
  - `GtkCellRenderer`s
- You can store more data in a row than you display (handy!)

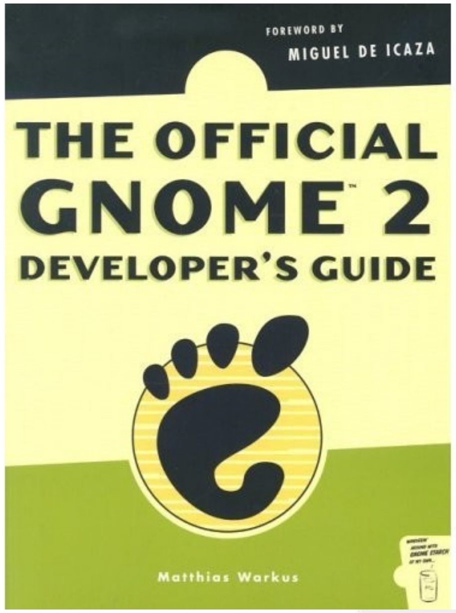
Python Demo!

See the `gtk.TreeView` for the Forrest

Getting More Out of GTK+/GNOME

- GConf – store configuration data
- GNOME-VFS – access data over networks
- Cairo – antialiased vector graphics
- GooCanvas – Cairo based canvas widget
- D-BUS – cross-desktop IPC with GLib tie-in
- Soup – HTTP, XML-RPC and SOAP libraries
- libwnck – Access window information
- libnotify – Popup balloons

Would Ye Like To Know More?



- In C:
  - http://www.gtk.org/tutorial/
  - Matthias Warkus, *The Official GNOME 2 Developer's Guide* (No Starch Press, 2004)
  - Devhelp
- In Java:
  - http://java-gnome.sourceforge.net/4.0/doc/
- In Python:
  - http://www.pygtk.org/pygtk2tutorial/index.html

Fin ;)

Questions?

www.davyd.id.au/articles.shtml

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