

# How to Introduce Virtualization in AGL?

## Objectives, Plans and Targets for AGL EG-VIRT

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# The connected car challenges

Automotive electronics industry is today facing several challenges which include:

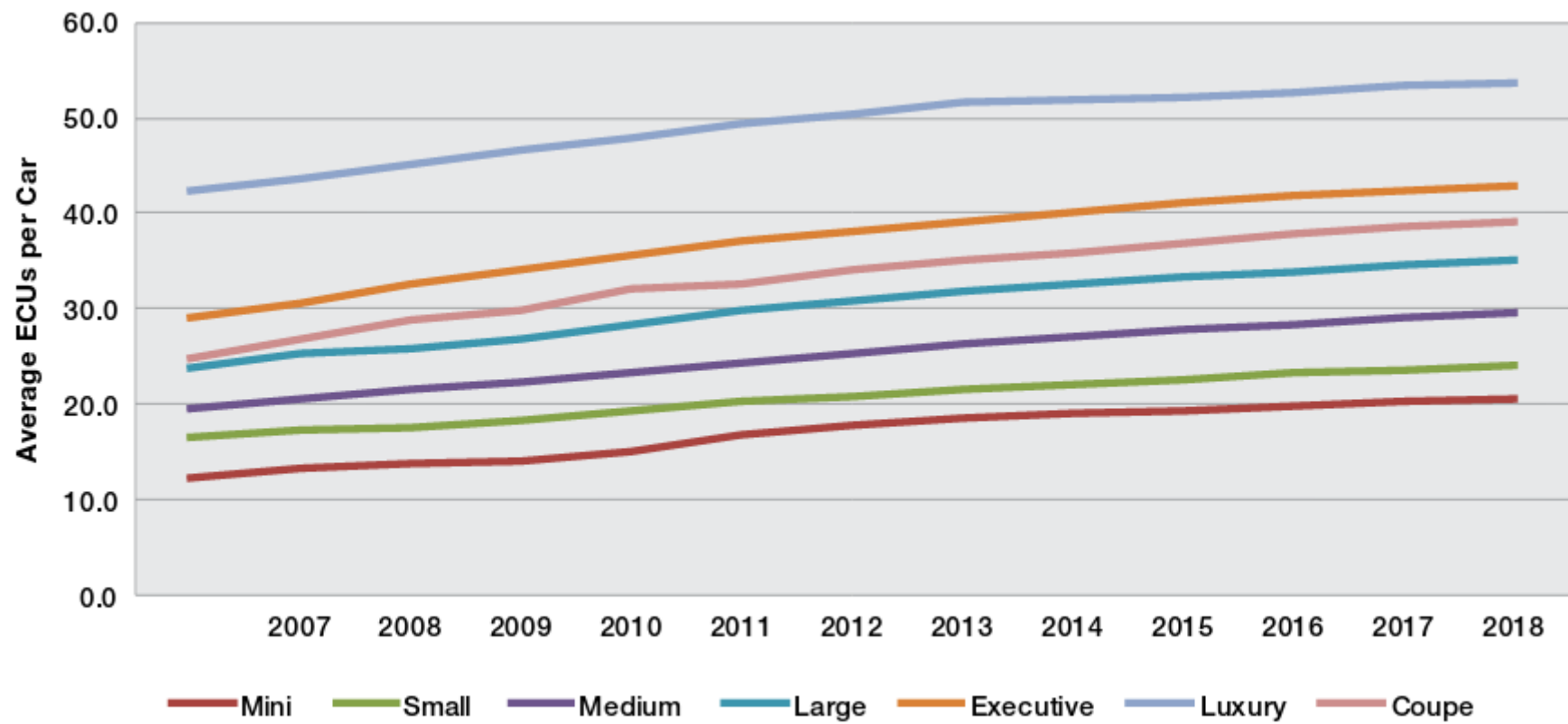
- Software time to market/updates (Infotainment, SoTA, ADAS, control units, etc.)
- Cyber security (remote threats, CAN attacks, etc.)
- Connectivity (5G, connected vehicles, etc.)

*How to correctly address them?*



# Consolidation

Source strategy analytics



*Automotive consolidation means reduced complexity*



# Virtualization: the connected car enabler

Virtualization helps addressing all of them with a unified ECU architecture:

- Software time to market/updates
  - *Flexibility, co-execution of IVI and RT tasks, ease of deployment/maintenance, migration, portability*
- Cyber security
  - *Isolation*
- Connectivity
  - *Software Defined Networking, limited overhead*



# Open virtualization: the perfect solution for connected cars

Open source virtualization does more than that, by adding:

- Software time to market/updates
  - *Open standards and existing code speed up applications development*
- Cyber security
  - *More eyes on the code means reduced vulnerabilities life*
- Connectivity
  - *Networking virtualization community very active can bring important benefits (tools, knowledge, etc.)*



# Virtualization Expert Group (EG-VIRT)

The purpose of the AGL Virtualization Expert Group is to add virtualization support to AGL targeting at an open infrastructure able to support different potential solutions:

- No specific hypervisor is targeted
- Multiple solutions can be supported together (Container + hypervisor, partitioning system + hypervisor)
- Intel and ARMv8 support



# EG-VIRT activity

In its first 6 months, the EG-VIRT group activities focused on:

- Kicked off on January 2017
- Bi-weekly telephonic meetings held on a regular basis
- 1 JIRA spec (Virtualization, SPEC-148) with 1 task (KVM porting to AGL, SPEC-496)
- 1 Gerrit change under review (Change 9317) with 3 patchsets
  - [RFC] Enable KVM hypervisor execution in AGL

*How far did we go?*



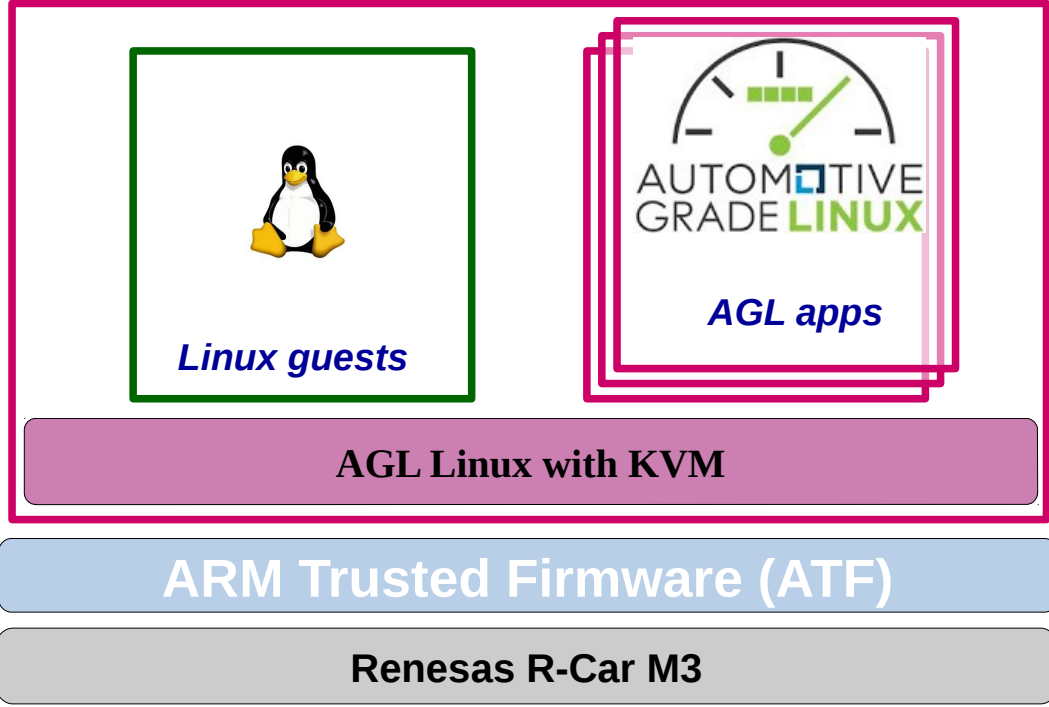
# Demo

```
root@linux:~
```





# Demo overview





# EG-VIRT SPEC 496

## KVM on AGL open points

A first step has been achieved with a PoC of KVM running in the AGL distribution. However, there is still work to do:

- Do we need additional packages?
  - e.g., qemu, libvirt, vagrant, etc.
- How is this going to be integrated to AGL?
  - Virtualization profile, KVM profile, etc.



# EG-VIRT: virtualization open points

A first step has been achieved with a PoC of KVM running in the AGL distribution. However, there is still a lot of work to do:

- RT requirements
  - We need fast predictable responses from security critical OSES
- Certification
  - Open source solution needs to ease this process, which need to be performed for each specific target HW
- GPU virtualization, connectivity (Quality of experience)
  - Users are more and more demanding 3D/connected applications

*How to address them?*



# EG-VIRT: call for participants

Virtualization is of utmost importance to enable smart connected vehicles. Adding it in AGL means:

- Set the ground for open source connected autonomous vehicles
- Provide a reference infrastructure for future automotive systems and fast-prototyping, fast-innovating, connected applications
- Present an alternative solution to closed source hypervisors

*Virtual Open Systems is currently showing the way,  
however more participants are needed!*



# EG-VIRT: What's next

The EG-VIRT activity will continue, aiming at:

- Upstream the current patches in the mainstream AGL distribution for the Renesas R-Car platform
- Investigate real time capabilities and certification solutions for Linux/KVM
- *[Community support needed!]* Develop a community AGL PoC including virtualization
- *[Community support needed!]* Integrate virtualization in the reference AGL architecture



# EG-VIRT: join the discussion

- AGL wiki:
  - <https://wiki.automotivelinux.org/eg-virt>
  - <https://wiki.automotivelinux.org/eg-virt-meetings>
- JIRA:
  - <https://jira.automotivelinux.org/browse/SPEC-148>
- IRC (Freenode)
  - #automotive
- Mailing list
  - [automotive-discussions@lists.linuxfoundation.org](mailto:automotive-discussions@lists.linuxfoundation.org)



# Thank you!

To contact me:

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OR

Virtual Open Systems' booth at the Tokyo ALS2017



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