



# WebKit GTK+

an alternative browser engine  
for the free desktop

Alp Toker



# 2000, Zeitgeist

- Mozilla is starting to shape up
- Linux/Unix desktop users are migrating away from Netscape
- Cautious optimism about an open Web despite Microsoft Internet Explorer's dominance
- Meanwhile, KDE 2.0 launches with KHTML at the core of its browser shell, Konqueror. It does not go unnoticed.



*And so at last the beast fell and the unbelievers rejoiced.  
But all was not lost, for from the ash rose a great bird.  
The bird gazed down upon the unbelievers and cast fire  
and thunder upon them. For the beast had been  
reborn with its strength renewed, and the  
followers of Mammon cowered in horror.*

*from The Book of Mozilla, 7:15*

# 2005

- Safari developer Dave Hyatt (incidentally the co-creator of Firefox) announced on his weblog that Apple was open sourcing WebKit
- Previously, only WebCore and JavaScriptCore were open source
- CVS (now SVN) repository and Bugzilla were opened up
- A big step forward from the minimal code drops previously coming from Apple to satisfy the LGPL

# Today, 2007

- Firefox is in widespread use (estimated market share around 15%)
- Trend is to move away from monolithic “Internet suites” towards standalone applications and re-usable components
- There is an emerging demand for mobile Web browsers on phones, Internet tablets
- GNU/Linux has taken off and seems destined to become the commodity mobile and embedded OS

# However...

- The emerging de-facto mobile browser, at the core of many of these new Linux-based devices, is also in many cases the only proprietary component of the platform
- Vendors are choosing the Opera browser engine
- The community has been concentrating on desktop market share
- ... in the mean time, missing out on the potentially much larger embedded space

# What is WebKit?

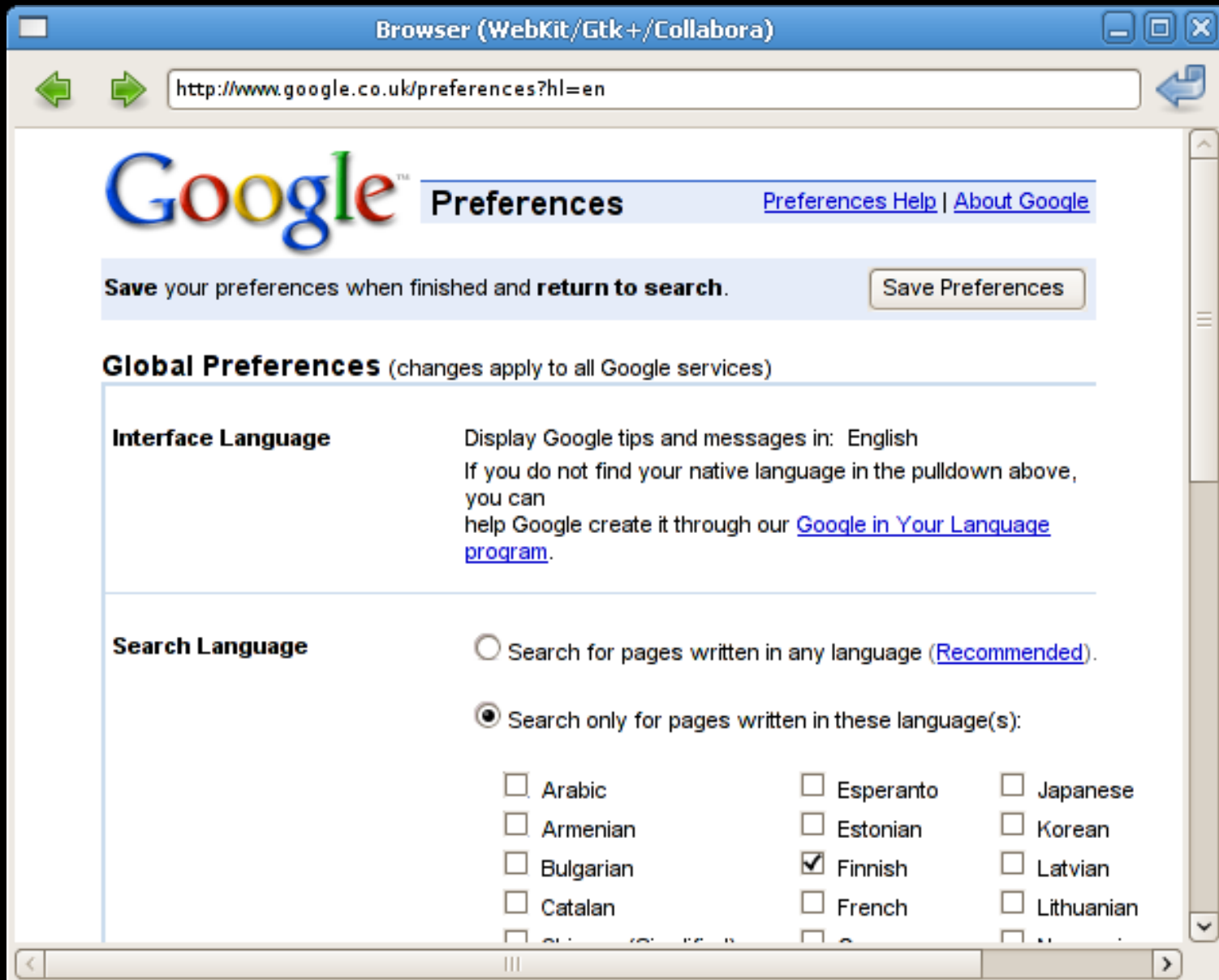
- An Open Source web browser engine
- The backend for Apple's Safari browser
- Officially available on OS X and Windows
- Used in Apple's iPhone
- Also ported to, ships with all Symbian S60 devices
- An Open Source project inviting contributions to the core engine as well as welcoming ports to new platforms and devices

# What is WebKit/Gtk+?

- Gtk+ is the UI toolkit used by eg. the GNOME desktop
- Gtk+ lacks a modern native browser engine, though Mozilla provides a workable gtkmozembed component
- WebKit/Gtk+ is a port of the WebKit browser engine to both use the Gtk+ toolkit for its functionality and to then be available for embedding into host Gtk+ applications



# Native widget theming



# Why hack on browsers?

## Personally...

- Was a Netscape user in 1995
- Became frustrated with the lack of in-place editing support
- Started hacking on my own browser engine and UI with built-in editing features
- Took about 9 months (weekends and evenings) to complete







**WebWorks...**

# WebWorks (cc. 1995)

Figure C.II.1.

WebWorks Version 1.0

**UNISTAT® Statistical Package**  
Version 4 for Windows™  
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Unistat for Windows is a comprehensive stand-alone statistical package that can also work as an Excel™ add-in. Unistat provides a one stop solution for data handling, data analysis and presentation quality scientific graphics.

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Netscape Version 1.2N

**UNISTAT® Statistical Package**  
Version 4 for Windows™  
The Next Generation of Statistics Software for Windows

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[Features](#) | [MS Office™](#) | [Reviews](#) | [Summary](#) | [Demo](#) | [Contact](#)

Unistat for Windows is a comprehensive stand-alone statistical package that can also work as an Excel™ add-in. Unistat provides a one stop solution for data handling, data analysis and presentation quality scientific graphics.

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# WebKit features at a glance

- Comprehensive Web standards support (WebCore, based on KHTML)
- JavaScript (JavaScriptCore, based on KJS)
- CSS, up to and incl. some CSS3
- “AJAX stuff”
- SVG
- Canvas
- Fast, lightweight, compatible, embeddable
- Under constant development

# “WebKit is an engine, not a browser”

- WebKit has been developed as a re-usable browser engine component
- Intends to provide seamless integration with existing applications
- WebKit/Gtk+ shares these goals

# WebKit: The code

- Written in a sensible subset of C++
- Limited use of templates
- Approachable to C hackers
- Follows a coherent coding style
- Dead code is removed liberally – there is always version control, after all
- All major internal APIs are “informally” abstracted for easy porting, but remain malleable, similar to those of the Linux kernel

# Development workflow

- Formalised Open Source development process
- Strict patch review for all contributors and committers
- Commit access given only after significant contributions, and following necessary paperwork
- Currently 2 WebKit/Gtk+ committers: Alp Toker, Holger Freyther

# A little story (“Stop energy”?)

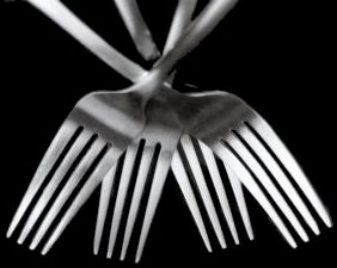
- Late 2006: Adobe announces intent to use WebKit in their AIR platform
- Supposedly would be completing the Cairo rendering backend
- Several months later, nothing but minimal patches
- Luckily the WebKit/Gtk+ developers decided *not to sit around waiting* for this code drop, but instead forged ahead and completed the graphics backend
- Well aware that we might have been duplicating effort
- Promises of code can be damaging – real patches or solid discussion much more helpful



# Forks considered harmful

- Some kinds of projects seem to *thrive on forking* as an evolutionary force
- This does not seem to be the case in browser development beneath a certain threshold of activity
- Gtk+ porting efforts attempting to fork from mainline WebKit have *tended to fail*



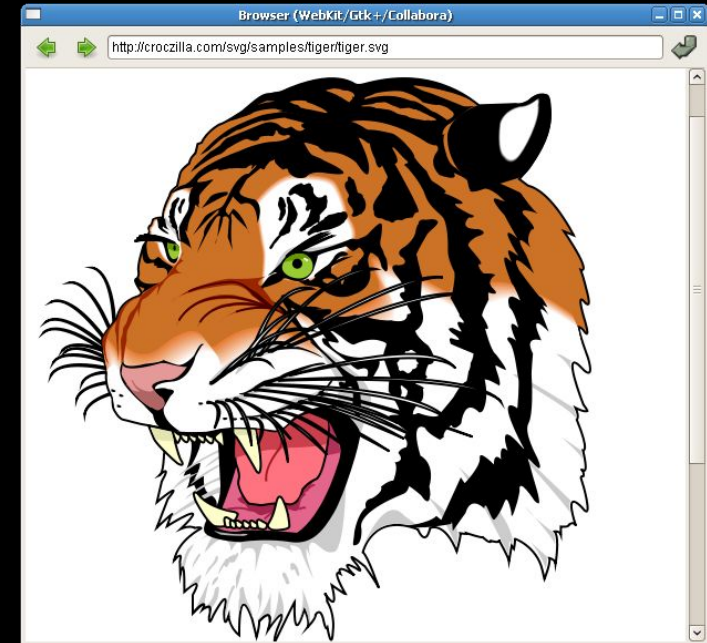


# Why don't forks succeed?

- Turns out that having an *expert developer team* (incl. Apple engineers) working directly on your shared code base is most valuable
- Maintainers of forked code bases are *alienated from the core developers*, who could otherwise offer advice and fix up their abstraction layers as needed
- Morale runs low with the realisation that your developers' *patches may never be merged*
- Lack of decent version control (git-svn may help here)

# Features: SVG Support

- SVG engine based on KSVG2
- SVG is supported as a core document type, not just an image format
- Vector graphics can be animated dynamically by manipulation of the DOM with JavaScript
- WebKit/Gtk+ implements its SVG backend using Cairo



# Features: The <canvas> element

- Provides dynamic scriptable rendering of bitmap images
- Powers Apple's Dashboard widgets
- Originally a WebKit feature
- Now supported by Mozilla, Opera
- Now part of HTML5
- Coming soon to WebKit/Gtk+

# December 2006: Proof of concept Nokia 770 port



gdklauncher



## The WebKit Open Source Project

### Welcome to the website for the WebKit Open Source Project!

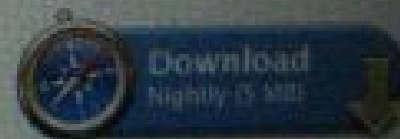
WebKit is an open source web browser engine. WebKit is also the name of the Mac OS X system framework version of the engine that's used by Safari, Dashboard, Mail, and many other OS X applications. WebKit's HTML and JavaScript code began as a branch of the KHTML and KJS libraries from KDE. This website is also the home of S60's S60 WebKit development.

### Getting involved

There are many ways in which you can get involved with the project. You can:

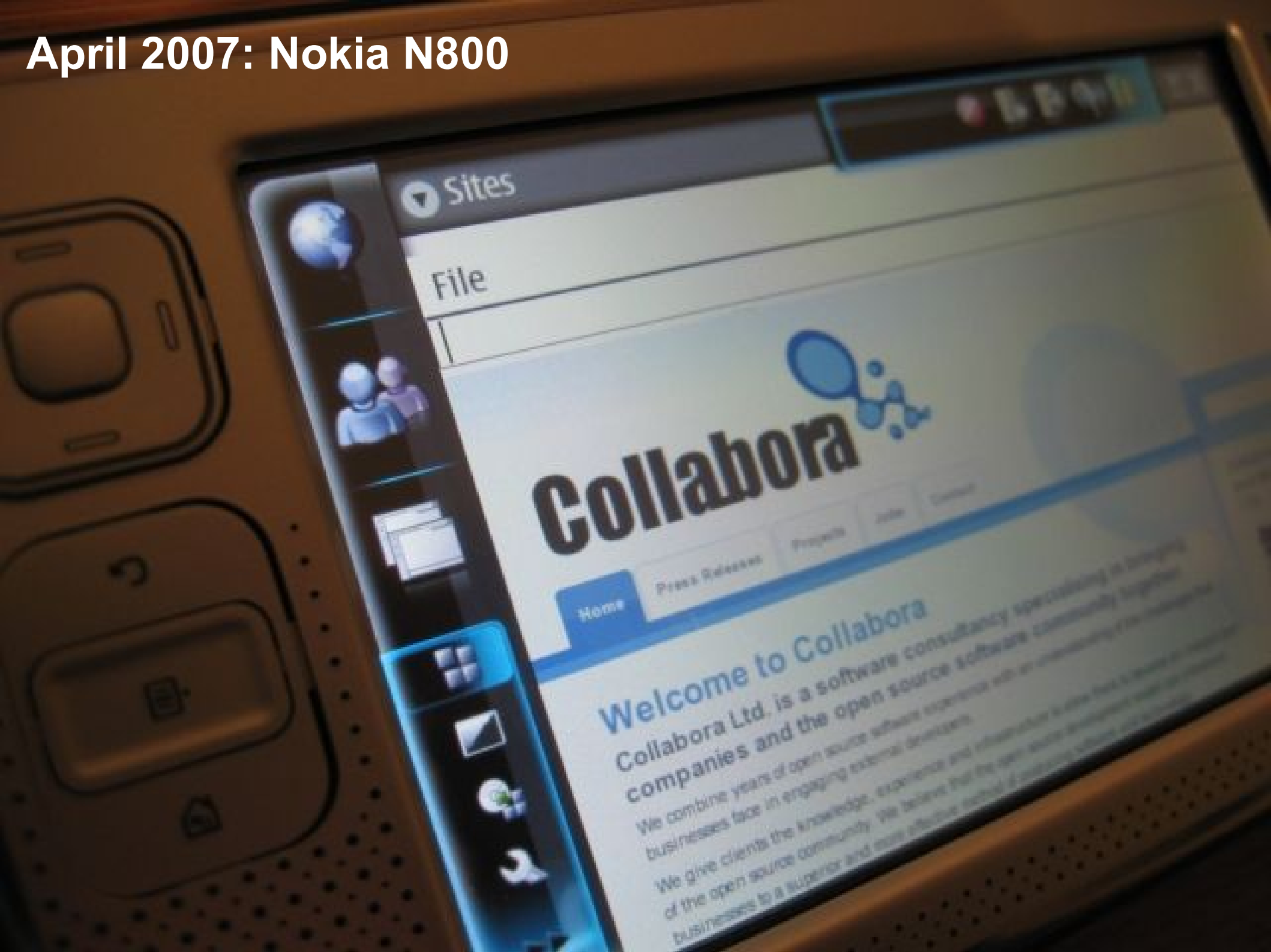
- check out and build the source code
- download the latest nightly build

Once you have either of these, you can help by:

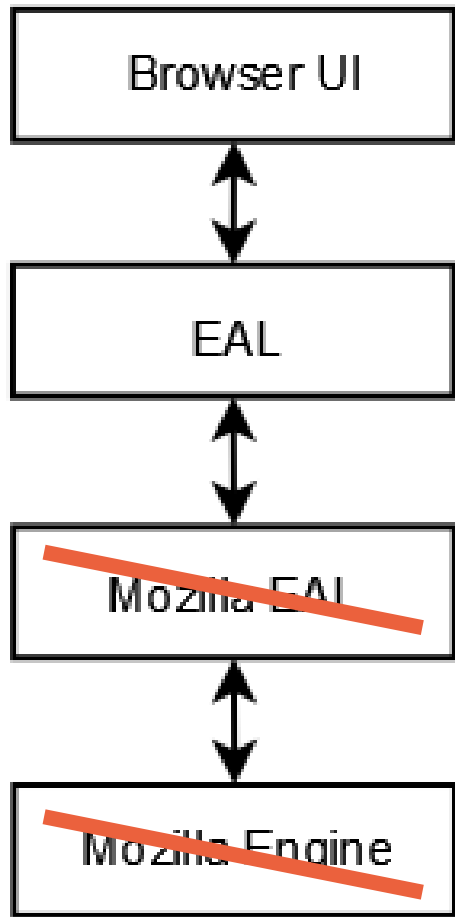


- Home
  - Surfin Safari Blog
  - Keeping in Touch
  - Trac
- Working with the Code**
  - Getting the Code
  - Building WebKit
  - Running WebKit
  - Debugging WebKit
  - Contributing Code
- Documentation**
  - Projects
  - Code Style Guidelines

April 2007: Nokia N800



# WebKit/EAL



Graphics: Nokia

- Nokia's Engine Abstraction Layer
- First introduced in the N800
- Allows users to switch between Opera and Nokia's Mozilla port
- We now have a WebKit/Gtk +-based EAL engine
- Integrates with device's buttons, input systems etc.

# EAL, abstracting browser engines





# Browsing on the N800

Web - Google Maps

Web Images Video News **Maps** Mail more ▾ Saved Locations | Sign in | Help

Google Maps e.g., "10 market st, san francisco" or "hotels near lax" Search Maps

Search the map Find businesses Get directions

Search Results My Maps **New!** Print Email Link to this page

**Welcome to Google Maps**  
You can drag the map with your mouse, and double-click to zoom. [Take a tour »](#)

Search the map, e.g.  
kansas city  
10 market st, san francisco

Find businesses, e.g.  
hotels near lax  
pizza

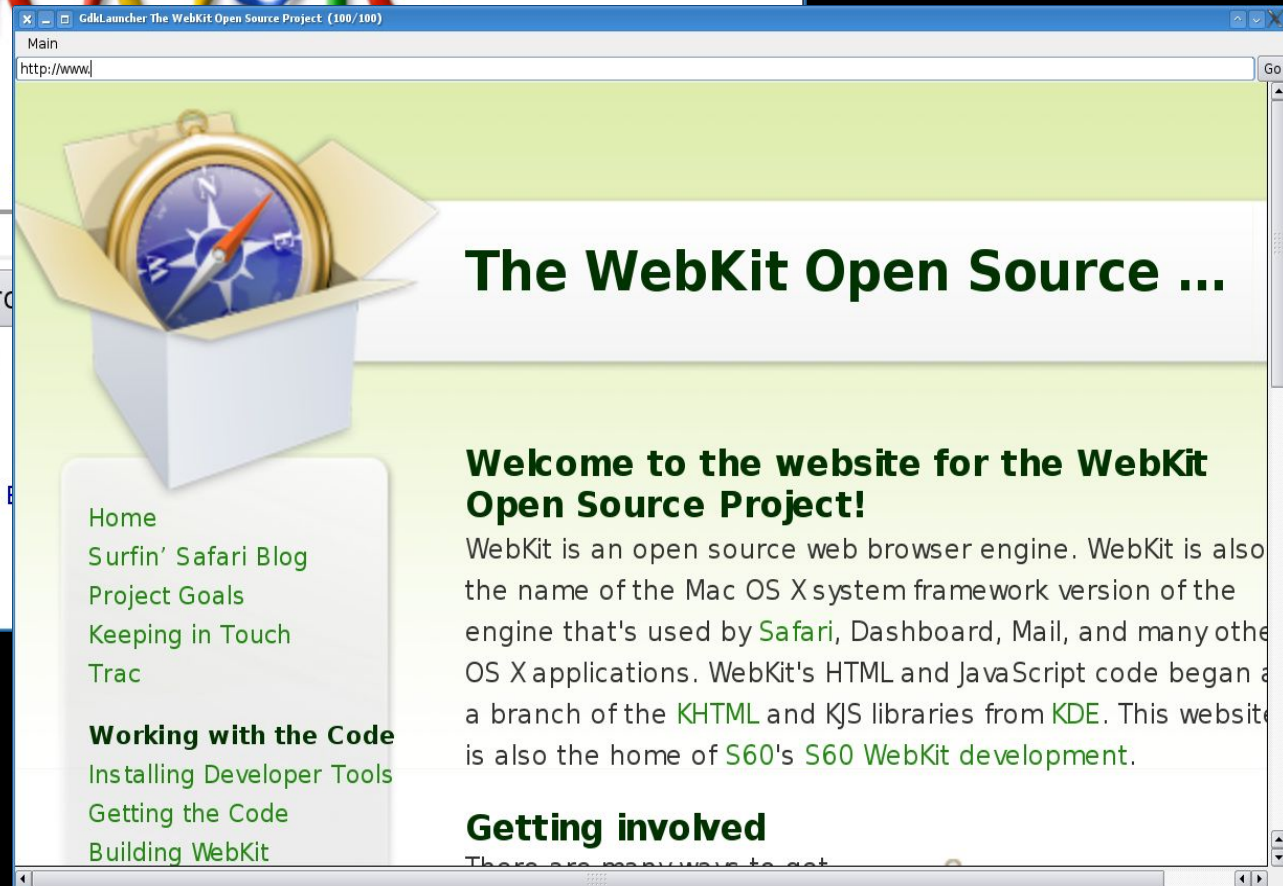
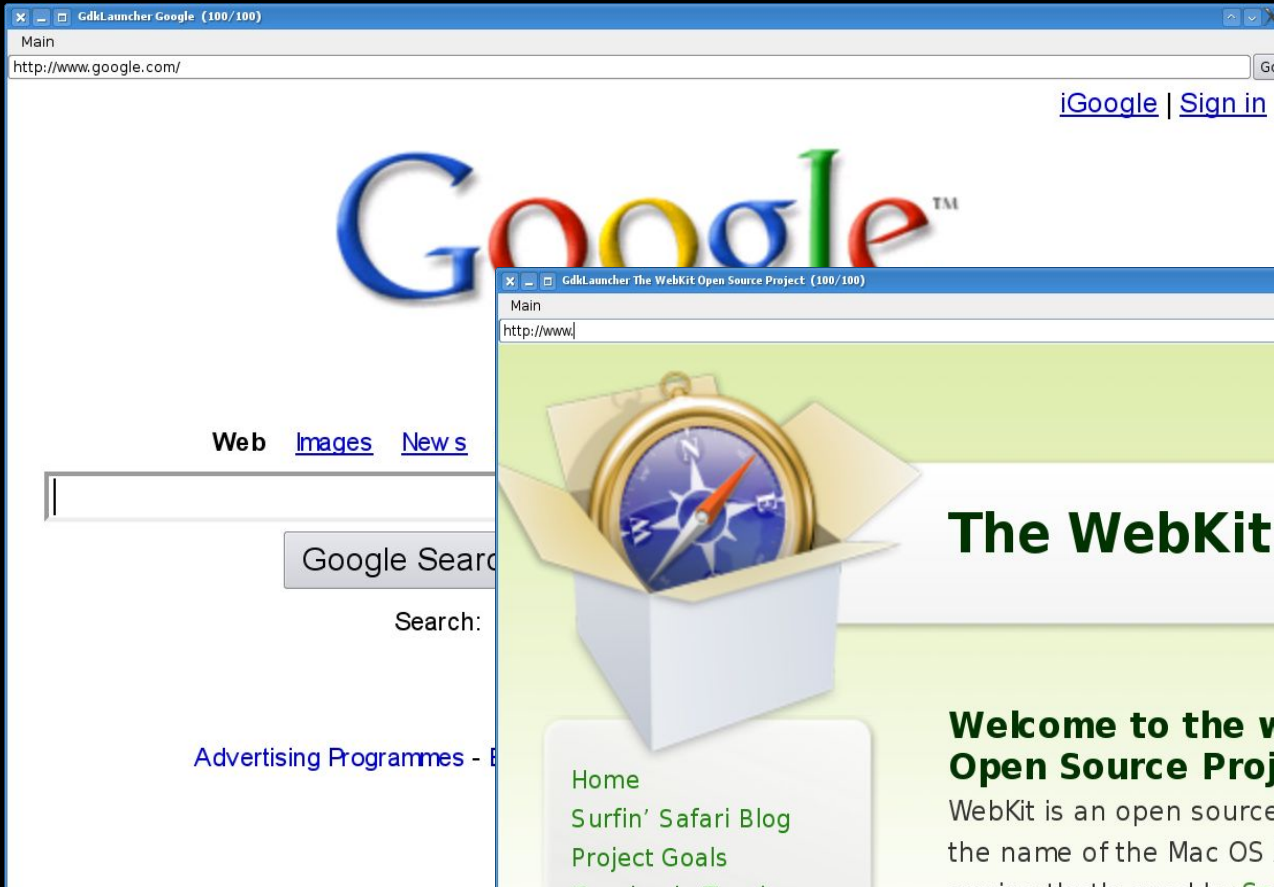
Get directions, e.g.  
jfk to 350 5th ave, new york  
seattle to 98109

Map Satellite Hybrid

Cambridge

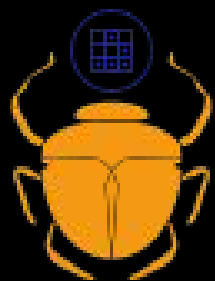
http://maps.google.com

# Full page scaling



# Cairo graphics backend

- Cairo, device-independent 2D vector graphics library, used eg. by Gtk+
- Shared amongst ports, but the main consumer is the Gtk+ port, with Qt, Wx, Mac using their own graphics libraries
- High quality antialiased vector graphics and image composition
- Unified display, printing, PDF output etc.



cairo



# State of the public API

- Apple's public, stable WebKit API is written in Objective-C
- WebKit/Gtk+'s public API is C/GObject, with properties, signals in the style of the Gtk+ toolkit
- Goal is to match the functionality of the Objective-C API
- Still API unstable – we need to ask the developer community what they expect a browser API to look like

# Seamless Gtk+ integration

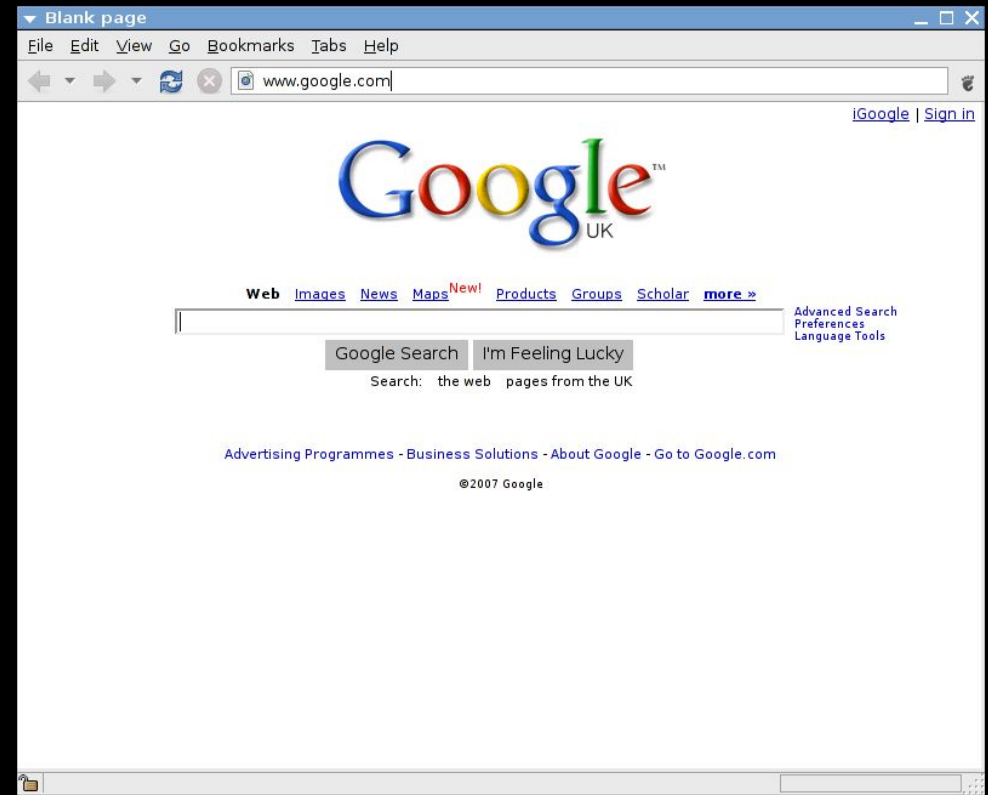
- The browser widget follows Gtk+ conventions closely, eg. makes size requisitions and deals with allocations, but is usually packed in a `GtkScrolledWindow`
- There is no XUL-style platform and toolkit – the engine uses the standard Gtk+ look and feel
- Uses Gtk+ technologies wherever possible
- Avoids a GNOME dependency in the core without compromising potential for GNOME integration

# Applications: Epiphany

## -with-engine=webkit



- Epiphany, a light-weight Web browser for the GNOME desktop
- Originally a Gtk+ UI around the Gecko rendering engine
- WebKit support added by Xan Lopez during GUADEC 2007



# Applications: Devhelp



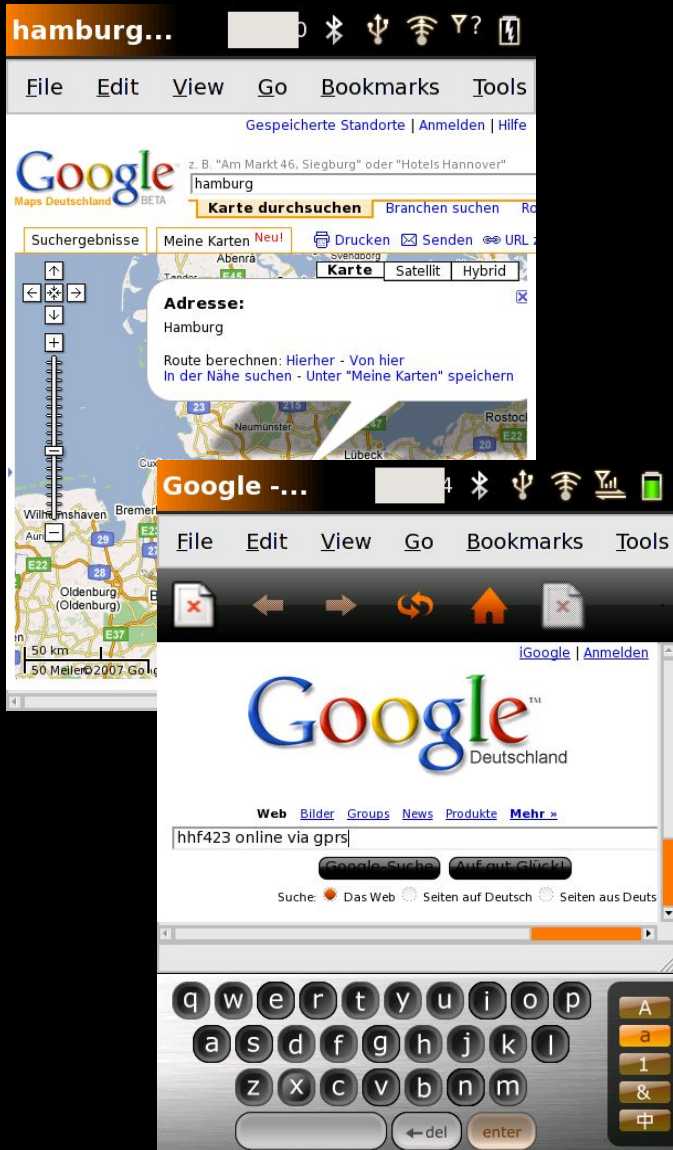
- A browser for Gtk+/GNOME API documentation
- Currently uses gtkmozembedded – developers did not sound too happy with it
- WebKit/Gtk+ integration work going on
- Faster startup
- Lower memory footprint

The screenshot shows the Devhelp application window with the following content:

```
Applications Raccourcis Système 53 °C 21:19
Devhelp : XXX
File Edit Go Help
Contents Search
Gtk
GtkIconInfo
GtkIconLookupFlags
GtkIconTheme
GtkIconThemeError
GtkSettings
GtkSettingsValue
GtkBorder
GtkRcProperty
GtkRcPropertyParser
GtkStyle
GtkAccelMap
GtkAccelMapForeach
GtkBindingArg
GtkBindingEntry
GtkBindingSet
GtkBindingSignal
GtkClipboard
GtkClipboardClearFunc
GtkClipboardGetFunc
XXX
GTK+ Reference Manual
Top | Description | Object Hierarchy | Properties
Settings
Settings — Sharing settings between applications
Synopsis
#include <gtk/gtk.h>
GtkSettings;
GtkSettingsValue;
GtkSettings* gtk_settings_get_default (void);
GtkSettings* gtk_settings_get_for_screen (GdkScreen *screen);
void gtk_settings_install_property (GParamSpec *pspec);
void gtk_settings_install_property_parser (GParamSpec *pspec, GtkRcPropertyParser parser);
gboolean gtk_rc_property_parse_color (const GParamSpec *pspec, const GString *gstring, GValue *property_value);
gboolean gtk_rc_property_parse_enum (const GParamSpec *pspec, const GString *gstring, GValue *property_value);
gboolean gtk_rc_property_parse_flags (const GParamSpec *pspec, const GString *gstring,
```

```
fred@trap:/var/tmp/jhbuild/checkout/devhelp/src$ bg
[1]+ ./devhelp &
fred@trap:/var/tmp/jhbuild/checkout/devhelp/src$ ldd .libs/libdevhelp-1.so | grep -i webkit
libWebKitGdk.so.0d => /usr/lib/libWebKitGdk.so.0d (0xb6db5000)
fred@trap:/var/tmp/jhbuild/checkout/devhelp/src$
```

# WebKit/Gtk+ and OpenMoko



- Holger Freyther, Google Summer of Code student for the OpenMoko project
- Has been concentrating on improving the port as a whole, benefitting everyone





# Proof of concept Sugar activity for the OLPC

The screenshot shows a web browser window displaying the OLPC Wiki homepage. The browser's address bar shows "BrowseKit Activity" and "Share with: Private". The page title is "The OLPC Wiki" and it is noted as "(Redirected from Home)". The main content area features a welcome message, a "What's new" section with several bullet points, and a "Latest Releases" box for OS images and firmware. The left sidebar contains navigation links for "About OLPC", "About the laptops", "About the site", "Search", and "Toolbox".

BrowseKit Activity Share with: Private

Activity Browse

1

article discussion view source history

## The OLPC Wiki

(Redirected from Home)

This page is maintained by the OLPC team. Please use the **discussion tab** for your comments.

deutsch | english | español | français | italiano | 日本語 | 蒙古語 | português | română | русский HowTo [ID# 56624] +/-

Welcome to the OLPC Wiki, home to collaborative notes about the One Laptop per Child project and related projects and communities. We currently have 3,760 pages and roughly two-thousand registered contributors; please join us and share your ideas. There is also a non-wiki [laptop.org](#).

[Submit new content](#)

### What's new

- Intel joins OLPC as its newest member.
- B4 machines are being distributed to developers who have joined the [Developers Program](#). Those without machines can still run [emulators](#) on their current computers. [Test Group Release Notes](#) are being updated daily. Also, visit the [Activities](#) page to see the latest on activity developments.
- We have a new skin for this wiki; thanks to [Simon Dorner](#) and the crew from OLPC Austria (you can change skins via [Special:Preferences](#) after you log in).
- Add an [OLPC badge](#) to your website.
- A report from OLPC in Nigeria: School [Galadima](#)
- OLPC wins the [Bridging Nations](#) Bridge Builder Award: Technological Innovation for Bridging Digital Divide.
- New milestone: working autonomous mesh operation while the XO is suspended.
- Latest release: The new stable build, [Build 406](#), and a new firmware release, [Q2C18](#), are available. Please update your machines. The [autoreinstallation image](#) makes this easy; you'll find many improvements in virtually all system functions ([Release notes](#)). Directions for [Customizing NAND images](#) have been added to the [wiki](#).
- Localization: The Spanish translation of [www.laptop.org](#) is now on line, thanks to the tireless efforts of [Xavier Alvarez](#). The templates for adding additional languages can be found at [Localization/www.laptop.org](#). The [Simplified Chinese translation](#) is also on line, thanks to [Scott Zhu](#); as is the [Portuguese translation](#), thanks to [Paulo Drummond](#); and the [Korean translation](#), thanks to [Do Young-Min](#).

Weekly updates can be found in [Current events](#).

### About One Laptop per Child

*It's an education project, not a laptop project.*  
— Nicholas Negroponte

**Latest Releases: OS images**  
Stable: [Build 406.15](#) (2007-06-19)  
Firmware: [Q2C18](#) (2007-06-14)  
[how to update...](#) +/-  
[known bugs?](#) [does it work for you?](#)

**About OLPC**

- Home
- Table of contents
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- Latest news
- Common questions
- Ask a question
- Mailing lists
- Contact OLPC

**About the laptops**

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- Software
- Content
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- Emulation
- Chat and IRC

**About the site**

- Recent changes
- Help using the site

**Search**

Go Search

**Toolbox**

- What links here
- Related changes
- Upload file
- Special pages
- Printable version

# WebKit/Gtk+ and OLPC?

- Proof of concept port of WebKit/Gtk+ as a Sugar activity done by Dan Winship, of Red Hat in *one day*. John Palmieri compared it with the existing Mozilla-fx3-based activity:
- “uses on average *10 megs less in resident memory*”
- “starts up *five seconds faster*”
- “feels a bit *more responsive* when scrolling”
- “just more aligned to our needs as a *small* and *fast* browser”
- Caveat: “the gtk port is just not finished yet [...] but it is close”

# HTML5: The <video> tag: Coming soon?

- HTML5 is a WHATWG spec
- Backend support recently landed in the WebKit feature branch
- Apple's OS X and Windows implementations use QuickTime for audio/video
- Plans to implement audio/video in WebKit/Gtk+ using GStreamer
- Promises to displace Flash as the video delivery mechanism of choice

# Getting involved

<http://www.webkit.org/>

IRC: #webkit, #webkit-gtk / FreeNode

**WebKit** GTK+

