Automotive Grade Linux: Status and Roadmap

Embedded Recipes

September 29, 2023

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About me

- Linux user since 1994
- Embedded Linux developer since 2000
- Principal Software Engineer at Konsulko Group since 2014
  - We're hiring!: https://www.konsulko.com/careers
- Working on AGL on contract since 2016
  - Yocto Project maintenance
  - Demo development, integration, and maintenance

About Me (cont)

Agenda

- Automotive Grade Linux
- AGL Development History
- AGL Roadmap
- Getting Involved

Automotive Grade Linux

- A collaborative open source project that is bringing together automakers, suppliers, and technology companies to build a Linux-based, open software platform for automotive applications
- Founded in 2014
- Currently over 150 members
  - 10 major OEMs and many Tier 1 and Tier 2 suppliers
- Code first model (as opposed to specification driven)
- Used in production vehicles from Toyota and Subaru
- https://www.automotivelinux.org/

AUTOMOTIVE GRADE LINUX

2023 Embedded Recipes

AGL Provides…

- A base automotive oriented Linux distribution built with Yocto Project (https://www.yoctoproject.org/)
- Goal of providing 70-80% of the platform for production
- Focus was initially on in vehicle infotainment (IVI) targets
- Expansion into instrument cluster (IC) and telematics based on member interest
- Expert groups for various areas of interest, with open biweekly meetings
- Biannual releases (nominally February & July)

More Concretely AGL Provides…

- Demo images as integration examples
  - Qt, Web app, and now Flutter based
- Web app support via Chromium + LG's Web Application Manager (WAM)
- Vendor BSP integration examples (e.g. Renesas)
- Automotive oriented Wayland compositor
  - agl-compositor
  - Goal of replacing weston + ivi-shell + ivi-extensions
- PipeWire + WirePlumber integration example
  - AGL funded initial WirePlumber development

AGL Development History

- Until 2020 significant development effort was put into an example application framework
  - application build, packaging, installation
  - example APIs for CAN, media playback, positioning, etc.
  - Example SMACK label based security scheme
- Present in releases up to 12.0/Lamprey (inclusive)
  - 12.0/Lamprey currently long-term support (LTS) release
  - Following LTS cycle of Yocto 3.1/dunfell (current planned EOL Spring 2024)

AGL Development History (cont)

- In 2020 members expressed a desire to reduce the maintenance effort the application framework was requiring
- In practice, members were not interested in contributing to the application framework to move it towards production readiness
- Proposal from Collabora to focus on using more existing best of breed open-source software and provide more forward looking technology demonstration functionality

AGL Development History (cont)

- Technology demonstrator examples
  - protobufs and gRPC for vehicle APIs
  - Emerging Vehicle Signal Specification (VSS) standard for vehicle signaling
  - SELinux integration
  - Simple application launcher leveraging systemd features (e.g. namespace sandboxing)

AGL Recent Development

- Application framework removed
- VSS integration
  - KUKSA.val databroker
  - gRPC API
  - Simple HVAC and audio mixer demo backends
- applaunchd application launcher
- Example radio gRPC API
- SELinux integrated, but in permissive mode
- agl-compositor gRPC API

AGL Recent Developments (cont)

- Flutter demo with Flutter homescreen, HVAC, dashboard, and IC dashboard apps
  - Working with Toyota's Flutter team
- Transition from own Chromium build to using Chromium Embedded Framework (CEF) project
  - Ongoing work by Igalia
- LXC system container demo
  - IVI & IC images in separate containers, minimal host image
- Simple QEMU+KVM demo
- Initial RISC-V support (HiFive Unmatched)

Roadmap

- Expand VirtIO integration
  - virtio-can and virtio-snd vhost backends coming
- Likely a refresh of the Flutter demo UI
  - Development workflow improvments
- Potentially a container / orchestration integration demo
  - Huge interest in Software Defined Vehicle (SDV) across automotive
- BeaglePlay and Beaglebone AI-64 board support

Roadmap (cont)

- Integrate Unified HMI work from Panasonic
  - virtio-gpu as flexible remote display protocol
- Some more simple demo gRPC APIs
  - network, Bluetooth, and mixer configuration
  - Would enables expanding Flutter and Web demo apps
- Potentially a Xen +Linux + RTOS demo
  - Waiting for upstream virtio-gpu support in Xen
- Documentation improvements

More Information

- "AGL Status and Roadmap Update", Walt Miner

  https://static.sched.com/hosted_files/aglammsummer23/af/AGL%20Roadmap%20Miner%20AMM%20Summer%202023.pdf
- "Introduction to AGL architecture", Walt Miner
  https://wiki.automotivelinux.org/_media/agl-distro/agl_training_-_intro_agl_architecture.pdf"
- "Creating Services for AGL", myself
  https://wiki.automotivelinux.org/_media/agl-distro/creating_services_for_agl_-_scottm_-_20221020.pdf

Getting Involved

- Documentation
  - https://docs.automotivelinux.org/en/needlefish/#
- Wiki
  - https://wiki.automotivelinux.org/
- Mailing list
  - https://lists.automotivelinux.org/g/agl-dev-community
- Weekly developer Zoom call on Tuesdays
  - https://wiki.automotivelinux.org/dev-call-info
- Full meeting schedule
  - https://lists.automotivelinux.org/g/agl-dev-community/calendar
- #automotive IRC channel on Libera.chat

Questions?