Crosswalk on IoT

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Session goals:

- What IoT means to Crosswalk from the graphics perspective
- Introduce a new graphics architecture for IoT
- Next challenges

Tizen graphics, IoT and Crosswalk

Tizen Graphics

- Tizen is not much different than traditional Linux distros:
- In short: kernel Linux + GL driver + X11 or Wayland
  - Native App: toolkit (EFL or Qt)
  - Web App: runtime (WebKitEFL or Crosswalk)
- GL graphics context requires several megabytes! (sorry, no reference)
  - Problems on constrained platforms:
    - memory allocation: GPU driver resources, texture storage, double-buffering etc
    - memory bandwidth: texture upload of bitmaps

IoT

- IoT display-based devices:
  - medical monitors, smartwatch, wrist, etc
- hardware are not very capable:
  - CPU < 1 GHz, memory < 512 MB, no GPU
- system is somewhat simple:
  - e.g. one fullscreen web app at each time
    - simple window management
    - simple UI

Crosswalk (1/2)

- Crosswalk is based on Blink and Chromium
- It implements Tizen Web APIs for system control
- Chromium has a new platform backend system called Ozone:
  - Crosswalk on Tizen IVI uses Ozone-Wayland
  - Ozone-Wayland implements Wayland platform for Chromium
  - There are other Ozone implementations like KMS/DRM, caca, testing, etc

Crosswalk (2/2)

- We believe that Crosswalk could encompass all IoT needs!
  - *Web is the whole system*
  - **a lean graphics architecture is required though**

a new graphics architecture for IoT

Solving Tizen Graphics issues for IoT

- Graphics architecture for IoT has the desired features:
  1. Able to run in constrained platforms
  2. Simple window management
  3. Simple UI
- Solution:
  - **remove the window system and toolkits**
    - why we'd need it given that apps are fullscreen and Web based?
  - **choose renderer method**
    - e.g. using **software rendering instead GL** we potently could reduce memory problems

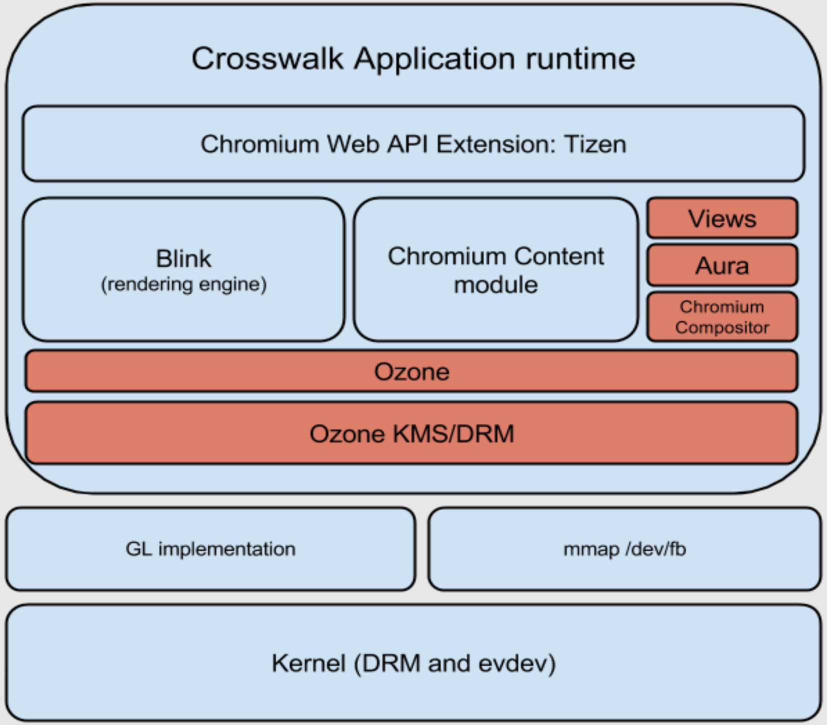
How Chromium helps? (1/2)

- Ozone:
  - Chromium Ozone backend system lets us to easily **switch the platform implementation**
  - We'd use Ozone KMS/DRM through software composing backend for constrained platforms
    - Ozone KMS/DRM uses double-buffer Skia surfaces, so it's quite capable

How Chromium helps? (2/2)

- Aura:
  - Aura is the UI framework for basic window and input events
  - Aura windows only have one graphics surface layer each (**so window management is not really needed at the window system level!**)
- Views:
  - Views is Chromium's internal widgets toolkit based on Aura
  - If desired, more complex windows decorations can be done using Views **(no external graphics toolkits are needed!)**

Crosswalk graphics architecture for IoT



Conclusion

- The new architecture is meant for IoT
  - constrained hw platforms where the Web takes over the whole system
- Less overall complexity due code reduction
  - Easily we save at least 1 million LoC (window system + toolkits)
- Proof-of-concept:
  - https://github.com/tiagovignatti/crosswalk/commits/embedded
  - Using Tizen Common ("Generic")

Next Challenges

Next Challenges

- Drawback: no Native App option anymore for Tizen
  - Everything goes through Chromium architecture
  - What about NaCl?
- Are we fine with Web performance for the UI?
- Send code to upstream Tizen and Crosswalk

Questions? Thank you!

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