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# Frame Timing and Pacing in XR

Lots of pretty charts



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Open First

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# Talk to me about

- XR, VR & AR
- [Volt Programming Language](#)
- Voxel/SVO rendering
- FOSS & Society
- Joining Collabora!

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- What is a frame?
- Tools
- Graphs
- Wrapping up



# What is a frame?

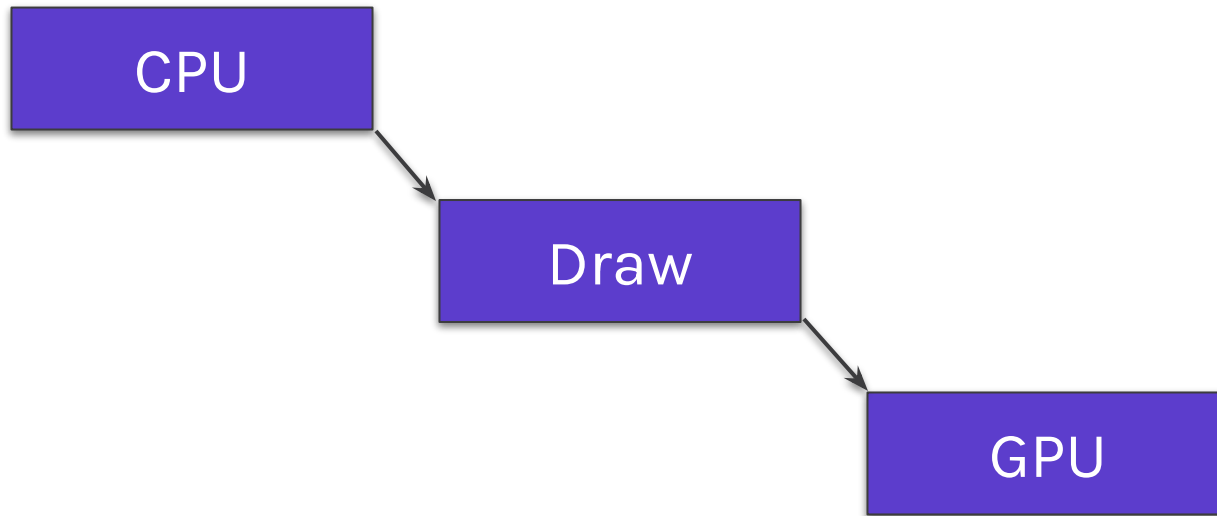
# Anatomy of a frame

- CPU
  - Logic
  - Drawing
- GPU

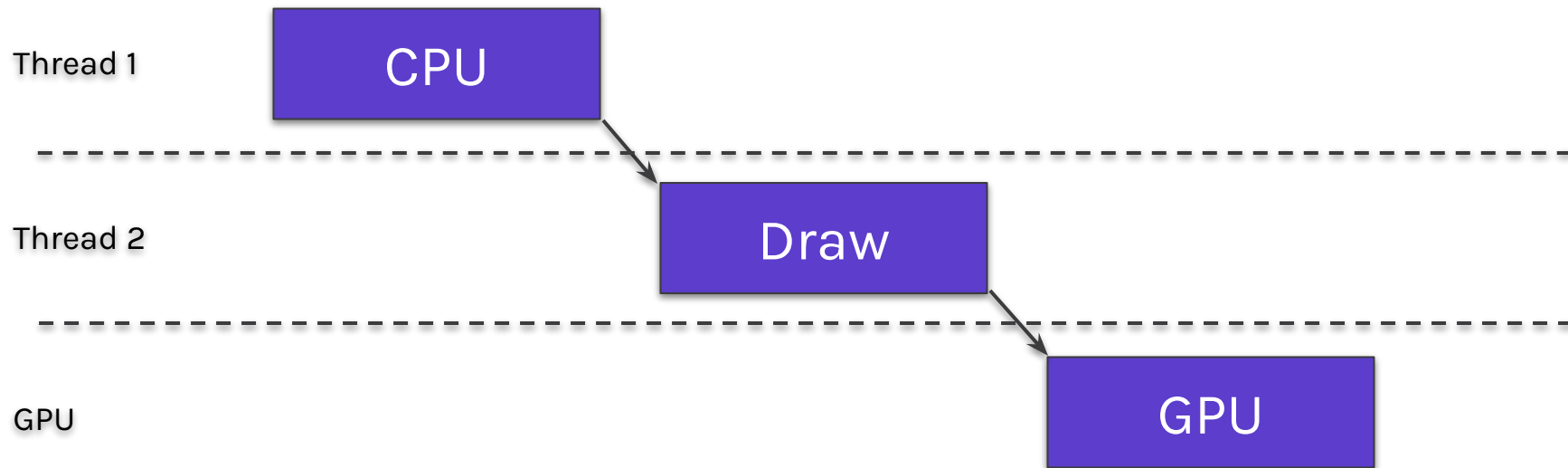
# On a line



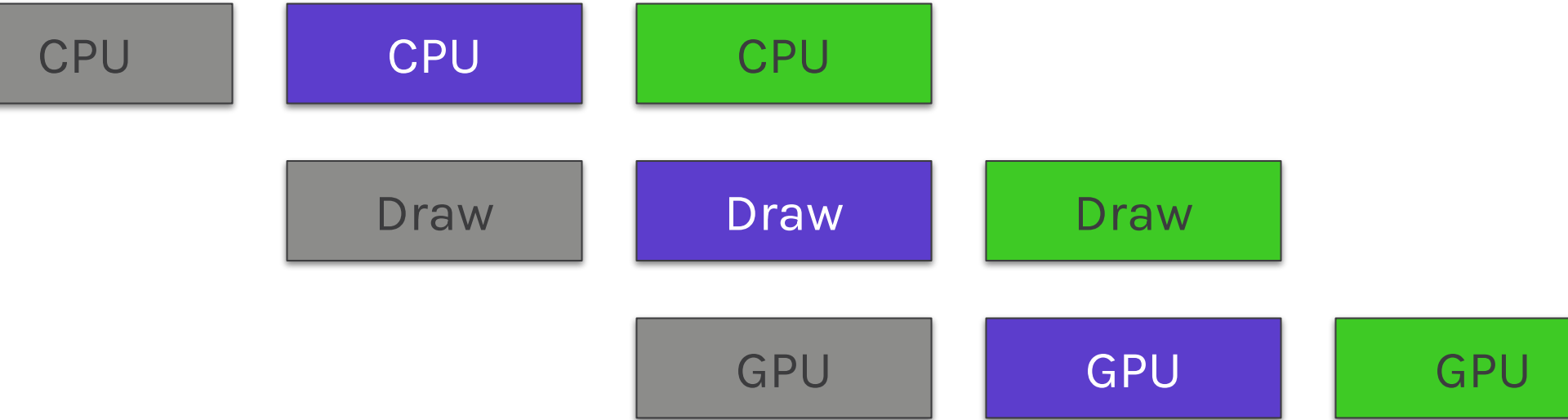
# Waterfall



# Waterfall

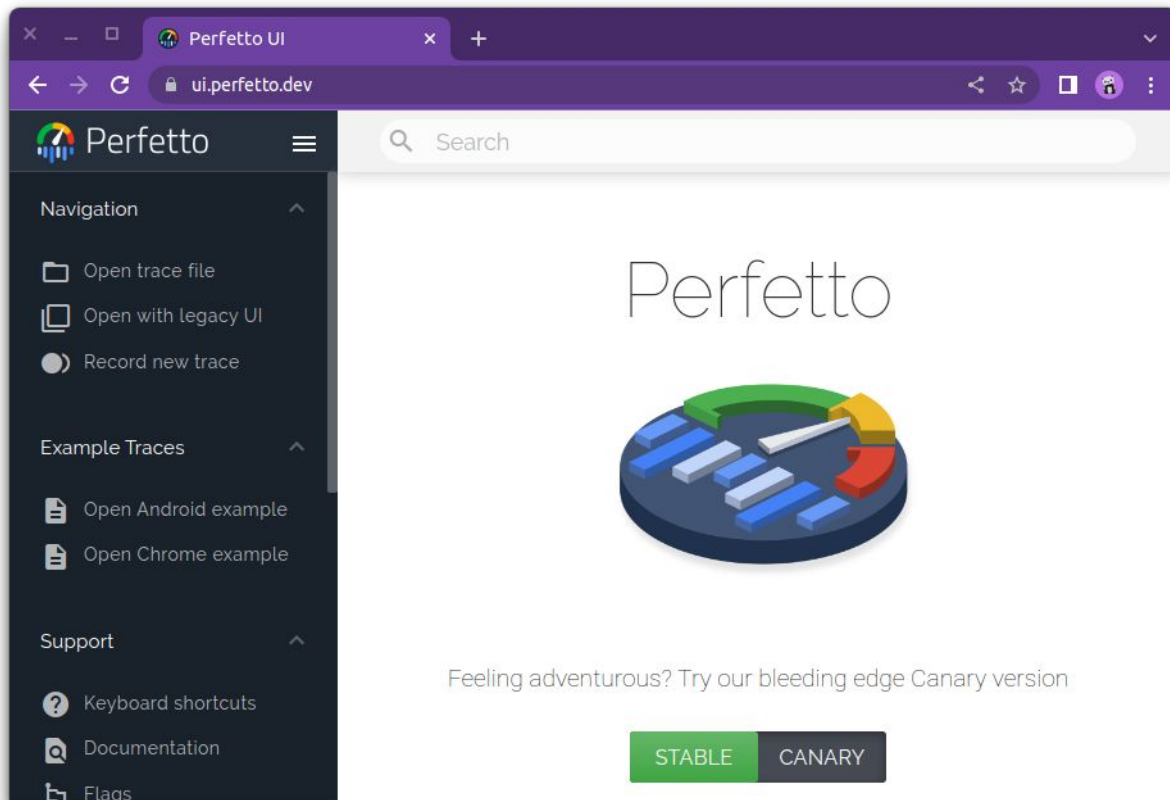


# Pipeline



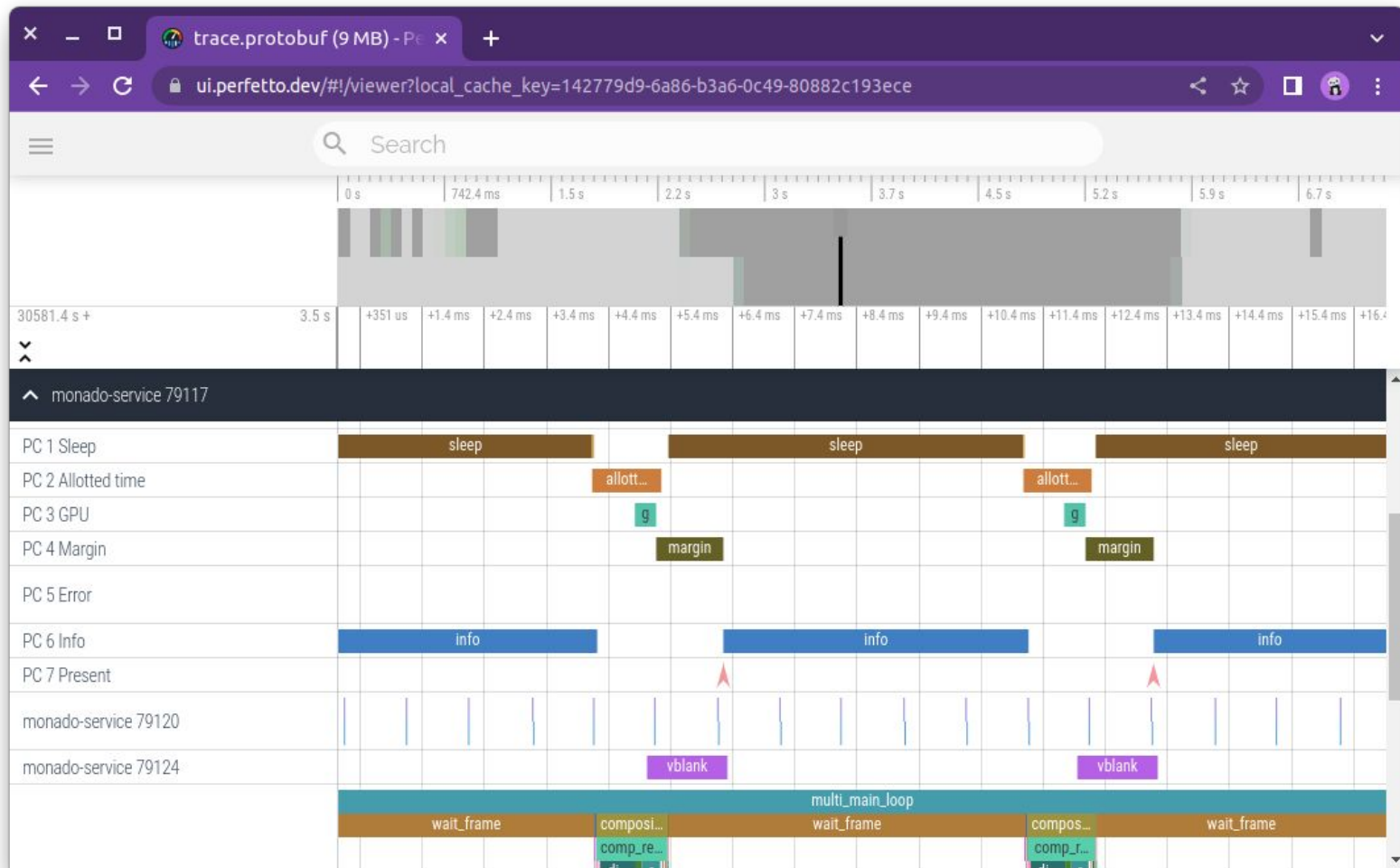


# Tools



# Perfetto

- Google Project
- Server/Client(s)
- System tracing
- Fancy UI



# Home growned scripts

- Dump data from Monado
- Process in Python
- Visualise using Bokeh



# Graphs

# Perfetto demos

- System tracing
- Monado trace
  - Graphics composition
  - Compute composition



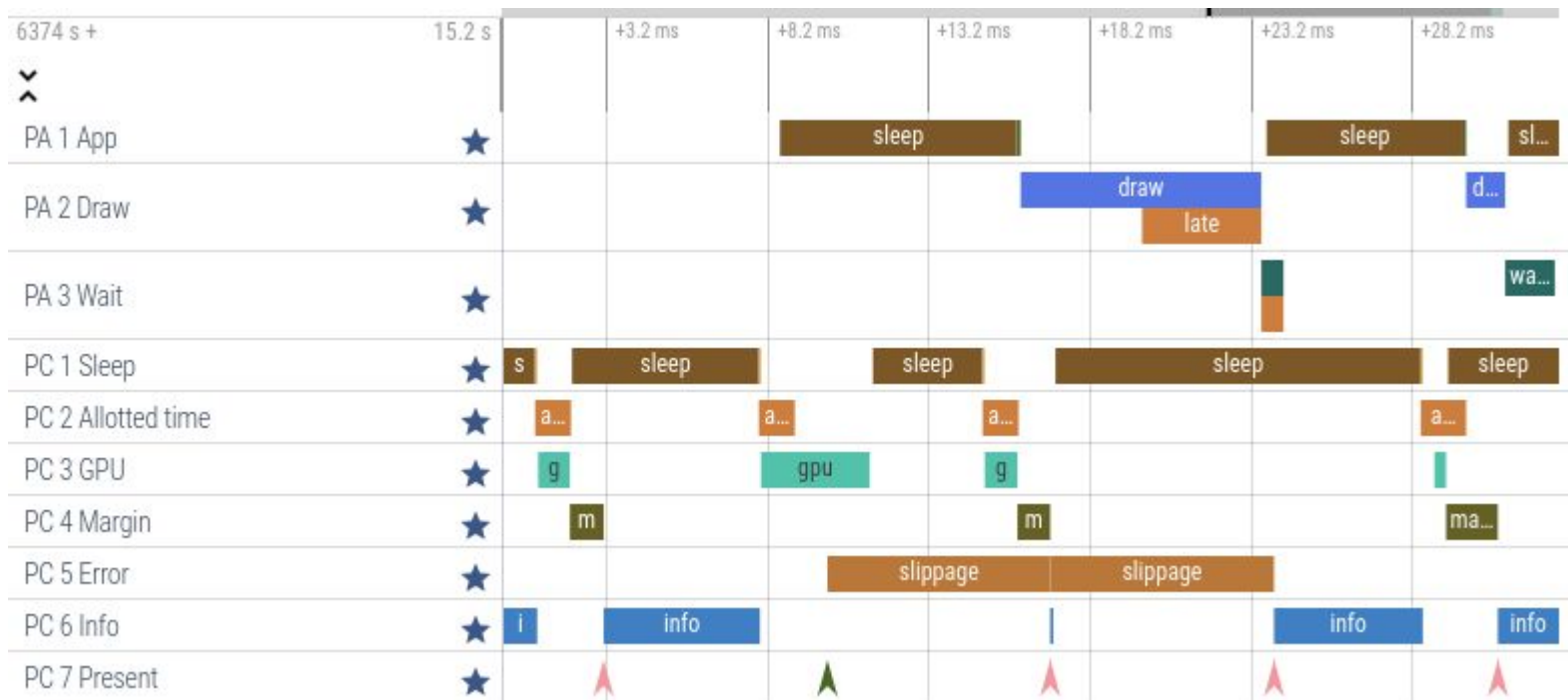
# Monado Metrics

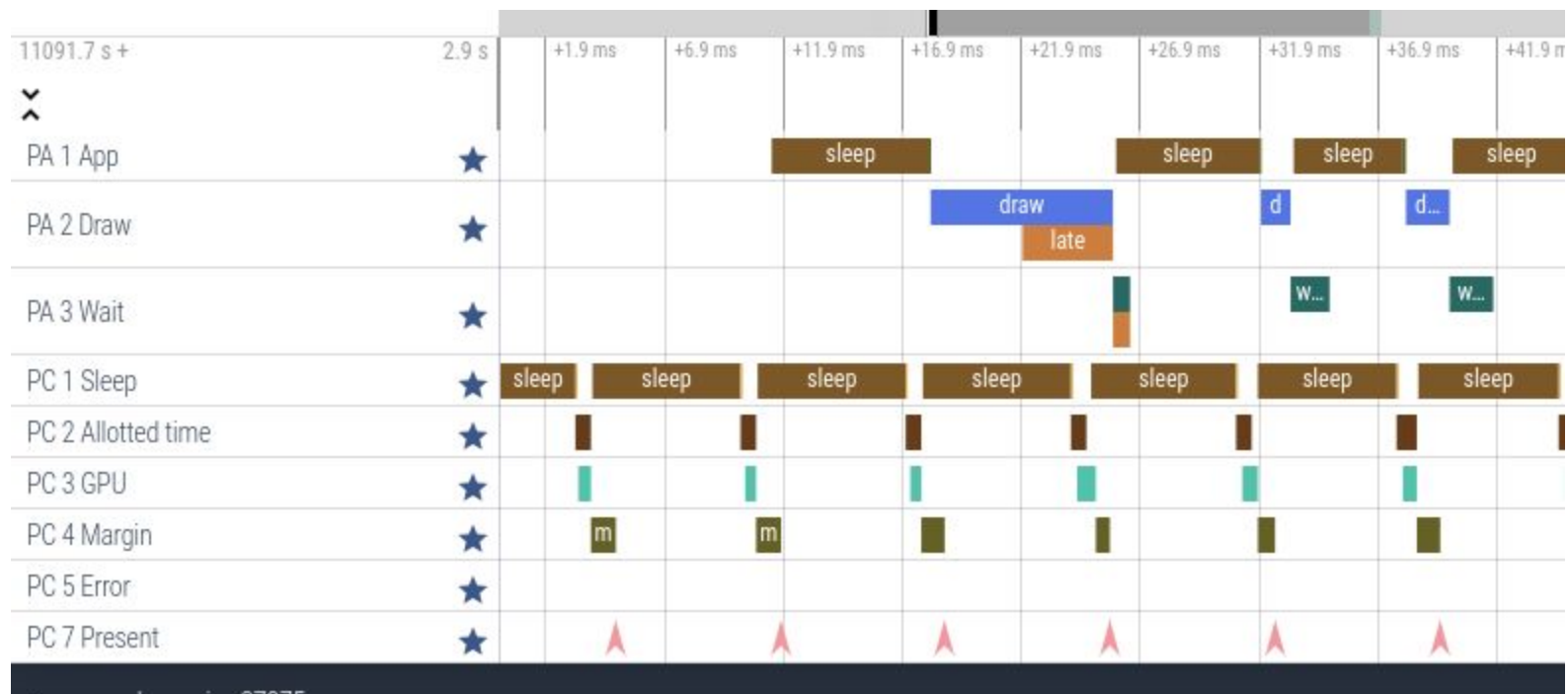
- Pretty graphs
- Compare to perfetto trace

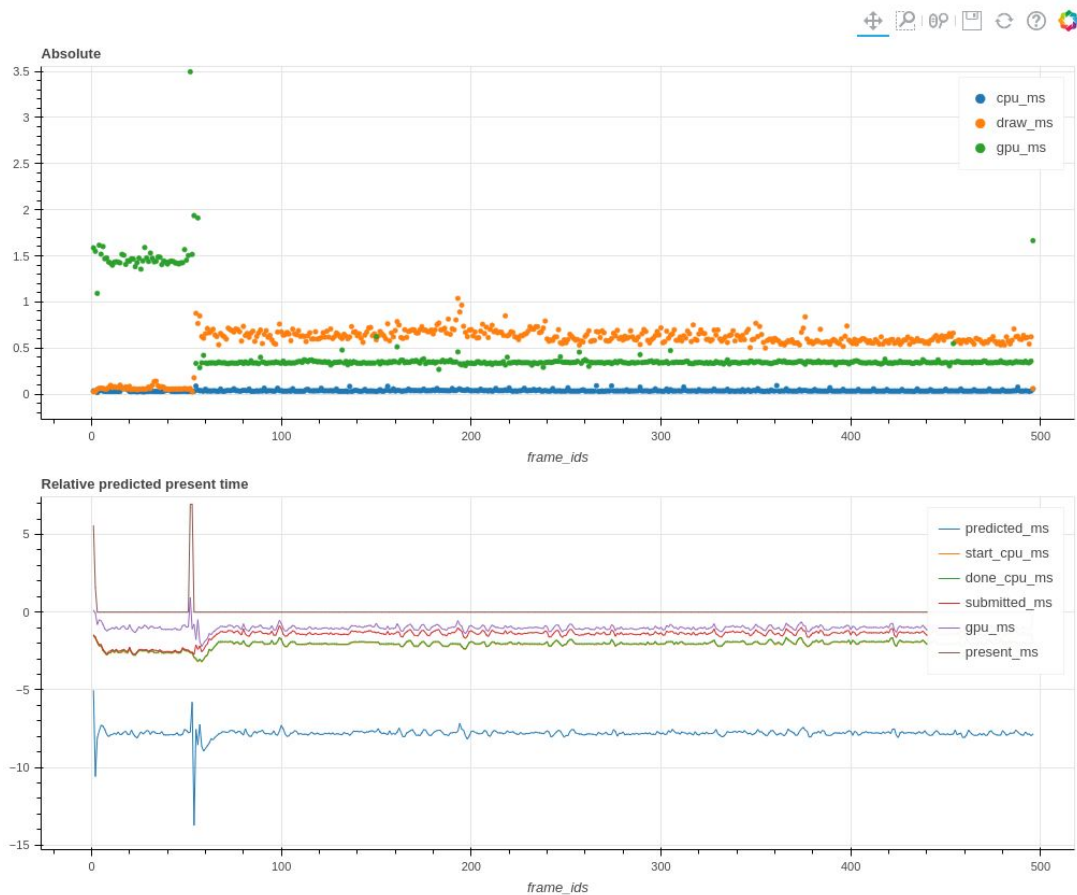


# Backup pictures

And for offline viewing





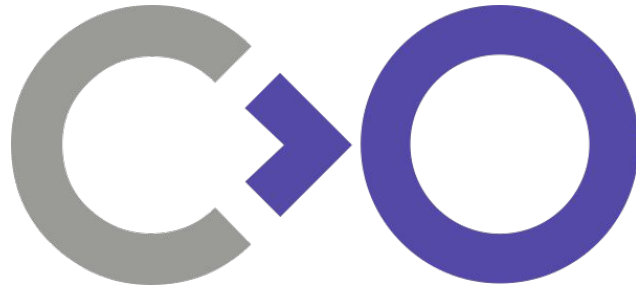




# Wrapping Up

# Some thoughts

- Perfetto limitations
  - Overlapping calls
- I'm not a python programmer
  - Oh god what am I doing?!



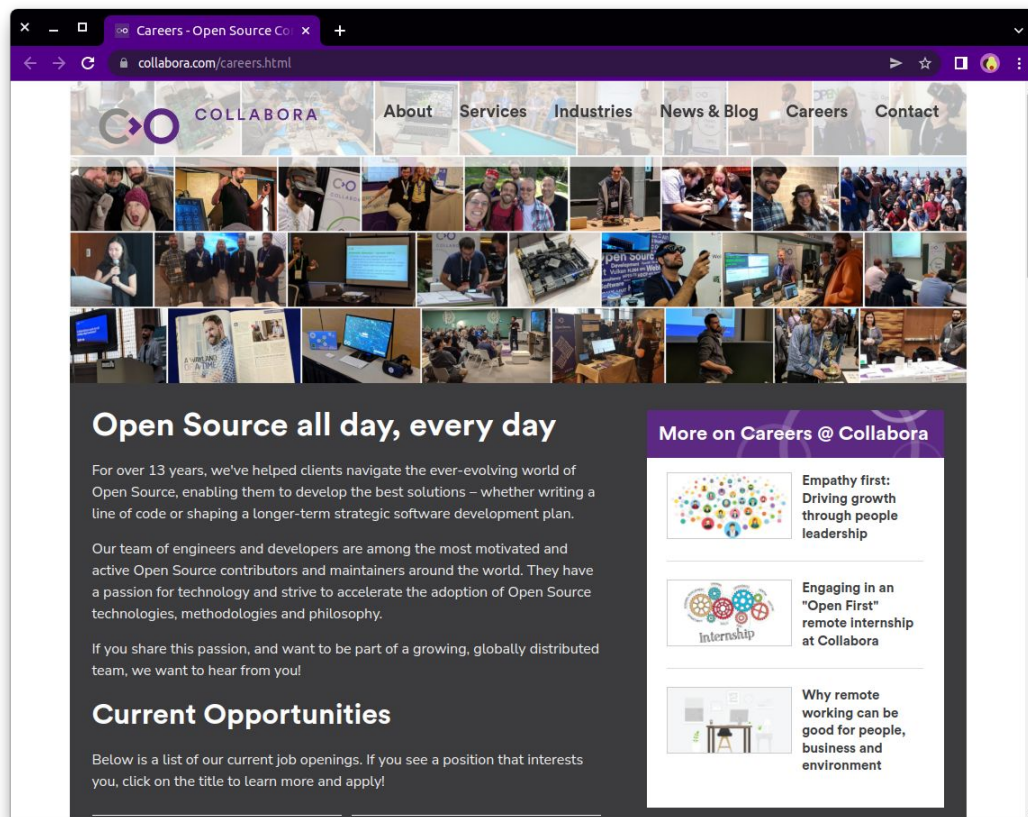
Questions?



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We are hiring!






The screenshot shows the 'Careers - Open Source Co' page on the Collabora website. The browser address bar shows 'collabora.com/careers.html'. The page features a navigation bar with links to 'About', 'Services', 'Industries', 'News & Blog', 'Careers', and 'Contact'. Below the navigation bar is a large grid of 24 small images showing various people working and interacting. The main content area has a dark background and includes the following sections:

- Open Source all day, every day**

For over 13 years, we've helped clients navigate the ever-evolving world of Open Source, enabling them to develop the best solutions – whether writing a line of code or shaping a longer-term strategic software development plan.

Our team of engineers and developers are among the most motivated and active Open Source contributors and maintainers around the world. They have a passion for technology and strive to accelerate the adoption of Open Source technologies, methodologies and philosophy.

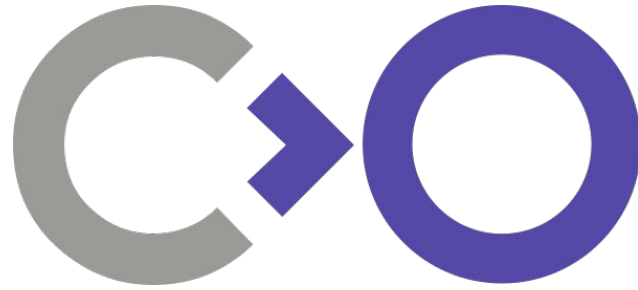
If you share this passion, and want to be part of a growing, globally distributed team, we want to hear from you!
- Current Opportunities**

Below is a list of our current job openings. If you see a position that interests you, click on the title to learn more and apply!
- More on Careers @ Collabora**
  -  **Empathy first:**  
Driving growth through people leadership
  -  **Engaging in an "Open First" remote internship at Collabora**
  -  **Why remote working can be good for people, business and environment**

# Links

- <https://monado.freedesktop.org/>
- <https://perfetto.dev>
- <https://ui.perfetto.dev>
- <https://gitlab.freedesktop.org/monado/utilities/metrics>
- <https://www.collabora.com/careers.html>





Thank you!



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