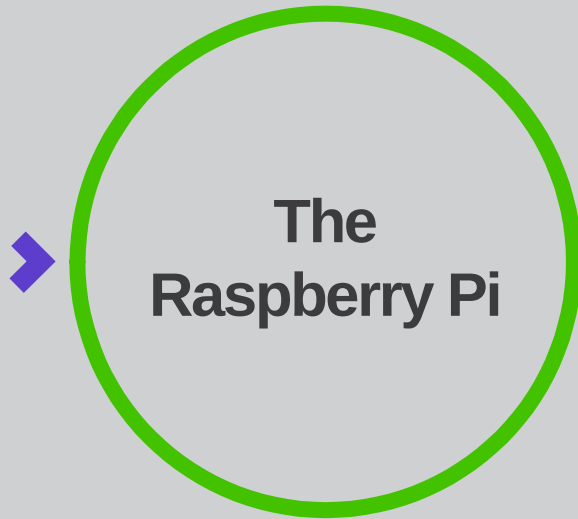COLLABORA

The Raspberry Pi Browser

Presented by
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Brought to you by
Marco Barisione, Emanuele Aina, Julien Isorce, ChangSeok OH, Tomeu Visozo, George Kiagiadakis, Andre Magalhães, Gustavo Noronha
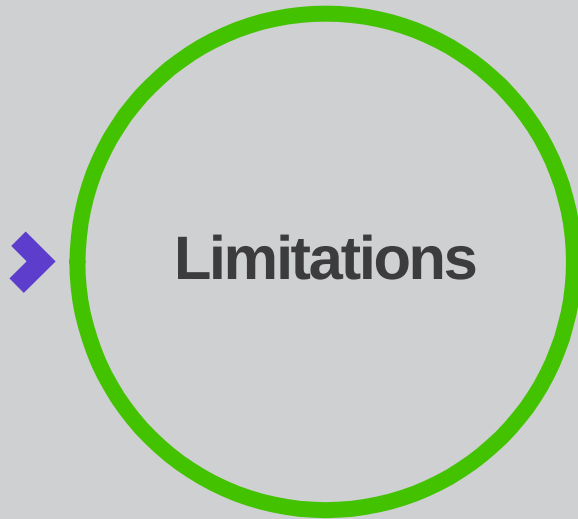
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The Raspberry Pi

Cheap hardware, not very powerful

- ARM v6 CPU

- Up to 512 MB of RAM

- Reasonably powerful VideoCore media processor
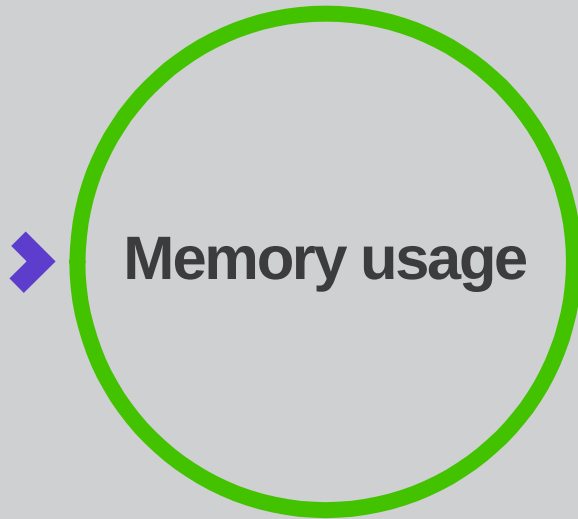
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Challenge

Make a modern browser that runs well enough to be usable

- Multiple tabs
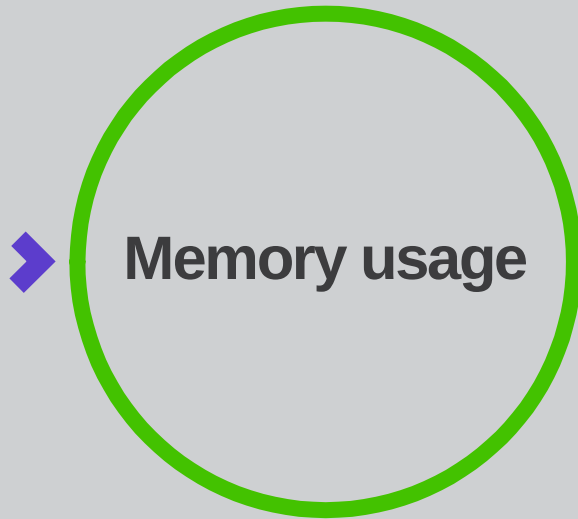
- Responsive

- Support YouTube

Limitations

Drivers and concerns

- WebKit2 out of the question for worries of memory usage overhead (working on it…)

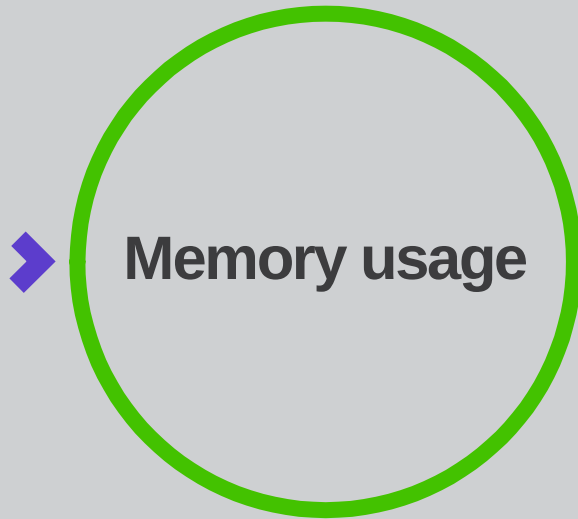- Accelerated Compositing out, unreliable GL stack

- Wayland postponed

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Epiphany gets tab limits

Memory usage

- Up to 3 tabs are kept live

- Background tabs may get freed

- Per-tab session restore infrastructure reused to reload tabs that got freed when switched to

- *For the future*, could make Epiphany kill web processes, with WebKit2
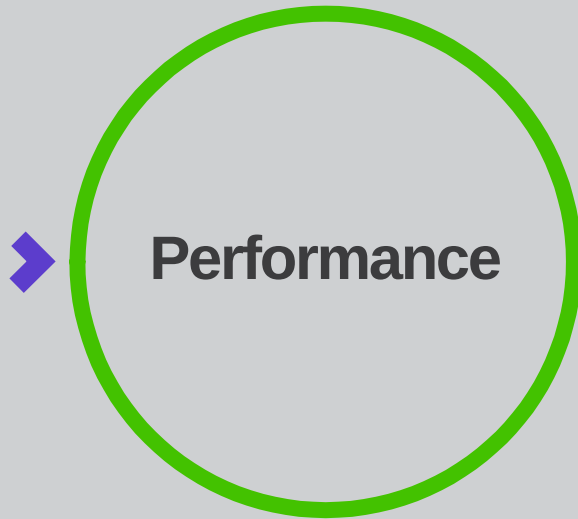
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Memory usage

Memory pressure handler

- Notification from the system which allows throwing away caches and other temporary memory when memory is becoming very scarce

- Implemented by Apple for Mac & iOS ports

- Patch on bug 123532

- Problem: only works when inside a cgroup
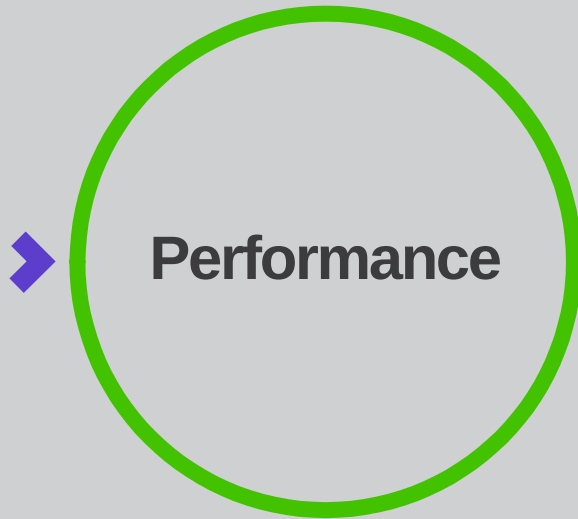
Memory usage

Disk Image Cache

- Saves decoded images to files and memory maps them

- Plugs the main source of heap fragmentation – process memory usage grows much less

- A bit different: Apple uses it for non-decoded image data

- Made cross-platform on bug 124167

- Gustavo would like to finish this patch and enable it on WebKit2GTK+, need to discuss API
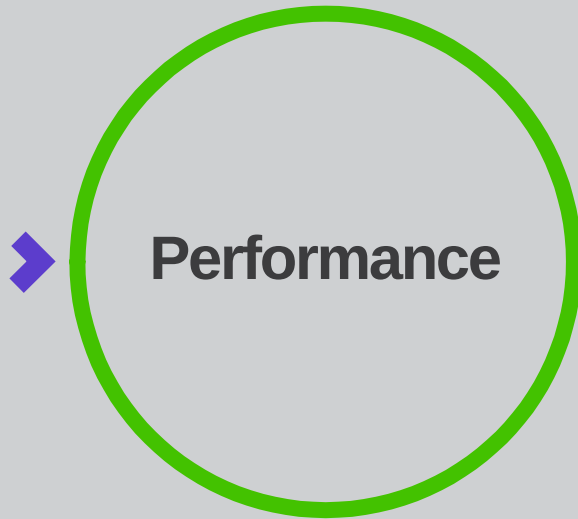
Performance

Use RGB16 throughout

- This is the format cairo and pixman have been optimized for on the raspberry pi

- All surfaces changed to use it

- GStreamer backend changed to render to it directly

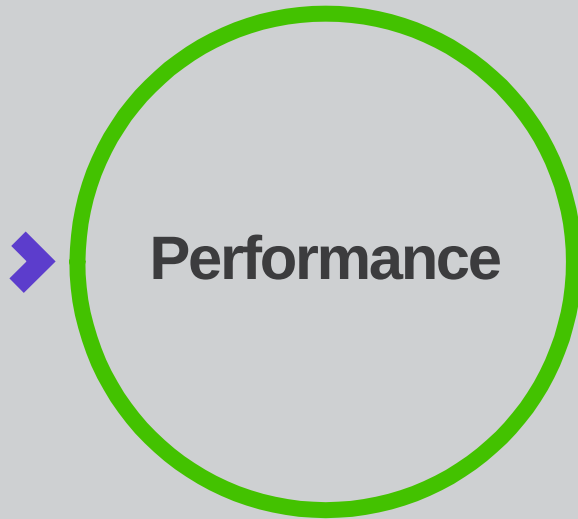- Image decoders changed to decode to it directly

OMX and dispmanx usage

Performance

- OMX used for image decoding

- OMX used for video scaling

- dispmanx used directly for fullscreen video
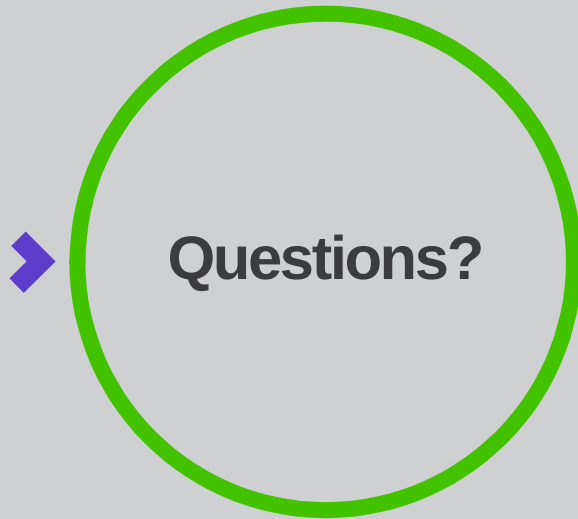
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Performance

Faster scrolling

- Tiled backing store enabled to make scrolling more responsive

- Suspends pretty much everything while scrolling – JS, animation, painting

Videos made faster

Performance

- First of all, no preloading, special case for embedded YouTube videos

- Videos are painted directly to the final surface instead of going through the tiled backing store

- YouTube hacked by injected JS to always use a <video> tag and to avoid running lots of its own JS code, in particular the one that deals with loading comments

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Questions?

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