Power Your Car with Automotive Grade Linux

Automotive Linux Summit 2017

Walt Miner (@VStarWalt)
Community Manager, AGL, The Linux Foundation
What is AGL?

- Non-profit
- Open source Linux-based collaborative project
- Hosted at Linux Foundation
- Focused on rapid innovation of vehicle software
Collaborating to build the car of the future through rapid innovation

http://AutomotiveLinux.org
Goals of AGL

• Build a single software platform for the entire industry
• Develop 70-80% of the starting point for a production project
• Reduce fragmentation by combining the best of open source
• Create an ecosystem of developers, suppliers, expertise all using a single platform
AGL Charter and Scope

**AGL is the only organization planning to address all of the software in the vehicle**

- Infotainment
- Instrument Cluster
- Heads-Up-Display
- Telematics / Connected Car
- Advanced Driver Assistance Systems
- Functional Safety
- Autonomous Driving
AGL Growth

AGL now has 98 members!
10 OEMs are members of AGL
Over 60% growth in 2016
760+ developers on AGL mailing list
Total of 10 OEMs supporting AGL!
AGL Members - Total of 98 companies!

<table>
<thead>
<tr>
<th>Platinum</th>
<th>Bronze</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENSO, mazda, Panasonic</td>
<td>Advanced Driver Information Technology, Advanced Telematic Systems, ALPS, ARM, MIRACLE, MITSUBISHI, MOVIMENTO</td>
</tr>
<tr>
<td>Renesas, SUZUKI, TOYOTA</td>
<td>audio:kinetic, AutoTIC, bright box, China Mobile, NEC, NVIDIA, NXP, O3GO</td>
</tr>
<tr>
<td>HONDA, NTT DATA, NTT DATA MSE Corporation</td>
<td>Eureka, Inc., Ford, REALVNC, SasKen, SAMSUNG</td>
</tr>
<tr>
<td>Gold</td>
<td></td>
</tr>
<tr>
<td>AISIN AW CO.LTD., Continental, Mercedes-Benz</td>
<td>Fujitsu GlobalLogic, HARMAN, sdtech, (SiriusXM), SONY, STAR LAD</td>
</tr>
<tr>
<td>Silver</td>
<td></td>
</tr>
<tr>
<td>MITSUBISHI ELECTRIC, NISSAN, Pioneer</td>
<td>Mentor Automotive, MICROCHIP, micware, Ubiquitous, VeriSilicon</td>
</tr>
<tr>
<td>QUALCOMM, WIND</td>
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</table>
AGL is a “Code First” organization!

Specifications lead to fragmentation!
### Top 25 Git Committers in 2017

<table>
<thead>
<tr>
<th>Commits</th>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>577</td>
<td>Romain Forlot</td>
<td>IoT.bzh</td>
</tr>
<tr>
<td>250</td>
<td>Jose Bollo</td>
<td>IoT.bzh</td>
</tr>
<tr>
<td>127</td>
<td>Ronan Le Martret</td>
<td>IoT.bzh</td>
</tr>
<tr>
<td>79</td>
<td>Jan-Simon Moeller</td>
<td>Linux Foundation</td>
</tr>
<tr>
<td>43</td>
<td>Matt Ranostay</td>
<td>Konsulko</td>
</tr>
<tr>
<td>32</td>
<td>Stephane Desneux</td>
<td>IoT.bzh</td>
</tr>
<tr>
<td>30</td>
<td>Jens Bocklage</td>
<td>Mentor Graphics</td>
</tr>
<tr>
<td>30</td>
<td>Petteri Aimonen</td>
<td>Individual</td>
</tr>
<tr>
<td>30</td>
<td>Loic Collignon</td>
<td>IoT.bzh</td>
</tr>
<tr>
<td>25</td>
<td>Karthik Ramanan</td>
<td>TI</td>
</tr>
<tr>
<td>21</td>
<td>Anton Gerasimov</td>
<td>Advanced Telematics Systems</td>
</tr>
<tr>
<td>20</td>
<td>Martin Kelly</td>
<td>Xevo</td>
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<tr>
<td>18</td>
<td>Sebastien Douheret</td>
<td>IoT.bzh</td>
</tr>
<tr>
<td>16</td>
<td>Matt Porter</td>
<td>Konsulko</td>
</tr>
<tr>
<td>16</td>
<td>Scott Murray</td>
<td>Konsulko</td>
</tr>
<tr>
<td>7</td>
<td>Kotaro Hashimoto</td>
<td>Mitsubishi Electric</td>
</tr>
<tr>
<td>7</td>
<td>Naoto Yamaguchi</td>
<td>AisinAW</td>
</tr>
<tr>
<td>6</td>
<td>Marcus Fritsch</td>
<td>Mentor Graphics</td>
</tr>
<tr>
<td>6</td>
<td>Milan Srdinko</td>
<td>ALPS</td>
</tr>
<tr>
<td>5</td>
<td>tte_zheng_wenlong</td>
<td>Toyota</td>
</tr>
<tr>
<td>4</td>
<td>Harunobu Kurokawa</td>
<td>Renesas</td>
</tr>
<tr>
<td>4</td>
<td>Philippe Coval</td>
<td>Samsung</td>
</tr>
<tr>
<td>4</td>
<td>Yuichi Kusakabe</td>
<td>Fujitsu-Ten</td>
</tr>
<tr>
<td>3</td>
<td>Multiple</td>
<td></td>
</tr>
</tbody>
</table>

- **1394 Total Commits**
- **45 Committers**
- **21 Companies**
- **01 Jan 2017 – 26 May 2017**
- **Commits to master**
## Commits by Company in 2017

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<td>77</td>
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<td>36</td>
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<td>TI</td>
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1394 Total Commits
45 Committers
21 Companies

- 01 Jan 2017 – 26 May 2017
- Commits to master
Other Numbers

• On pace to double last year (1791 commits)
• 19 new committers in 2017
• 64 unique individuals and 27 unique companies have contributed to AGL since the start of the project
• 7 individuals not affiliated with a member company have contributed
• 240 Jira issues closed since start of 2017
Vision for 2017

• Daring Dab July 2017
• Electric Eel Planned for CES 2018
• AGL App Framework Complete
• AGL Reference Apps available for both Qt5 and HTML5
• All APIs available as App FW Service Binders
• IC, Telematics and other profiles
• Complete set of documentation
• Daily, Weekly, and Event based board testing
• Published Test Results
Thanks for all the fish...

- AGL Releases:
  - AA – Agile Albacore – Jan 2016
  - BB – Brilliant Blowfish – July 2016
  - CC – Charming Chinook – Dec 2016
  - DD – Daring Dab – July 2017
  - EE – Electric Eel – Dec 2017
  - FF – Funky Flounder – July 2018
2017 AGL Schedule

Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

Charming Chinook

3.0.0 | 3.0.1 | 3.0.2 | 3.0.3 | 3.0.4 | 3.0.5

Daring Dab

Feature Development

RC1 | RC2 | RC3 | 4.0.0 | 4.0.1 | 4.0.2 | 4.0.3 | 4.0.4

Electric Eel

Feature Development

RC1 | RC2 | RC35.0.0

As of 30 May 2017

See https://wiki.automotivelinux.org/schedule#latest_schedule for latest schedule information
Charming Chinook

- Released January 6
- Patch Releases
  - 3.0.1 – 30 Jan 2017
  - 3.0.2 – 08 Mar 2017
  - 3.0.3 – 29 Apr 2017
  - 3.0.4 – Planned for 14 Jun 2017
    - Yocto Update to 2.1.3
    - ALS App changes
  - 3.0.5 – Planned for 16 Aug 2017
    - Probable end of life
Charming Chinook

- Release notes, binary downloads, source code and more at
  
  https://wiki.automotivellinux.org/agl-distro/release-notes
DARING DAB
Daring Dab

<table>
<thead>
<tr>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
</tr>
</thead>
</table>

New Features Developed

Stabilize

Patch Updates

App Development

- RC1 5.31
- RC2 6.22
- RC3 7.04
- Final Release 7.22
- Final 4.0.1
Daring Dab

• Updated to Yocto 2.2 (morty)
  • Pulls in updated kernel and user space packages
  • Improved tooling
• App Framework Improvements
  • CC Lessons Learned
  • App Templates
  • Security updates
  • App Installation and First-time Startup
• SOTA Updates
Daring Dab

- App FW Service Binders
- API V2
  - Stub generation from OpenAPI JSON
  - Permission integration through OpenAPI
  - Monitoring
- System-D
  - Private user-ID
  - Smack label
  - Cgroups
Daring Dab

• SDK Improvements
  • Docker image to eliminate host dependency issues
  • Available for reference boards with published images that include graphics drivers
  • Enables rapid AGL application development
  • Support for Qt (HTML5 planned!)
  • No Yocto knowledge is needed or assumed for SDK users
Daring Dab

- Secure signaling and notifications to and from vehicle buses
  - Optimized usage of CAN sockets
  - Migrated to BCM sockets
  - Map logical CAN bus names from CAN databases to physical can as present on hardware.
Daring Dab

- Available App FW Service Binders
  - Audio Manager
  - Bluetooth
  - Tuner
  - CAN signaling
  - Media Scanner
Daring Dab

- Apps
  - App business logic separated from API
  - Templates created to ease new App development
  - Homescreen improvements
  - CAN Test App – New
  - Phone App works with Bluetooth HFP
- Media Player
  - Bluetooth A2DP and AVRCP
  - USB and SD card detection
Daring Dab

- BSPs - Default tunings per architecture (e.g., Intel, ARM 32 and ARM 64)
Daring Dab Board Support

• Reference BSPs – Fully supported by manufacturer, CI, etc.
  ✓ Renesas R-Car 3 – M3 board (ARM 64)
  ✓ Renesas R-Car 2 - Porter board (ARM 32)
  ✓ Intel - Minnowboard Turbot and Joule (Intel 64 bit)
  ✓ TI - Jacinto 6 - Vayu board (ARM 32)
  ✓ QEMU (Intel 64 bit)
• Community BSP – Best effort by AGL community
  ✓ Raspberry Pi 2/3 (ARM 32 bit)
  ✓ NXP – i.MX6 – SABRE (ARM 32 bit)
  ✓ QCOM – Dragonboard 410-c (ARM 64 bit)
  ✓ Qualcomm SnapDragon 820 (ARM 64 bit)
  ✓ TI BeagleBone Black (ARM 32 bit medium profile)
ELECTRIC EEL
## Electric Eel

<table>
<thead>
<tr>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
</tr>
</thead>
</table>

### Electric Eel

- **New Features Developed**
- **Stabilize**
- **Patch Updates**

### App Development

- **Feature Development**: 7.1
- **RC1**: 9.30
- **RC2**: 10.30
- **RC3**: 11.30
- **Final Release**: 12.15
- **CES 2018**: 5.0.1
Electric Eel

- Yocto 2.3 – Pyro branch
- Rework Yocto Layers for headless devices
- Window Manager and Graphics Architecture
- Home Screen as an app
- Audio Manager architecture
- Additional Service Binders
  - Telephony
- CI and Automated Test Improvements
  - Fuego and Lava integration
  - “Lab in a box”
- CES 2018 Demo apps
MORE INFORMATION
AGL Documentation

- Getting Started
  https://wiki.automotivelinux.org/start/getting-started
- AGL documentation site
  http://docs.automotivelinux.org/
- AGL Wiki
  https://wiki.automotivelinux.org/
- AGL Jira
  https://jira.automotivelinux.org/
2017 F2F Workshops

- Feb 8-10 – AGL AMM - Tokyo
- Apr 4 – 5 – Microchip - Karlsruhe, Germany
- May 31 – ALS Tokyo Japan
- July 11 – 12 – Bay Area, California
- October - Fall AMM - Germany
- Nov 15-16 – CES Integration Session – Japan TBA
- Dec 13-14 – CES Integration Session - Japan TBA
Q & A
Q & A

• This is the segment where
  • You ask intelligent, well thought out questions
  • I ramble pointlessly and unintelligently

• And/Or
  • You ask “dumb” questions
  • I respond with concise, insightful, and well-reasoned answers
THANK YOU