A flexible test automation system for various Embedded Linux usecases

Khiem Nguyen / Engineer
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@KhiemNguyenT

THE LINUX FOUNDATION

WHO AM I ?

- Name：Khiem Trong. Nguyen (KHIEM Nguyen)
- Company：Renesas Design Vietnam

- Career：10 years experiences in embedded software development
  - Development and verification for Mobile and In-vehicle software platform
  - Development for test automation solutions of In-vehicle software platform

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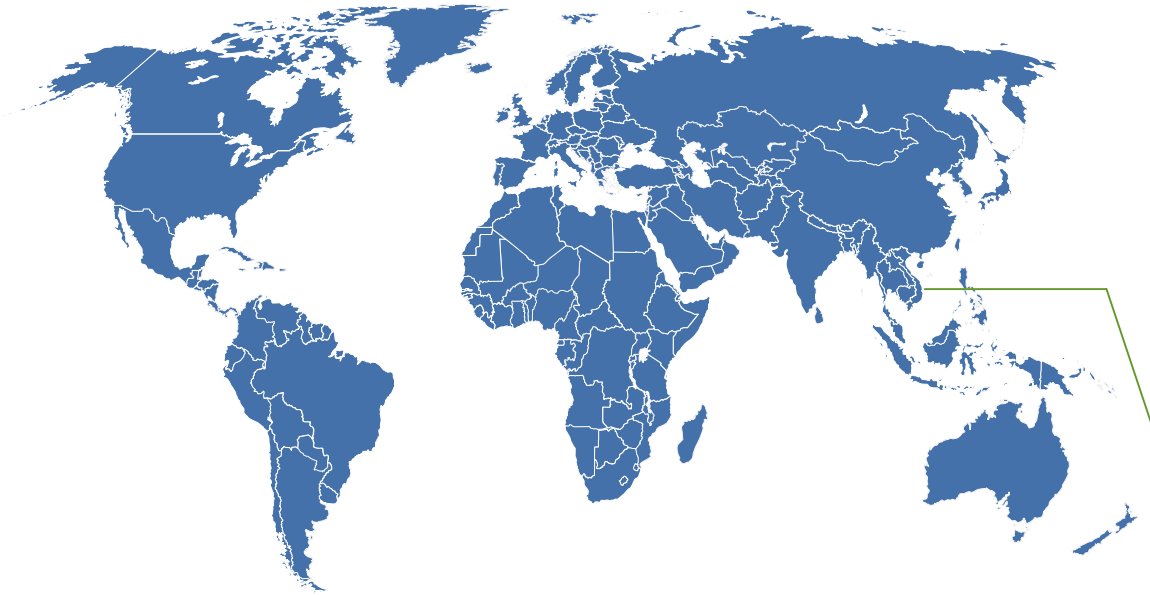
ABOUT RENESAS AND RENESAS DESIGN VIETNAM



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Intersil Corporation

- Renesas Design Vietnam Co., Ltd. (RVC) was founded in October 2004, as one of the main design centers in Renesas group.
- Business line: Design of semiconductor for both hardware and software.

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A FLEXIBLE TEST AUTOMATION SYSTEM FOR VARIOUS EMBEDDED LINUX USECASES

OPEN-SOURCE SUMMIT NORTH AMERICA 2018

08/29/2018, VANCOUVER

KHIEM NGUYEN
SENIOR STAFF ENGINEER
RENESAS DESIGN VIETNAM
RENESAS ELECTRONICS CORPORATION

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AGENDA

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MOTIVATION

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MOTIVATION (1/3)

" We have as many testers as we have developers.

And testers spend all their time testing,

and *developers spend half their time testing*.

We're more of a testing,

a quality software organization than we're a software organization. "

— Bill Gates

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MOTIVATION (2/3)

" The **first** rule of any technology used in a business is that

automation applied to an efficient operation will magnify the efficiency.

The **second** is that

automation applied to an inefficient operation will magnify the inefficiency. "

— Bill Gates

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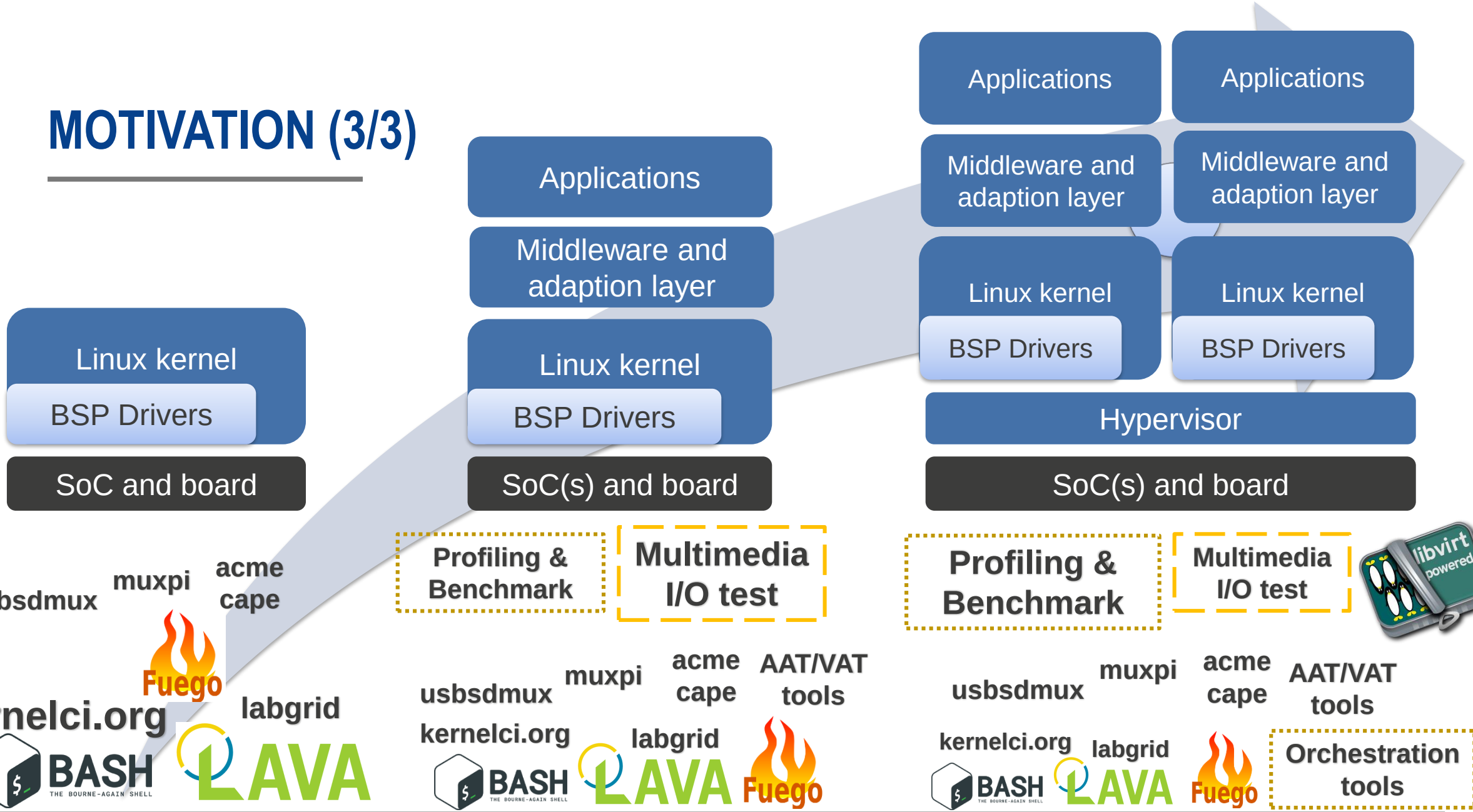
MOTIVATION (3/3)



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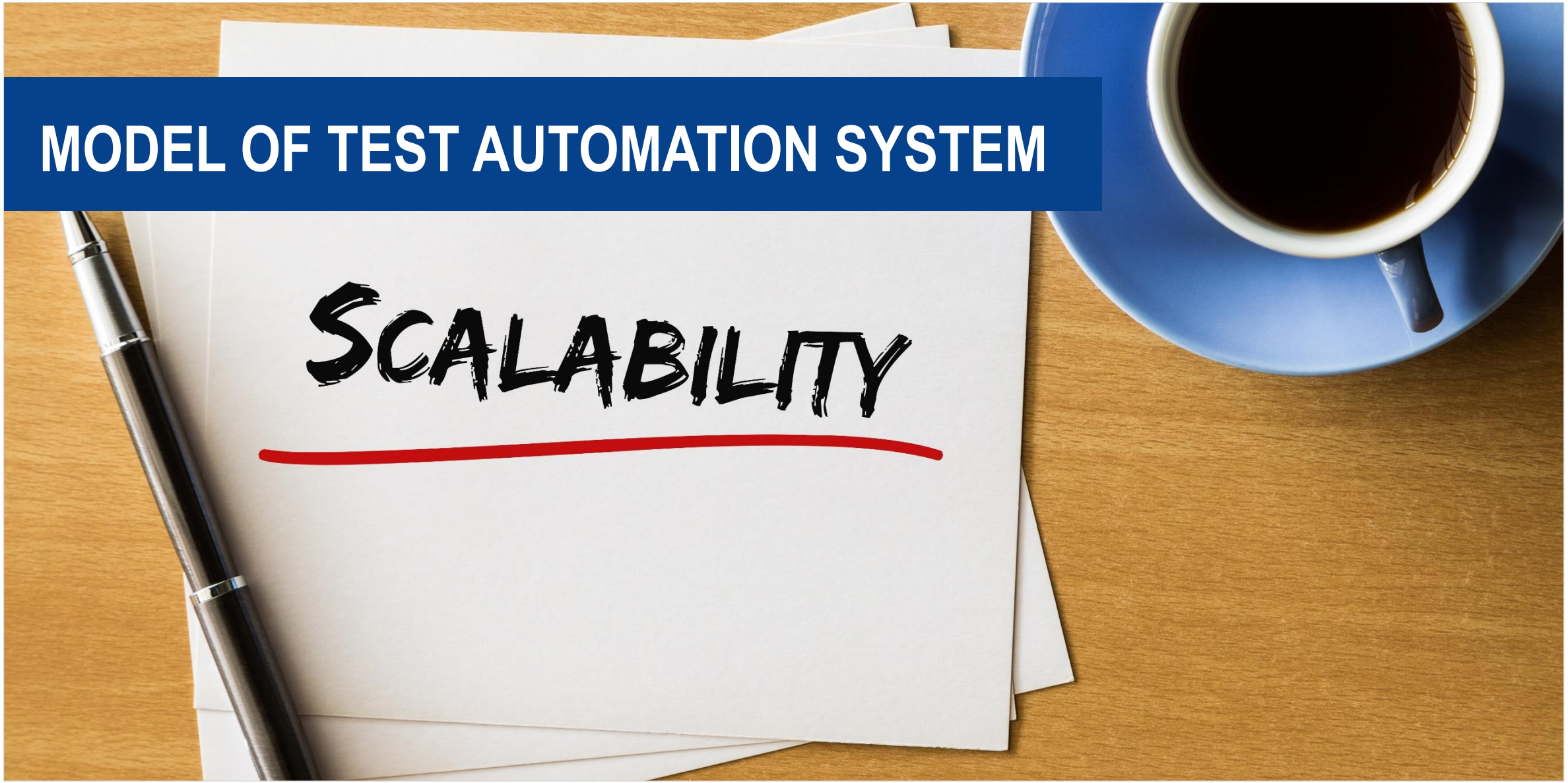
MODEL OF TEST AUTOMATION SYSTEM



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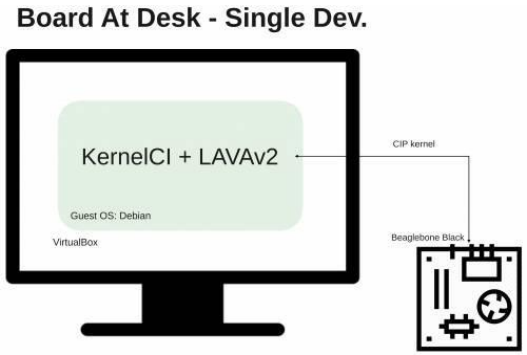
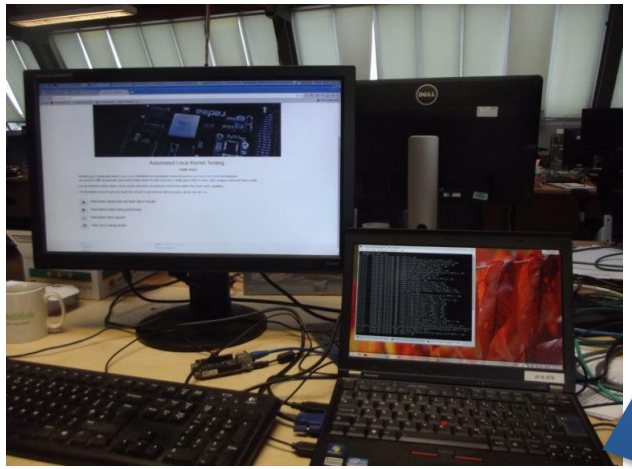
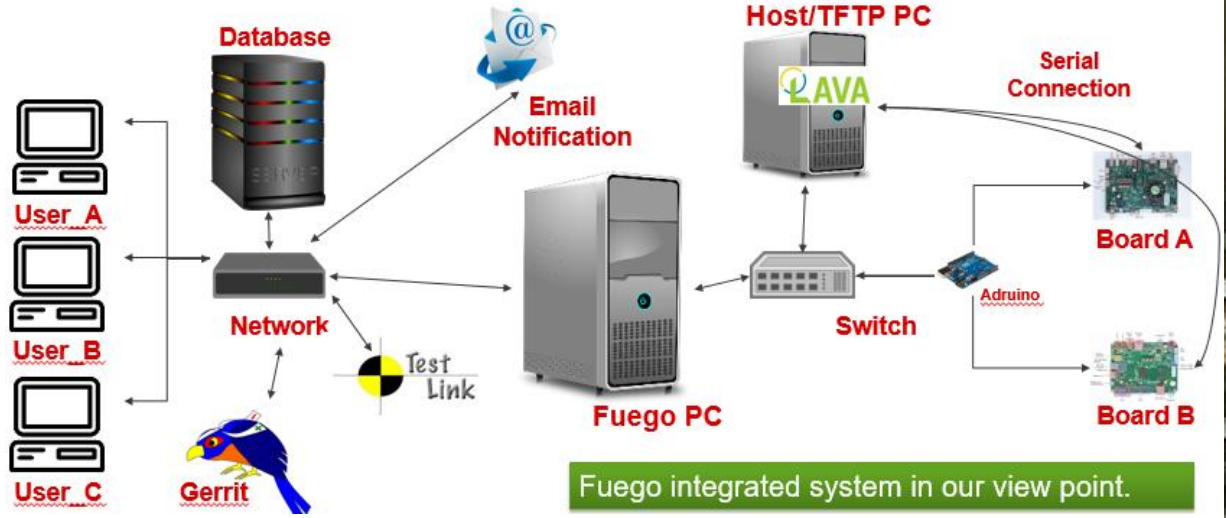
MODEL OF TEST AUTOMATION SYSTEM
OVERVIEW





CIP's Board@Desk model



Fuego integrated test automation model

The OSADL Test Rack

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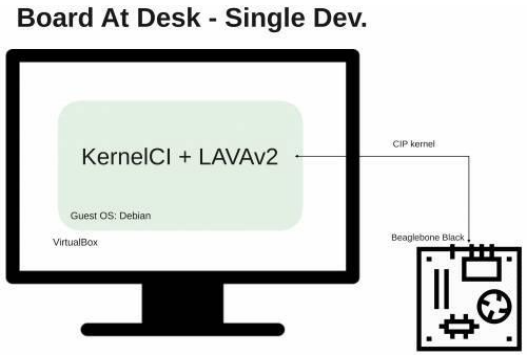
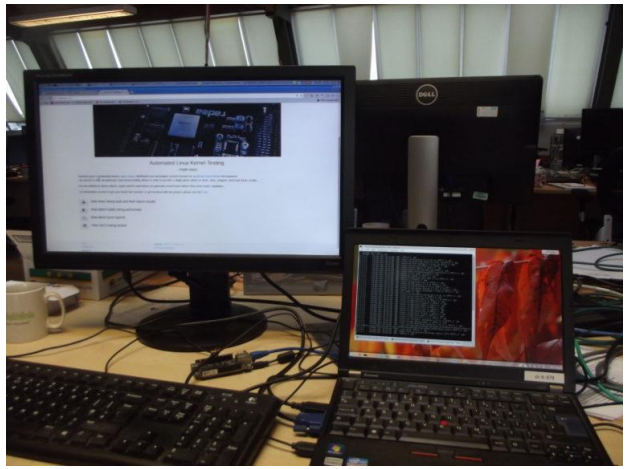
MODEL OF TEST AUTOMATION SYSTEM
INDIVIDUAL DEVELOPER DEVELOPMENT ENVIRONMENT





CIP's Board@Desk (*1)

- The integrated development environment for each developer.
  - Include a test execution framework (e.g. kernelCI, LAVA) plus a board control service (e.g LAVA).
- **Pros**
  - Easy to setup by each developer.
  - Suitable for developing the software for a specific hardware.
- **Cons**
  - May not support multiple hardware targets.
  - Cannot share the "working" environment with other developers.
  - May not support extended testing scenarios.

(*1) https://elinux.org/images/d/d9/2017-06-23_CIP_TechJam61.pdf

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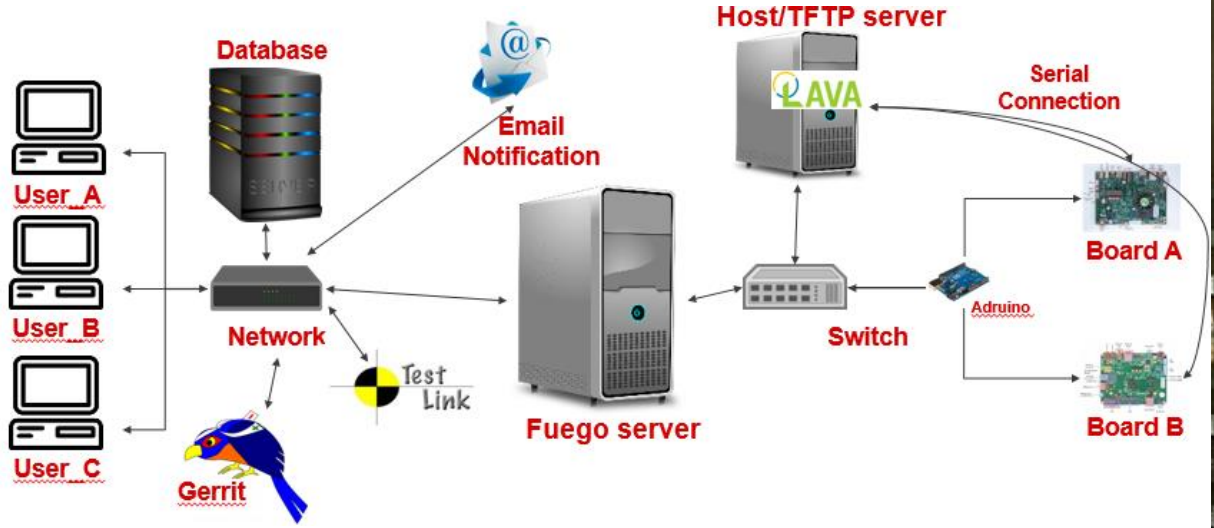
MODEL OF TEST AUTOMATION SYSTEM
SHARED DEVELOPMENT ENVIRONMENT WITH BOARD FARM(S) (1/2)

- The fully-integrated development environment with front-end, middle-end and back-end.
  - **Front-end**: interface with developers.
  - **Middle-end**: the test automation framework and related plug-ins or add-ons.
  - **Back-end**: board control services and related hardware setup.



Fuego integrated test automation (*1)

The OSADL Test Rack (*2)

(*1) Enhance Fuego Test Efficiency by Applying Additional Software & Hardware Solutions
(*2) OSADL Test Rack

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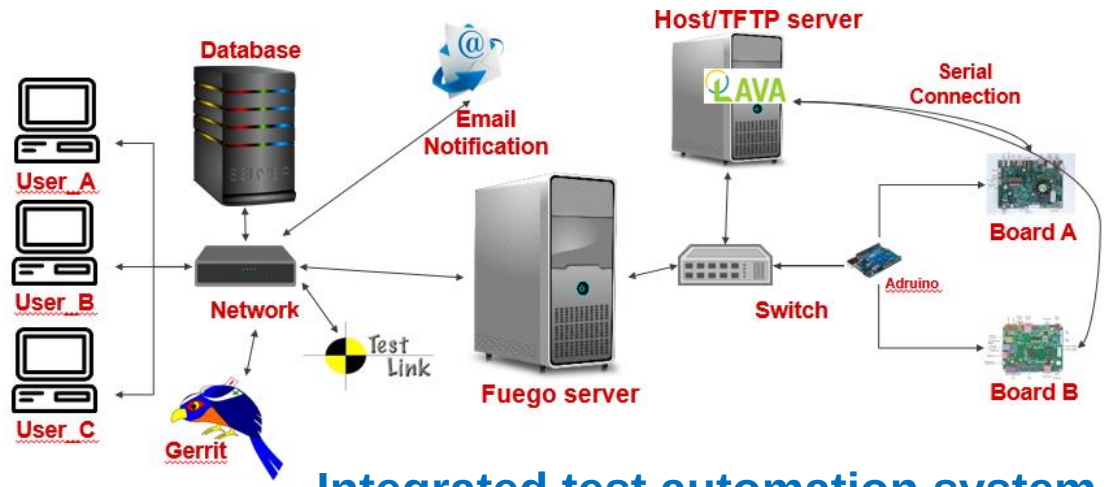
MODEL OF TEST AUTOMATION SYSTEM
SHARED DEVELOPMENT ENVIRONMENT WITH BOARD FARM(S) (2/2)

- **Pros**
  - Minimal effort on sharing/maintaining the development environment.
  - Easy to customize the development environment on-demands.
  - 24/7 development environment for different testing scenarios.
- **Cons**
  - Deploy whole system take time.

kernelci.org
labgrid
LAVA
usbsdmux
muxpi
AUTOTEST
Fuego
acme
cape



Integrated test automation system

(*1) Enhance Fuego Test Efficiency by Applying Additional Software & Hardware Solutic
(*2) OSADL Test Rack

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SCALE THE SYSTEM AT WILL

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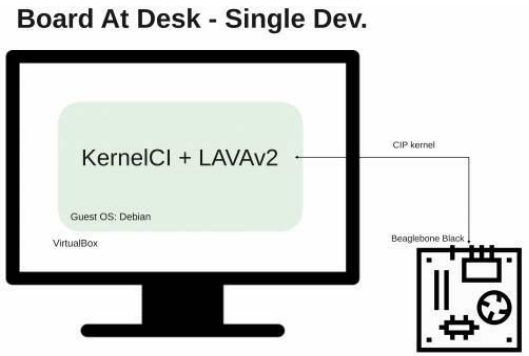
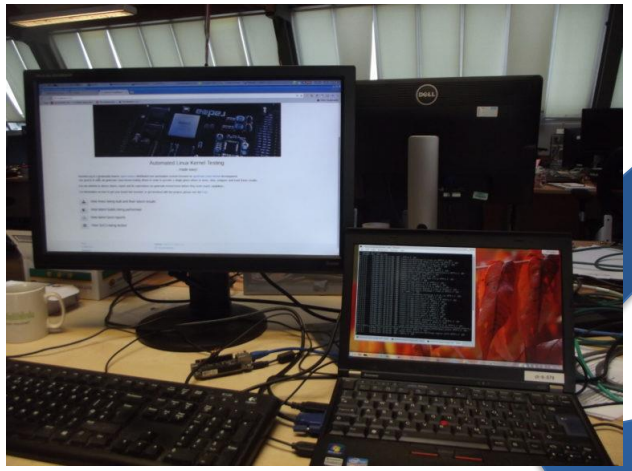
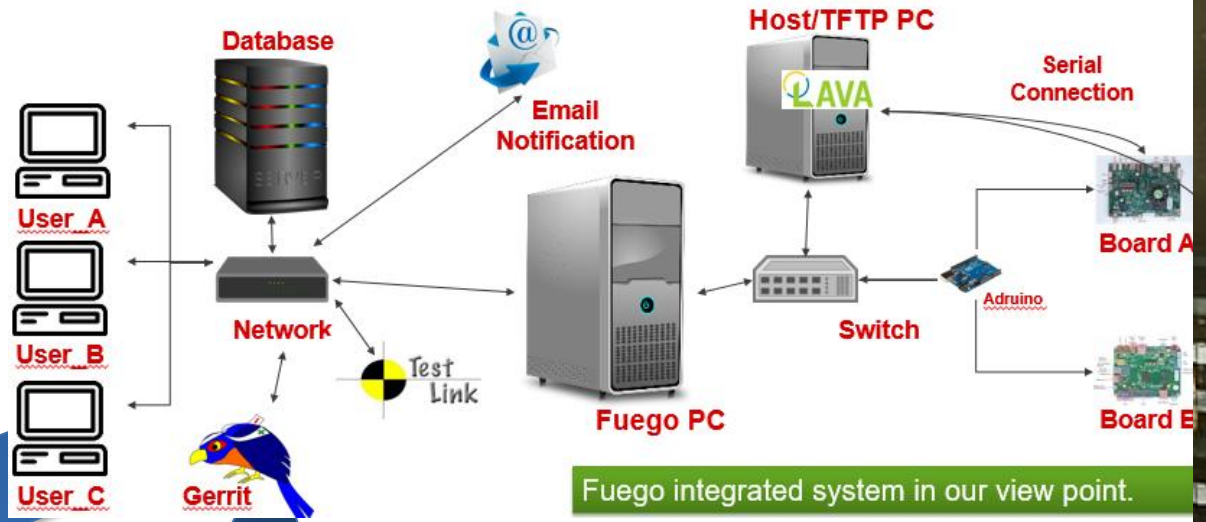
SCALE THE SYSTEM AT WILL





CIP's Board@Desk model



Fuego integrated test automation model

Make the system flexible enough for various demands

The OSADL Test Rack

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BIG IDEAS FOR EVERY SPACE RENESAS

SCALE THE SYSTEM AT WILL – STEPS TO THE HEAVEN (1/4)

1. Start with specific requirements,

   i.e. short-term versus long-term

2. Fit the requirements into available solutions in the community.

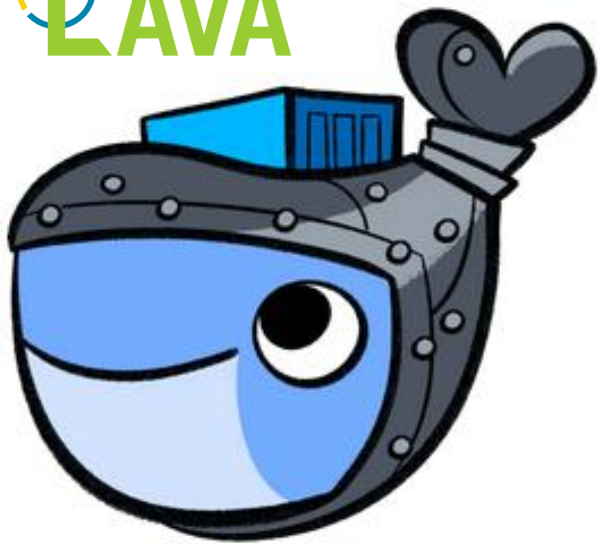
   - Prioritize the **portable** solutions.
   - Give it a try.
     - To understand the Pros-Cons and the gaps with the defined requirements.

kernelci.org

AUTOTEST

Fuego

LAVA



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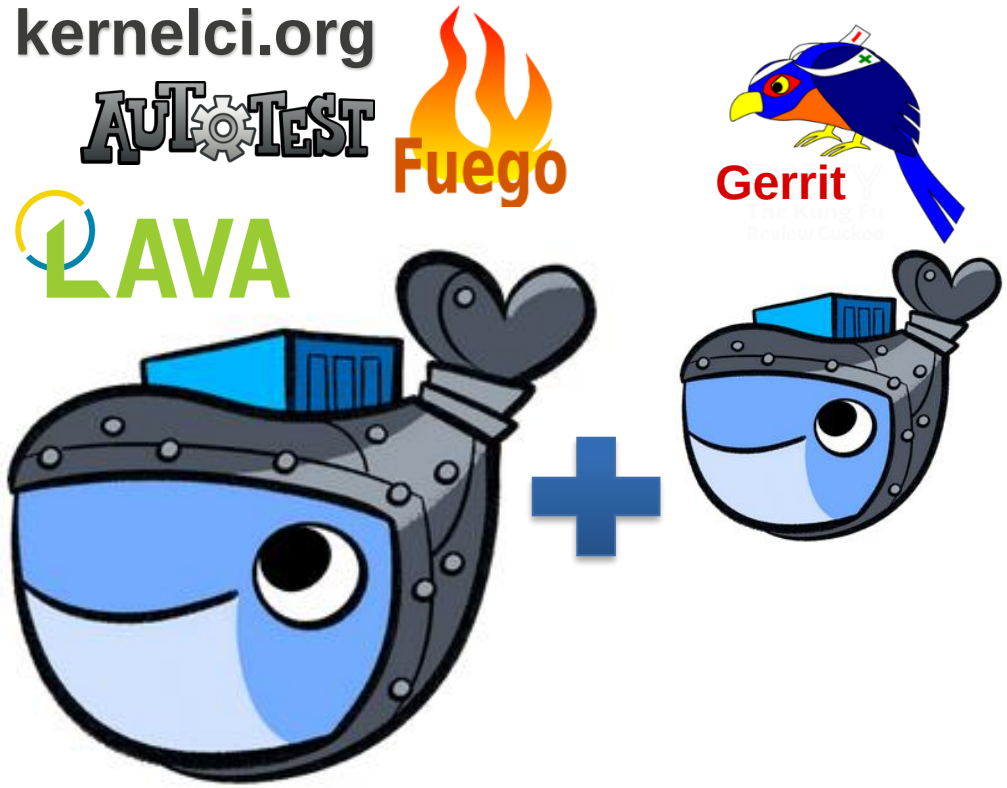
SCALE THE SYSTEM AT WILL – STEPS TO THE HEAVEN (2/4)

3 Do customization per demands

- Add the portable software components
- Develop the lacking pieces

- **Keep in mind**
  - Keep the interfaces across portable modules and module itself.



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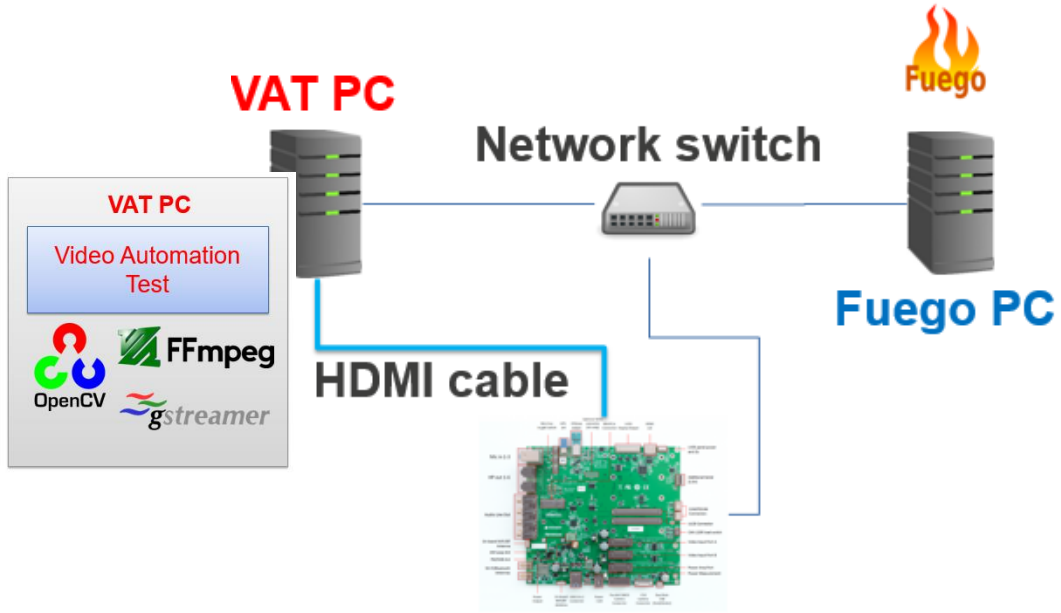
SCALE THE SYSTEM AT WILL – STEPS TO THE HEAVEN (3/4)

3 Do customization per demands

- Add the portable software components.
- Develop the lacking pieces.

- **Keep in mind**
  - Do ‘invention’ where it’s necessary.



Video Automation Test solution (*1)

(*1) Applying Video Test Automation to Automate Multimedia Verification with Embedded Linux
Will be presented in August 30 • 11:00am - 11:40am @ room 110

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SCALE THE SYSTEM AT WILL – STEPS TO THE HEAVEN (4/4)

4 Contribute the changes to the community. Give requests for desired features in new releases.

- Receive feedback
- Minimize the maintenance cost

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AUTOMATED TESTING COMMUNITY

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AUTOMATED TESTING COMMUNITY

- Join mailing list for discussing all matters related to the community test automation solution.

- Join the first Automated Testing Summit to have discussion across test automation solutions.
  - Being organized by Tim Bird, the Fuego maintainer, and Kevin Hilman, the KernelCI founder.
  - Will be held along with ELC-E 2018 event (October 22 - 24, 2018)
  - The detail is gathered at https://elinux.org/Automated_Testing_Summit.

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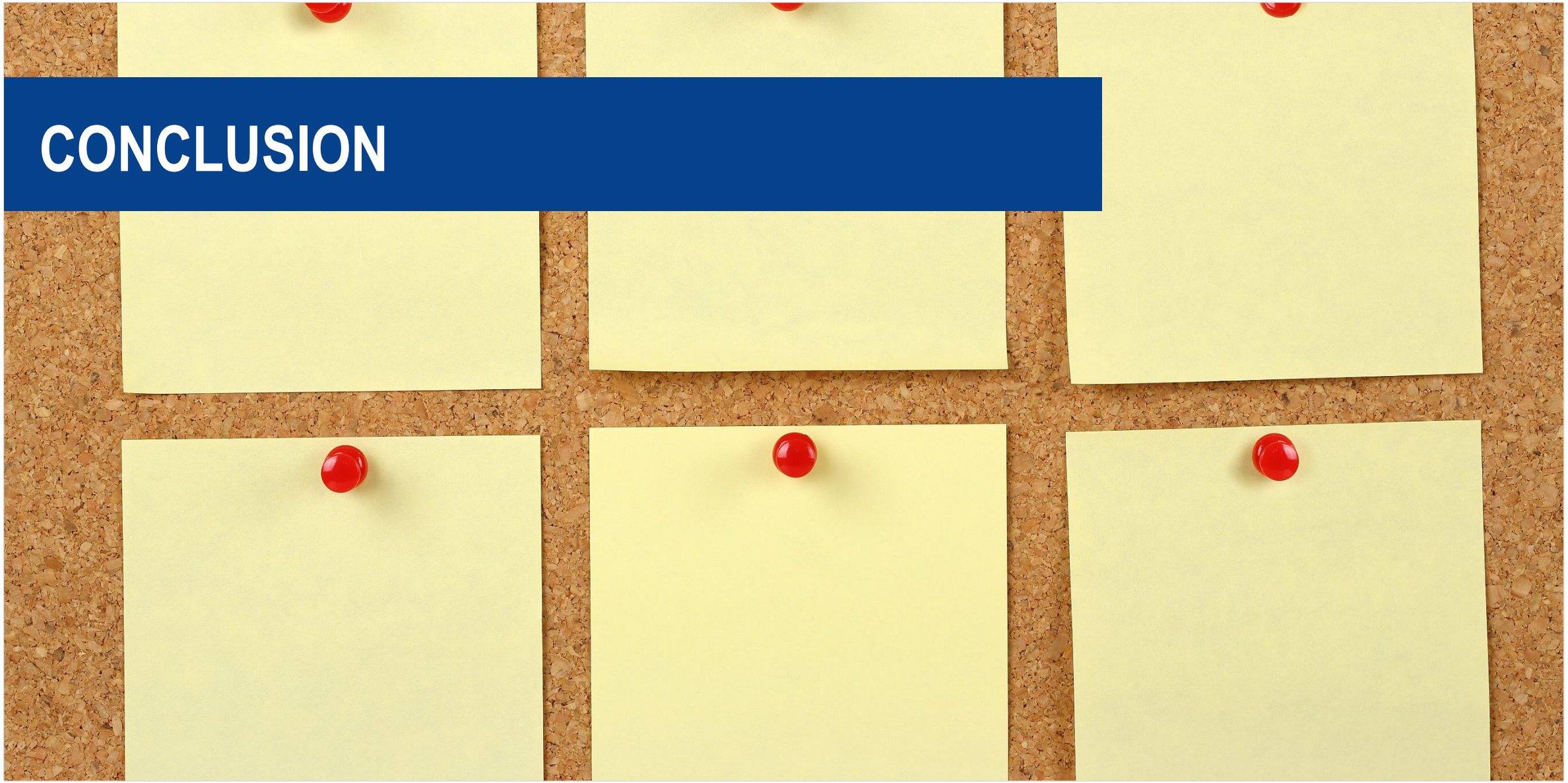
CONCLUSION



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CONCLUSION

- Testing becomes more efficient with right test automation solution.
- Utilize the open-source test automation framework and look into existing examples deployed in open-source software projects.
  - Prioritize the portable software components.
  - Keep the interface for upgrade path.
- Develop the lacking pieces where it’s necessary.

- Join the test automation community.
  - Join Automated Testing Summit this October.

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APPENDIX

- Some popular test automation frameworks
  - Fuego (http://fuegotest.org)
  - Lava (https://wiki.linaro.org/LAVA)
  - KernelCI (https://kernelci.org)
  - Labgrid (https://github.com/labgrid-project)

- Note about the architecture design (and idea) of test automation system.
  - https://elinux.org/Test_Stack_Layers

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