

The Web Platform on Linux devices with WebKit: where are we now?



Mario Sánchez-Prada

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About Me

- **Software Engineer** and partner at **Igalia**.
- **Open Source work**: GNOME, Chromium/Blink, WebKit.
- **Other**: Maemo, Endless OS, Samsung Smart TV.
- Currently **coordinating** Igalia's **WebKit team**.



About Igalia

- **Founded in A Coruña (Spain)** in 2001.
- Specialized **Open Source consultancy**.
- **Fully remote** and with a **flat structure**.
- Second-largest **contributor** to the main Open Source **Web Rendering Engines**.
- **Other OSS work**: kernel, compilers, multimedia, graphics, drivers...
- Members of different **Working groups**:
 - W3C, WHATWG, TC39, Test262, Khronos...

The screenshot shows the Igalia website homepage. At the top is a dark header with the Igalia logo and a menu icon. Below the header are several cards. One card for 'Browsers and Client-side Web Technologies' shows a person working on a laptop and a smartphone, with text about expertise in WebKit, WPE, Chromium/Blink, and Firefox. Another card for 'Upcoming Events' shows a person holding a smartphone and text about attending events like FOSDEM. A third card for 'GStreamer development' shows a person on a video call and text about a strong multimedia team. A fourth card for 'Helping Valve to Power Up Steam Devices' shows a person on a video call and text about working with Valve on SteamOS. A fifth card for 'The high performance WebKit port for embedded' shows a person holding a smartphone and text about WPE WebKit adoption. A sixth card for 'GStreamer development' shows a person on a video call and text about a strong multimedia team. A sidebar on the right lists 'Come Meet Us At...' with links to CSS Working Group Face to Face, FOSDEM, and Vulkanized events.

<https://www.igalia.com>

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Outline

- 1. Web Rendering Engines**
- 2. What is WebKit?**
- 3. WebKitGTK & WPE WebKit**
- 4. History of WebKitGTK & WPE WebKit**
- 5. Latest updates**
- 6. Next steps**



Web Rendering Engines

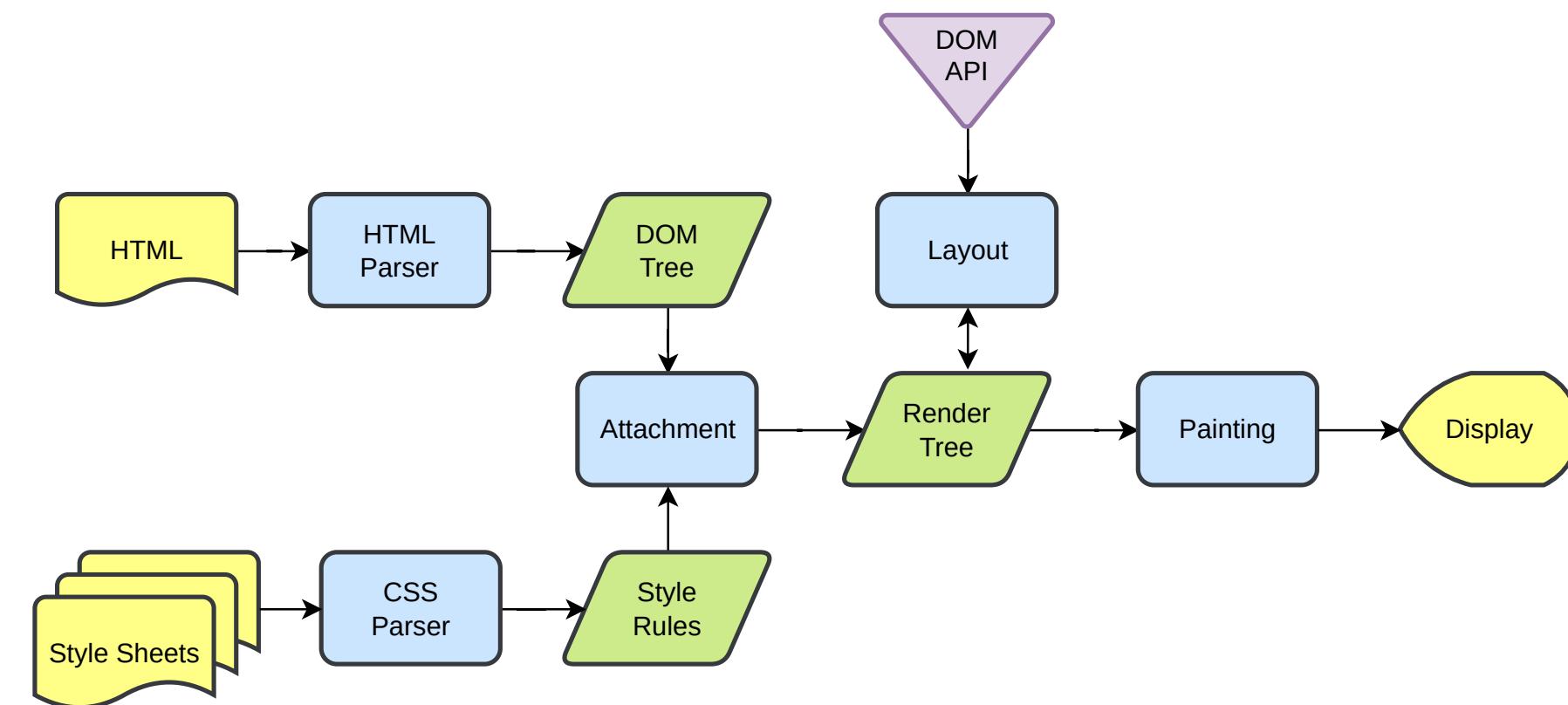
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What is a Web rendering engine?

- **Fetches** HTML / CSS / JavaScript content from multiple sources.
- **Interprets** the web content to create an internal representation.
- **Renders** a result that users can **interact with**.



Main Web rendering engines



Main Web rendering engines



servo



What is WebKit?



<https://webkit.org>



What is WebKit?

- Open Source **Web rendering engine** since 2005.
 - Forked from KHTML and KJS by Apple in 2001.
 - Forked again by Google in 2013 (*Blink*).
- **Main goals:**
 - Performance, portability, stability, compatibility, standards compliance, security, hackability and *embeddability*.
- Support for **different platforms**:
 - **Desktop & Mobile**: Mac, iOS, Linux, Windows.
 - **Embedded**: set-top-boxes, gaming consoles, smart home appliances, IVI systems, GPS navigation, digital signage...
- **Multi-process** architecture:
 - UI Process, Web Process, Network Process, GPU Process...



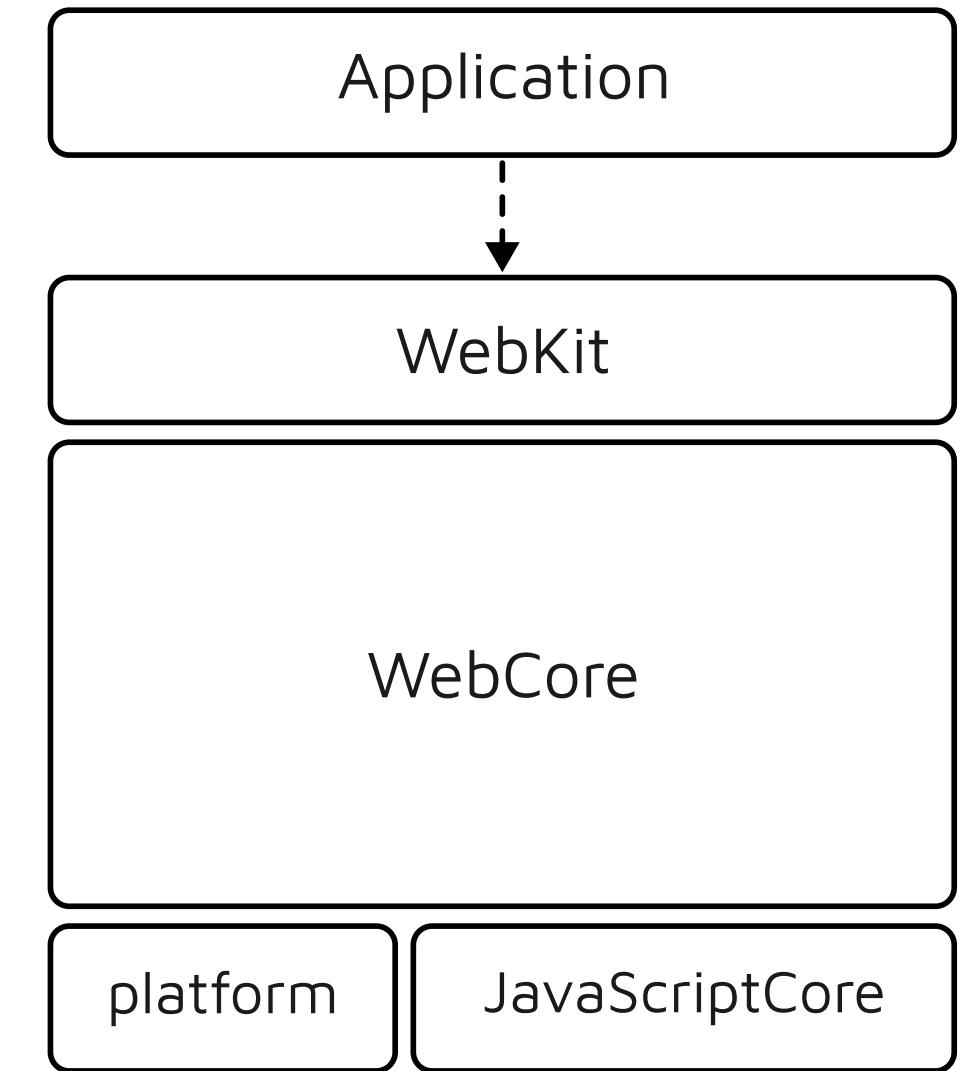
Advantages of WebKit

- 🕸️ **Complete implementation** of the Web Platform
- 🔌 **Embeddable** as top priority
- 🧩 **Flexible and modular** architecture
- 🚀 **Performance** and **stability**
- 🔒 **Privacy and security** by design
- 🐧 **Independent** Linux-based flavours
- 👉 **Not controlled** by any big corporation



WebKit architecture

- **Application:**
 - What the end-users interact with.
- **WebKit:**
 - Exposes a public API to applications and implements the multi-process model.
- **WebCore:**
 - HTML/CSS parsing, rendering, layout, painting, network, multimedia, accessibility...
- **JavaScriptCore:**
 - JavaScript engine (also supports WebAssembly).
- **Platform:**
 - Platform-specific hooks and low-level plumbing.

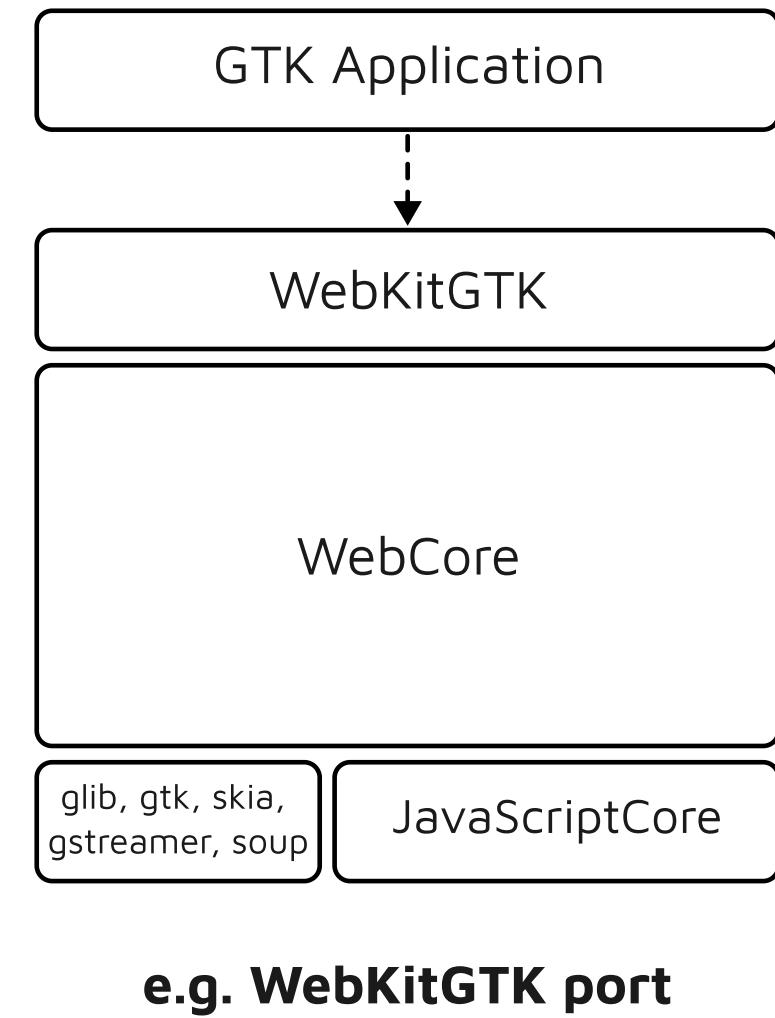


WebKit ports

WebKit port: adaptation of WebKit to a platform.

Official WebKit Ports (*upstream* ports):

- **Mac**: Safari, Apple Mail, iTunes, App Store...
- **iOS**: Web browsers on iOS devices (also Chrome).
- **Windows**: Microsoft Playwright, PlayStation SDK.
- **PlayStation**: PlayStation 4 & PlayStation 5.
- **WebKitGTK**: GNOME Web, Evolution, Shotwell...
- **WPE WebKit**: Custom "browsers" for embedded devices.



<https://docs.webkit.org/Ports/Introduction.html>



WebKitGTK & WPE WebKit

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What is WebKitGTK?

WebKitGTK: port of **WebKit** for Linux-based **GTK applications**.

- **Fully-featured** implementation of the **Web Platform**
 - Support for **HW-accelerated graphics** and **multimedia**.
- **Used** in a wide variety of **GTK applications**:
 - GNOME Web (browser), Evolution (mail client), GNOME Builder (IDE)...
- **Provides a *widget*** to be used in GTK applications: **WebKitWebView**
 - Offers a public API to interact with the Web engine and respond to events.
 - Platform-specific functionality is implemented on top of other components (e.g. Skia, OpenGL, EGL, GStreamer, libsoup, fontconfig, harfbuzz...).
- Fully operational **JavaScript engine** (JavaScriptCore)



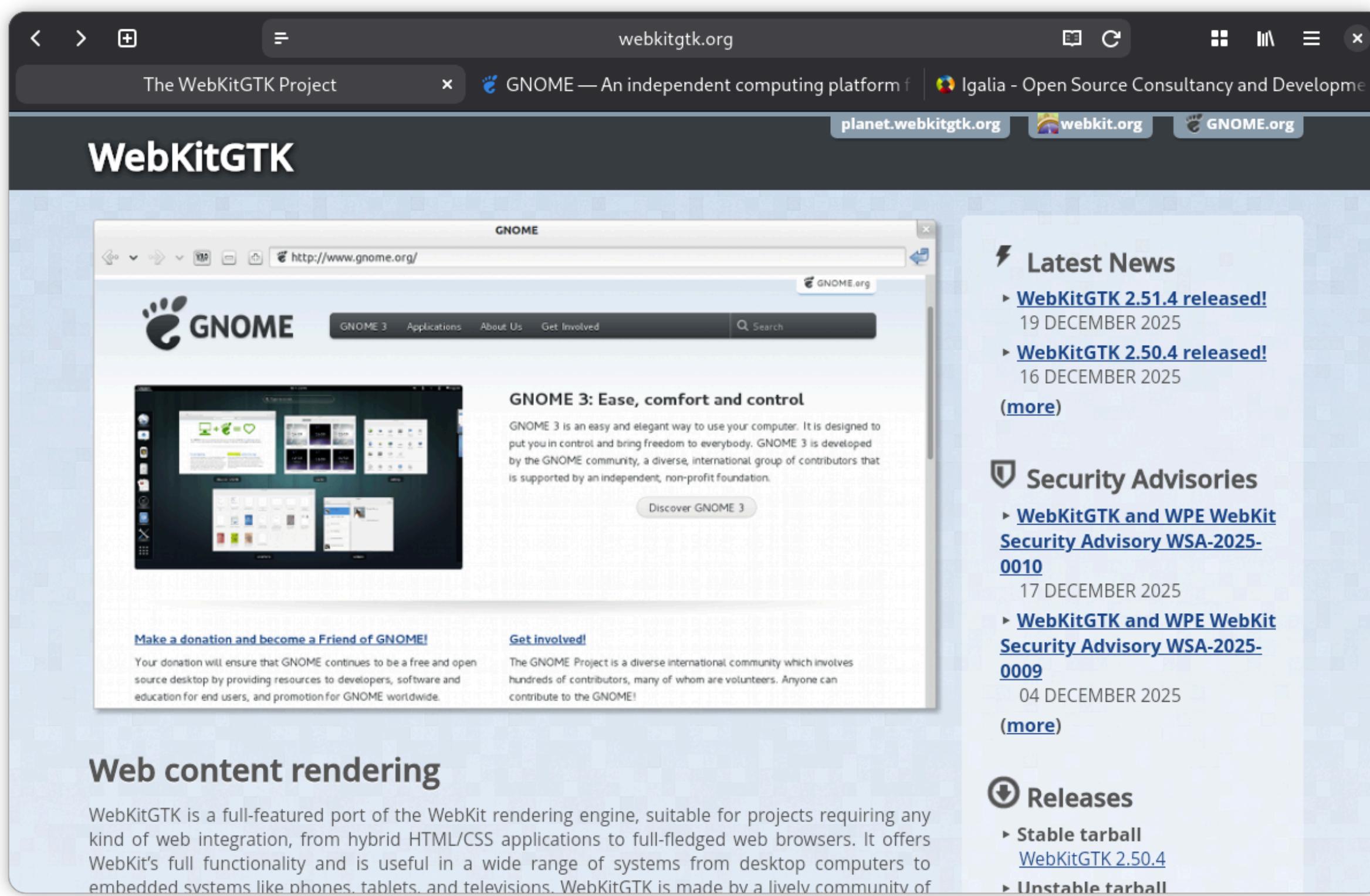
<https://webkitgtk.org>

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What is WebKitGTK?



The screenshot shows a web browser window displaying the webkitgtk.org website. The browser's title bar shows the URL and tabs for "The WebKitGTK Project", "GNOME — An independent computing platform", and "Igalia - Open Source Consultancy and Development". The main content area of the website features a screenshot of the GNOME desktop environment. The desktop includes aGNOME logo, a search bar, and links for "GNOME 3", "Applications", "About Us", and "Get Involved". Below the desktop screenshot, there are sections for "Make a donation and become a Friend of GNOME!" and "Get involved!". The right sidebar contains sections for "Latest News", "Security Advisories", and "Releases". The "Latest News" section lists two releases: "WebKitGTK 2.51.4 released!" on 19 DECEMBER 2025 and "WebKitGTK 2.50.4 released!" on 16 DECEMBER 2025, with a "(more)" link. The "Security Advisories" section lists two advisories: "WebKitGTK and WPE WebKit Security Advisory WSA-2025-0010" on 17 DECEMBER 2025 and "WebKitGTK and WPE WebKit Security Advisory WSA-2025-0009" on 04 DECEMBER 2025, with a "(more)" link. The "Releases" section lists "Stable tarball" for "WebKitGTK 2.50.4" and "Unstable tarball".

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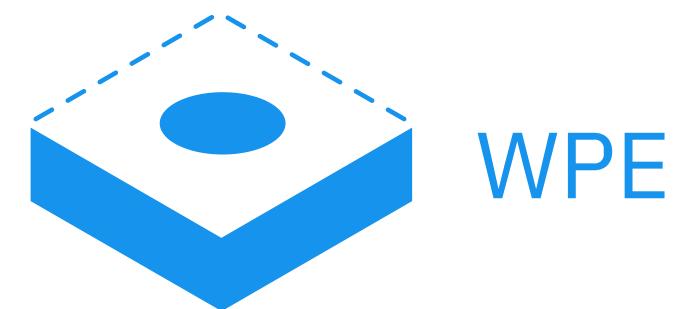
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What is WPE WebKit?

WPE WebKit: port of **WebKit** for Linux-based **embedded devices**

- **Shared architecture with WebKitGTK**
 - **Common parts**: GLib, Skia, GStreamer, libsoup, fontconfig...
 - **Key differences**: **no UI toolkit**, graphics stack, input handling.
- Focus on **flexibility, security and performance**
- **Minimal set of dependencies**
- **Backend-based** architecture for I/O
- **Low memory and storage footprint**
- Platform-specific **HW-acceleration**



<https://wpewebkit.org>



What is WPE WebKit?

```
mario:~ $ wkdev-enter --name wkdev
wkdev-enter: Launch a command or spawn an interactive shell in a container built by 'wkdev-create

[REDACTED] WPE

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includin

NOTE:
- Be sure to try 'wkdev-test-host-integration' to verify your container setup b
- The home directory  ${HOME} =/home/mario within the container is not the same a
You can find your regular host home directory in the container under  ${HOST_H
- Instructions on how to build / debug / profile WebKit can be found in the SDK
locally in  ${WKDEV_SDK} /docs or online https://github.com/Igalia/wkdev-sdk/tr
mario@wkdev:~$ cd /host/home/mario/work/WebKit/
mario@wkdev:/host/home/mario/work/WebKit$ ls WebKitBuild/
WPE
mario@wkdev:/host/home/mario/work/WebKit$ ls WebKitBuild/WPE/
Release
mario@wkdev:/host/home/mario/work/WebKit$ ls WebKitBuild/WPE/Release/
ANGLE          CTestTestfile.cmake      manifest.txt
bin            DerivedSources          nimlang.ops
bmalloc        DeveloperTools        PAL
build.ninja    Documentation        PerformanceTests
build-webkit-options.txt  facebook.ops  reddit_memory_warning.ops
CMakeCache.txt flickr_memory_warning.ops reddit.ops
cmakeconfig.h  flickr.ops          share
CMakeFiles      GIDocgenGenerated    Skia
cmake_install.cmake  inspector-resources.stamp  Source
compile_commands.json  JavaScriptCore  TestRunnerShared
CPackConfig.cmake  JavaScriptCoreGLib  theverge_memory_warning.ops  wpe-platform-2
CPackSourceConfig.cmake  lib          theverge.ops
mario@wkdev:/host/home/mario/work/WebKit$ ./Tools/Scripts/run-minibrowser --wpe https://wpewebki
Using default MiniBrowser
MESA-INTEL: warning: ../src/intel/vulkan/anv_formats.c:981: FINISHME: support more multi-planar
```

lt by 'wkdev-create'



WPE

Home Learn & Discover Blog Developers [Get WPE](#)

Explore Embedded Browsers

The Web Platform is a frequently chosen foundational technology for many reasons, including:

- Web Platform technologies are built on standards, they have great longevity
- The standards are open, embedded systems can incorporate them without licensing fees or other worries. Open standards with great longevity allows lots more things to benefit from the same investments
- The number of people with the basic skills to build things with web technologies is massive

[Learn more about embedded browsers](#)

Supported Hardware

WPE is currently running on a wide range of hardware. This page lists configurations which are known to work, sorted by manufacturer:



ps wpe-platform-2.0-uninstalled.pc wpe-platform-wayland-2.0-uninstalled.pc
WPEPlatformDRM-2.0.gir WPEToolingBackends
be <https://wpewebkit.org>
more multi-planar formats with DRM modifiers

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Why do Web rendering engines matter in embedded devices?

- **Strategic role in the software stack** of embedded devices
 - Rendering, networking, security sandbox, media, I/O, accessibility...
- **The Web Platform allows building all sorts of applications**
 - Flexibility for designing, implementing and testing your product.
- **Known development stack**
 - Massive pool of web developers that could implement applications.
- **Useful to implement all kinds of products**
 - Smart home, In-Vehicle/Flight Infotainment, digital signage...



WebKit on embedded devices

- Phones & tablets
- Set-top boxes & TVs
- Smart home appliances
- GPS navigation devices
- Audio/video conferencing
- Hi-Fi sound systems
- Audio streaming
- Digital signage
- Server-side rendering
- QA and testing



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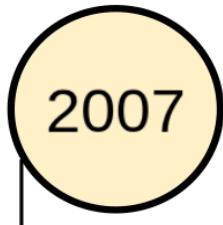
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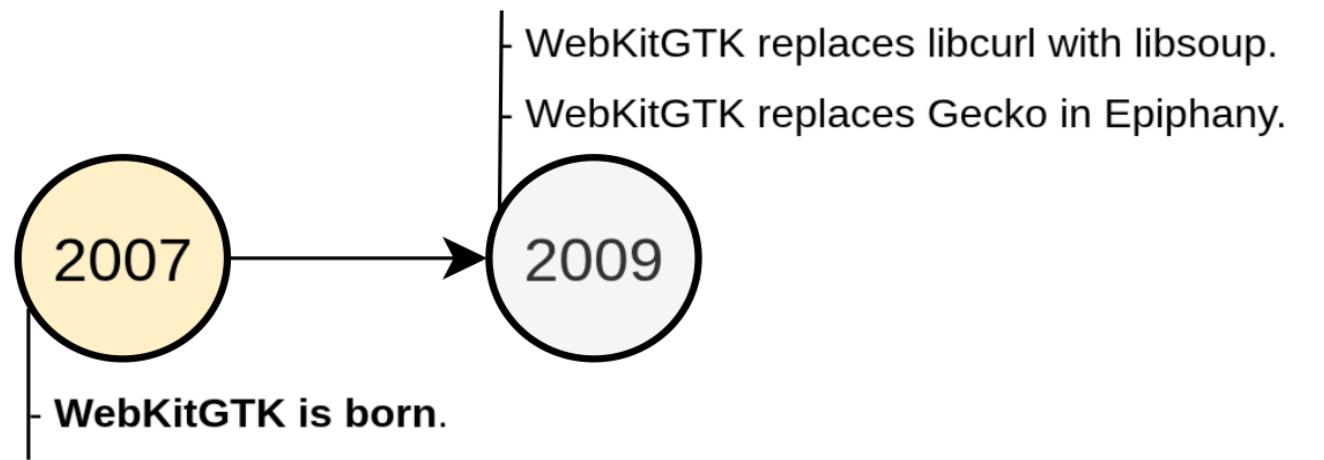
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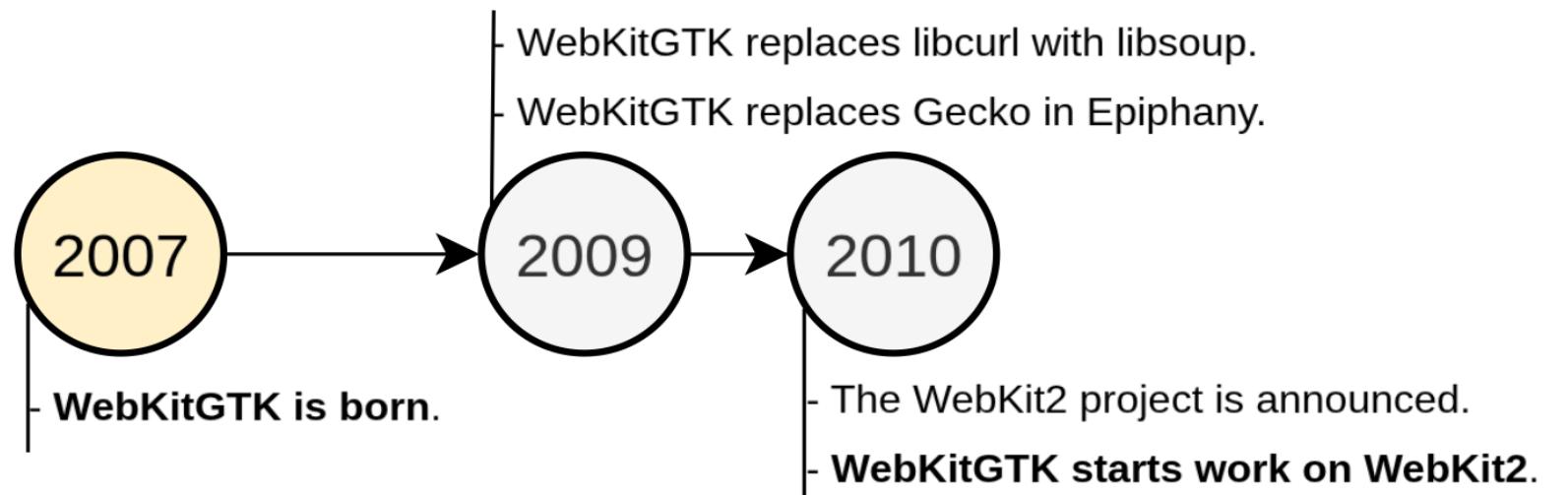
WebKitGTK is born.



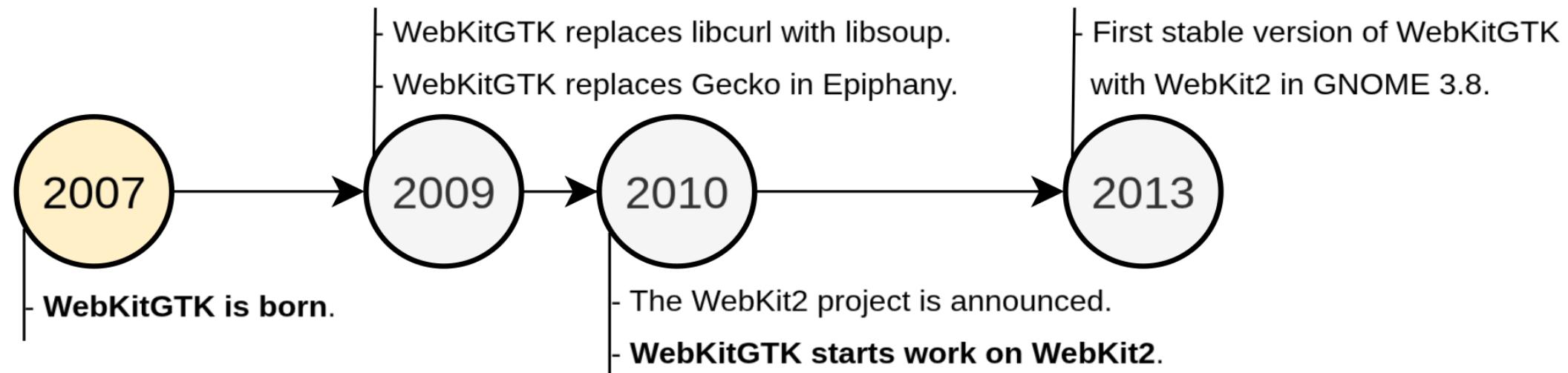
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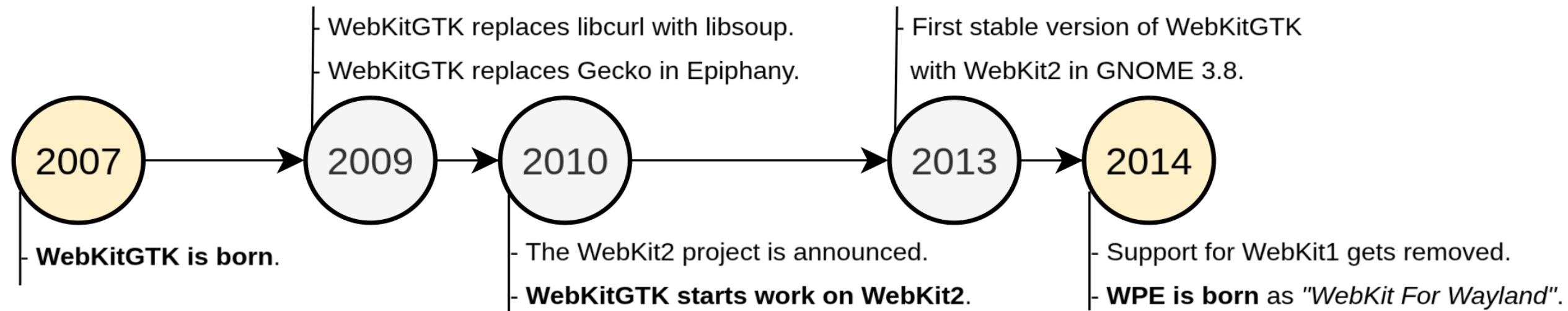
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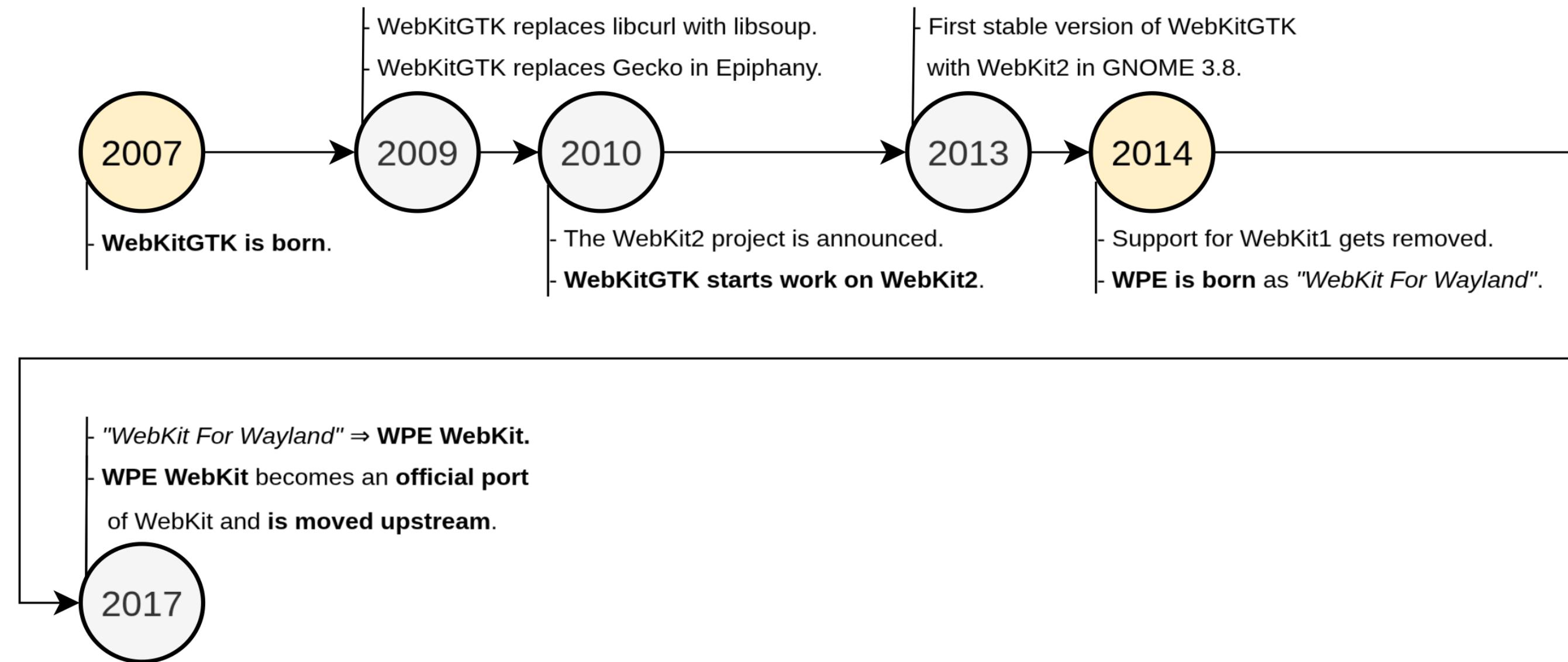
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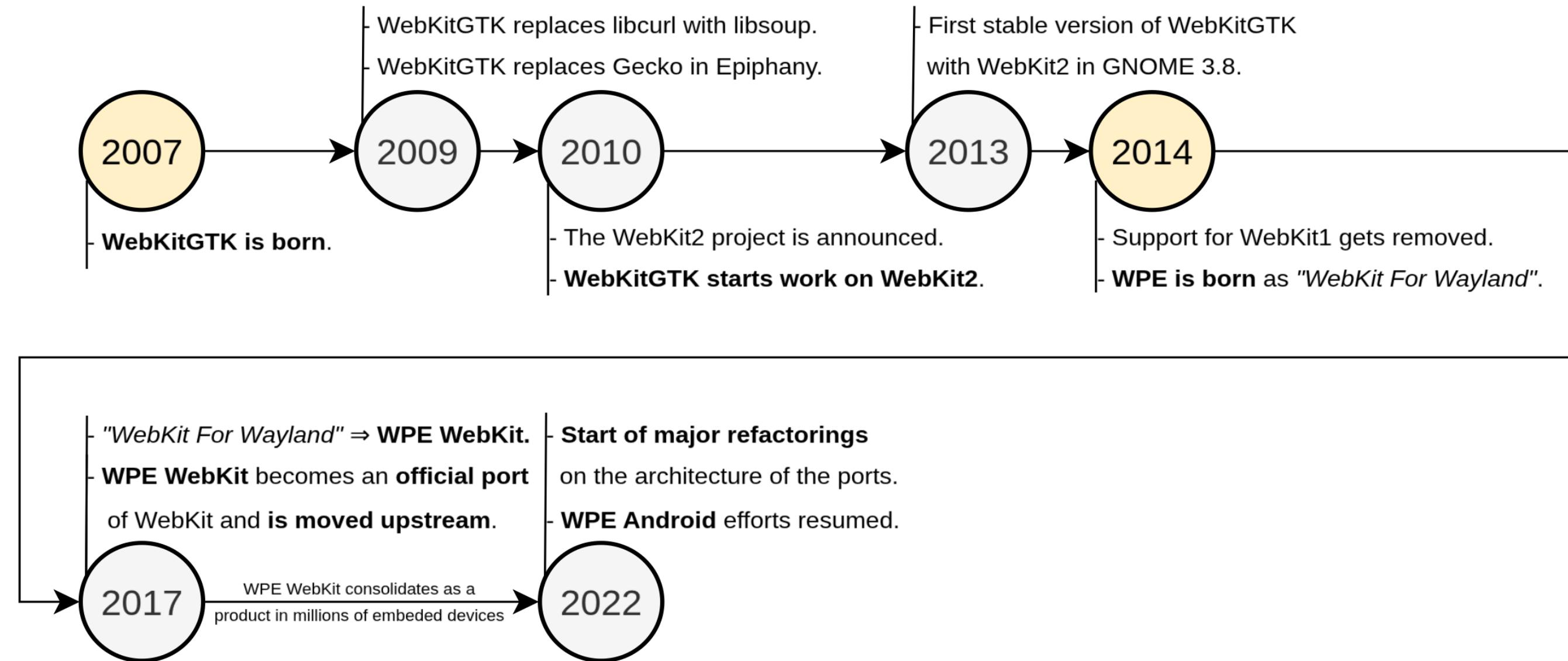
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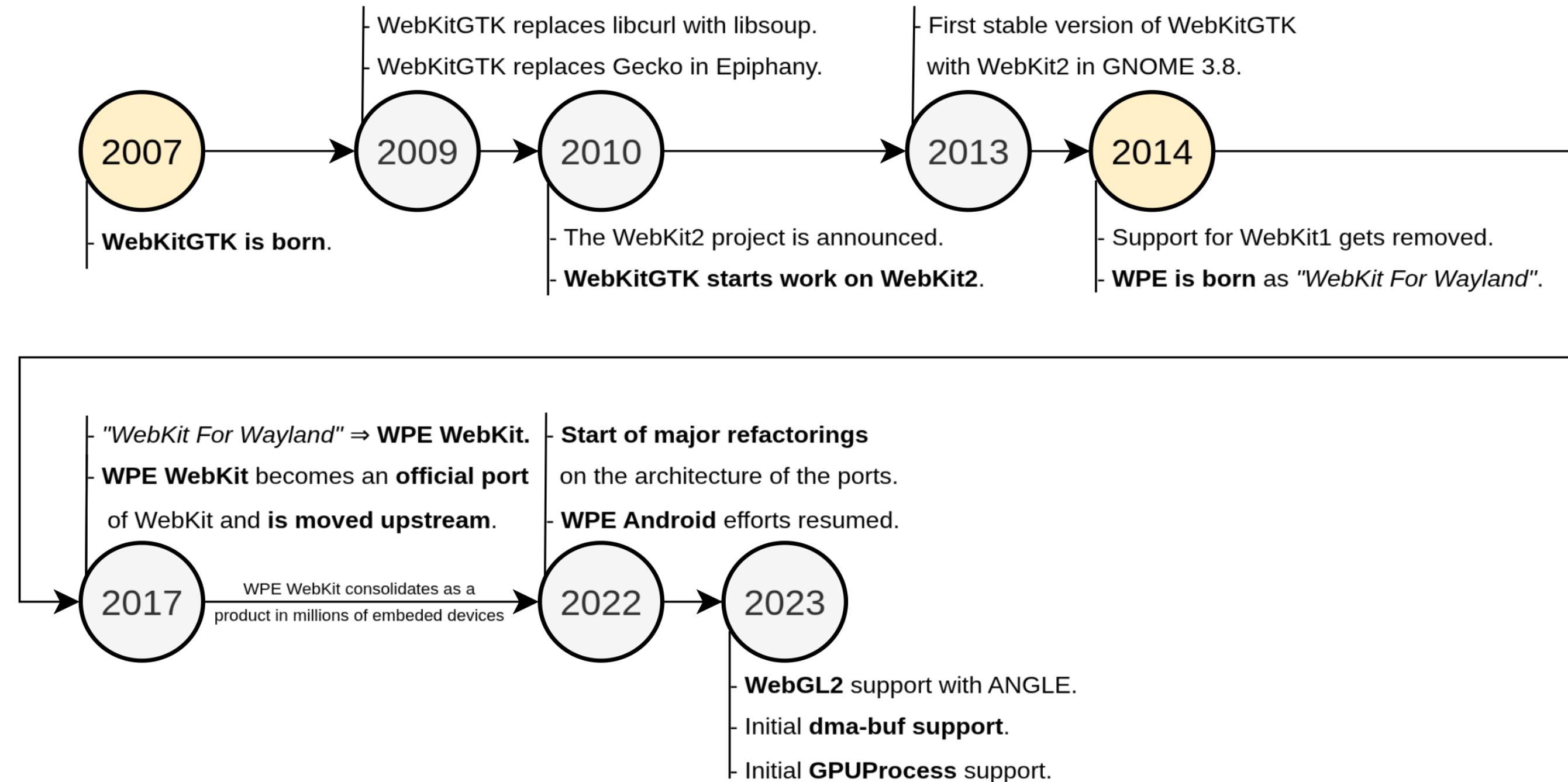
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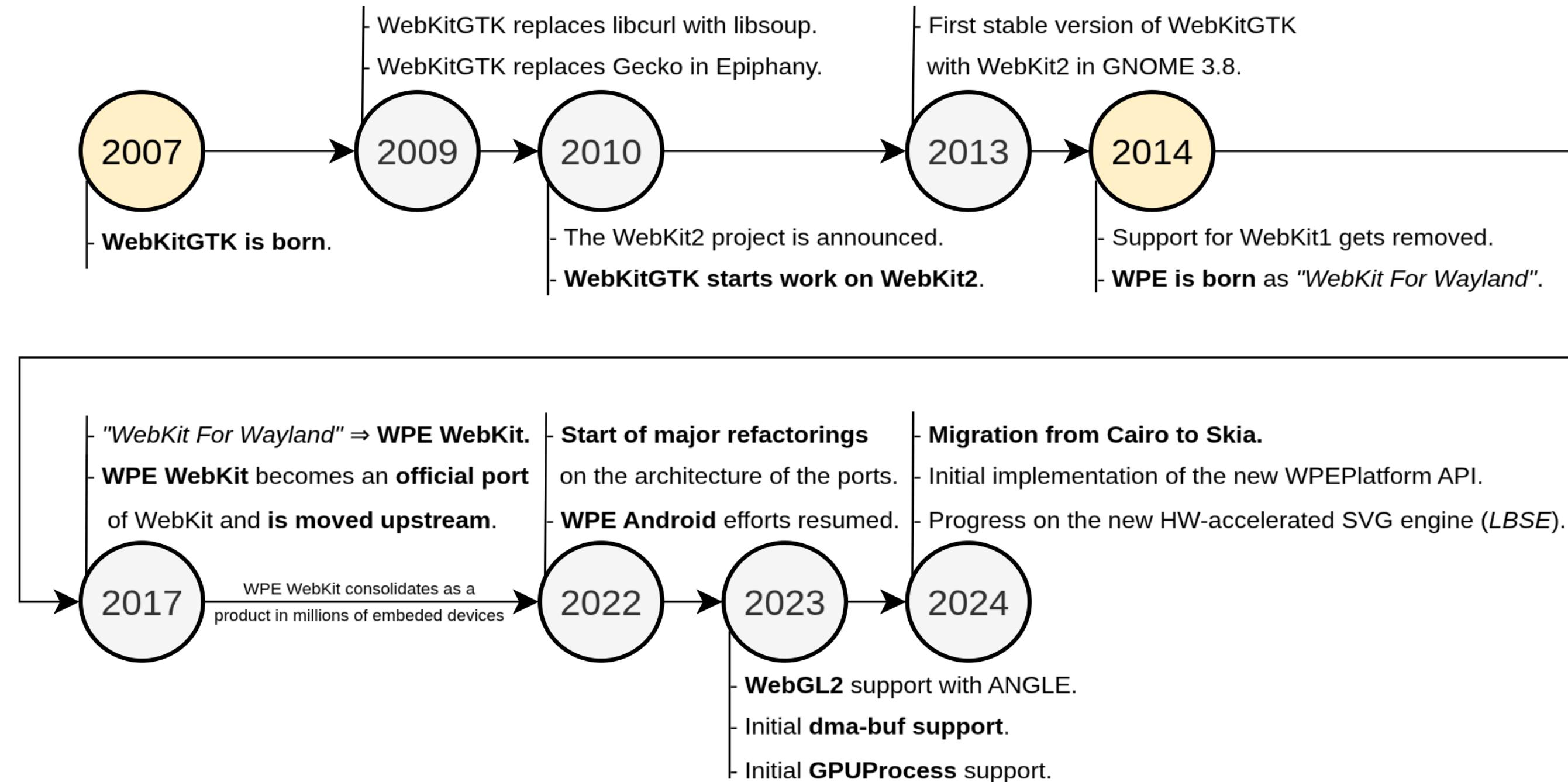
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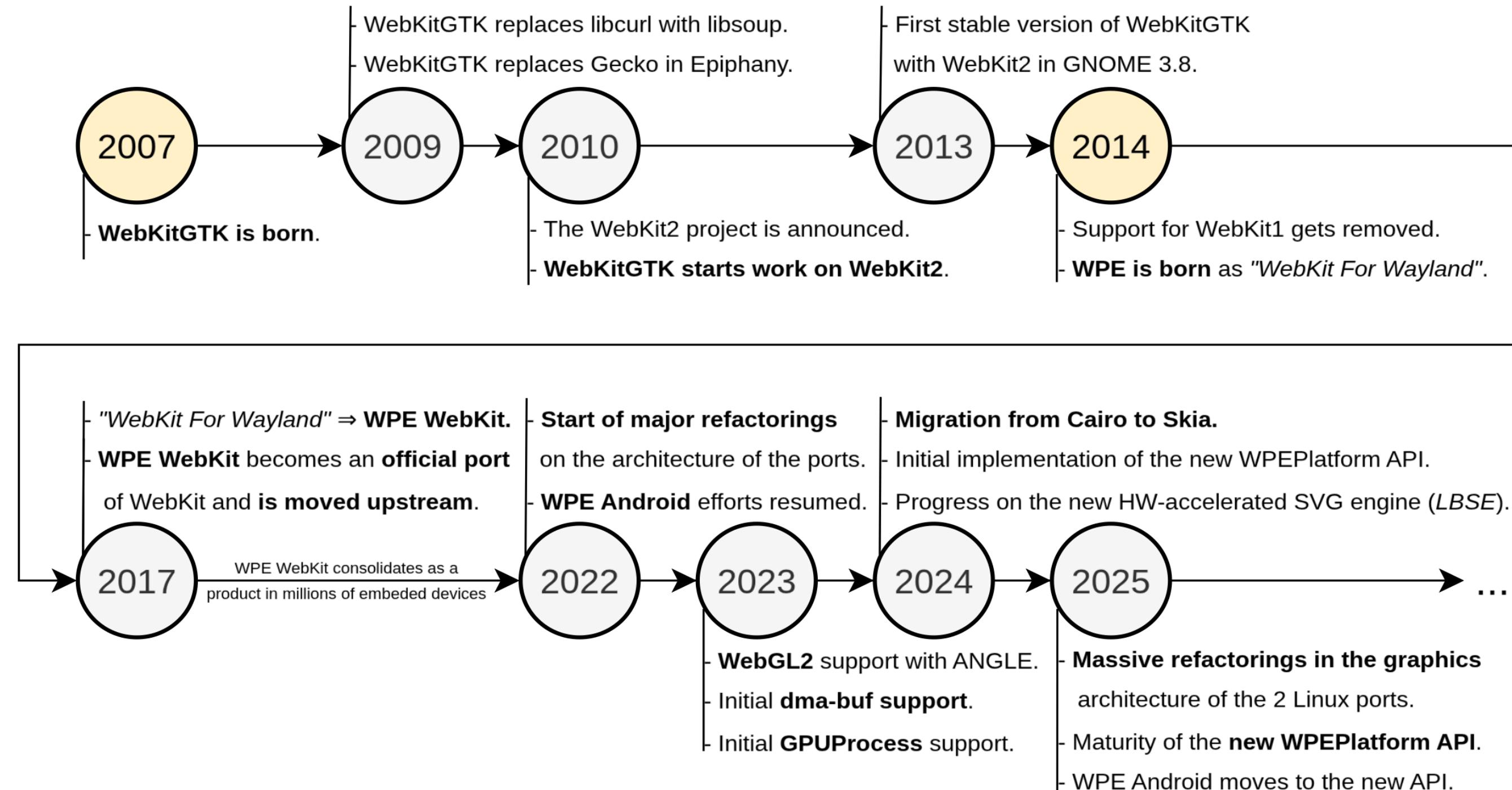
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Latest updates

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Latest updates

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 - WebM support in MediaRecorder, WebAudio fixes, WebCodecs compliance.
 - GStreamer-based WebRTC backends.



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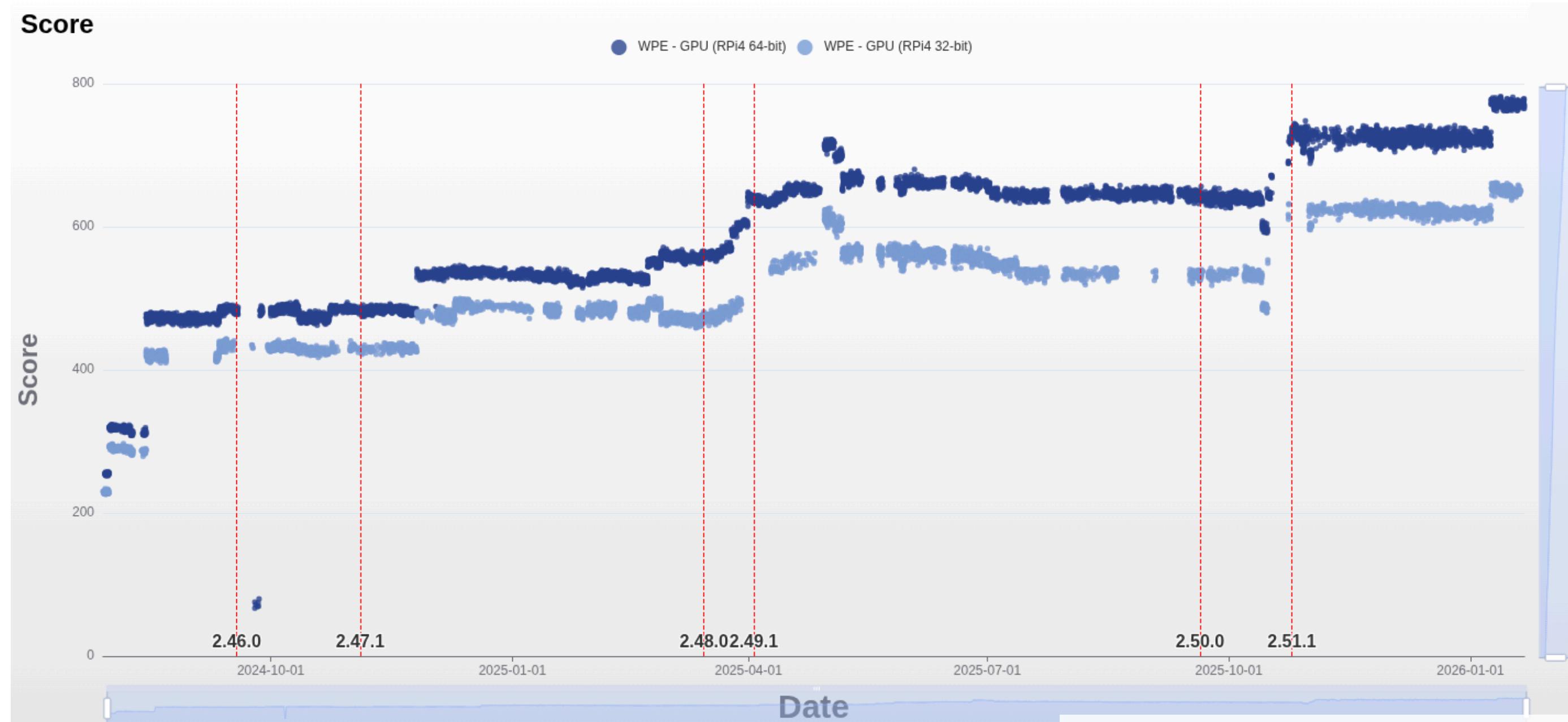
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- **Multimedia-related improvements**
 - WebM support in MediaRecorder, WebAudio fixes, WebCodecs compliance.
 - GStreamer-based WebRTC backends.
- **Big overhaul to the graphics rendering pipeline**
 - Major refactoring and removal of unused abstraction layers.
 - Threaded GPU rendering, GPUProcess for WebGL.
 - Damage tracking and propagation to the compositing stage.



Latest updates

MotionMark 1.3 improvements on the 32-bit & 64-bit Raspberry Pi 4

Last processed revision — RPi4 32-bit: [305815@main·RPi4](#) 64-bit: [305924@main](#)



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Latest updates

MotionMark 1.3 improvements on the 64-bit Raspberry Pi 4

Test	Score July 2024	Score April 2025	Score October 2025	Score January 2026
Multiply	501.17	710.75	697.15	678.93
Canvas arcs	140.24	820.64	859.68	859.48
Canvas lines	1613.93	3025.16	4648.54	7508.43
Paths	375.52	4268.87	3953.83	4288.59
Leaves	319.31	480.19	684.72	673.94
Images	162.69	265.14	263.19	267.88
Suits	232.91	444.55	388.62	399.03
Design	33.79	63.99	114.09	100.24
OVERALL	254.15	634.49	737.56	778.99



Latest updates

- **JavaScriptCore**

- Improve memory management for long-running applications.
- New tooling to detect memory leaks and do profiling.
- WASM-related work for 32-bit support (i.e. BBQJIT, OMG, IPInt).



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- **Security**

- 2 major feature releases + several bug/security fixes releases.
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- Increase use of smart pointers, dropped libsoup2 support.

- **Quality assurance**

- Better infrastructure, improved test coverage.
- Move the QA bots to the new **WebKit Container SDK**.



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- Support for accessibility, multiple views, touch events in DRM platform.
- GTK4 platform implementation via an external backend.
- Multiple API additions and API tests. Integration with QA bots.



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- **Android support**

- Upstreamed all the patches from the WPE-Android project.
- AHardwareBuffer support for Android in WebKit upstream.
- Native integration with Android subsystems (e.g. logging).
- Kept evolving the WPE-Android project (WPE 2.50, NDK r27, **WPEPlatform API**).



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- **WebXR support**

- Implemented WebXR using OpenXR and added support for the WebXR AR module.
- Enabled WebXR support on both Linux and Android.



Next steps



Next steps

- **Multimedia-related improvements**
 - GStreamer-based WebRTC backend.
 - Screen capture streaming to WebRTC PeerConnection.
 - WebCodecs integration with WebGL and WebAudio.
 - Player suspension (useful in pages with many media elements).



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- **Multimedia-related improvements**
 - GStreamer-based WebRTC backend.
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 - WebCodecs integration with WebGL and WebAudio.
 - Player suspension (useful in pages with many media elements).
- **More work on the graphics rendering pipeline**
 - Align the graphics architecture with other ports.
 - Compositor refactor to avoid OpenGL dependency and support new APIs.
 - Improvements around async scrolling animations.
 - Enable GPUProcess in more cases (i.e. WebGL only for now).
 - Remove Cairo support.



Next steps

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- **Quality assurance**
 - Better QA infrastructure and improve test coverage.
 - Resume the WebKit *gardening* efforts for the Linux ports.



Next steps

- New **WPEPlatform API**
 - Complete the new **WPEPlatform API**.
 - Write more API tests and documentation.
 - Release version 1.0 (aiming for WPE 2.54).



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- **WebXR support**

- Implement more WebXR modules.
- Implement WebXR layers, hit test, and anchors.



Wrapping up

- **WebKit** keeps being a **complete and embeddable Web engine on Linux**.
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 - **New possibilities** opening with **Android** and **WebXR support**.

It's a pretty exciting moment for **WebKit on Linux!**



How to contribute

WebKit:

Website: <https://webkit.org>

Mailing list: <https://lists.webkit.org/mailman3/lists/webkit-dev.lists.webkit.org>

Documentation: <https://docs.webkit.org>

WebKitGTK:

Website: <https://wpewebkit.org>

Mastodon: <https://floss.social/@WebKitGTK>

Bluesky: <https://bsky.app/profile/webkitgtk.org>

Mailing list: <https://lists.webkit.org/mailman3/lists/webkit-gtk.lists.webkit.org>

Matrix: [#webkitgtk:matrix.org](#)

WPE WebKit:

Website: <https://webkitgtk.org>

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Bluesky: <https://bsky.app/profile/wpewebkit.org>

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Questions?

Mario Sánchez-Prada

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