Where’s the H/W?

A guide to development labs / platforms available in Linaro and how to leverage them
Agenda

- **Overview**
  - Types of hardware labs available to Linaro Members / Community
  - Locations of Linaro Labs

- **kernelCI.org Labs**
  - Overview, How to leverage, & How to get involved

- **Server Colo’s**
  - Overview, How to leverage, & How to get involved

- **LAVA Lab**
  - Overview, How to leverage, & How to get involved

- **What’s next?**
  - Developer Cloud
Overview: Lab Locations

- Server Colo Austin, Tx
- LAVA Lab Cambridge, UK
- kernelCI.org distributed board farm (9 Locations)
- Developer Cloud Coming Soon!
- Server Colo China Coming Soon!
- Dev Cloud Installing now!
Overview: Linaro Board Farms/Labs and Targeted Usage

- **kernelCI.org [Linaro Members and Community]**
  - A distributed CI testing infrastructure to validate that upstream kernel trees build and boot on the Embedded platform variants in the kernelCI distributed board farms.

- **Server Colo [Linaro Members and Community]**
  - A 64 bit ARM Server lab that supports Members and Community to checkout nodes for application development and validation purposes

- **LAVA Lab**
  - Supports Member Engineering efforts for Linaro. Contains Member hardware to support Linaro Engineering activities.
  - Runs production LAVA instances ([http://validation.linaro.org](http://validation.linaro.org))
  - Boards available to Linaro Members and specific Community Access on approval
    - Linaro / Member developers can access idle boards and run custom experiments on as-needed basis
  - Qualified w/ Usage Plans and Test Plans on per project basis
Overview: Linaro Board Farms/Labs and Targeted Usage

- Developer Cloud
  - **Newest addition** to the Linaro hardware development labs!
  - Distributed Cloud lab setup for developing and validation of cloud applications on ARM64
kernelCI { http://kernelci.org/ }
kernelCI Details

- Validates upstream **kernel** trees on boards and provides results daily as trees are “touched”
  - Bigger than just LTS / upstream. Other trees mapped in are shown here: [http://kernelci.org/job/](http://kernelci.org/job/)
- “Virtual” embedded platform validation farm.
  - Set up in multiple locations (currently 9) and is architected to be extensible for the easy addition of new Labs / Embedded Targets
- Primary purpose is to build and boot the various upstream kernel trees to assure they are regression-free.
  - As usage grows this may be extended to richer testing. See “BKK16-215: KernelCI beyond boot testing session” today.
- Not just Linaro
  - Multiple individuals and companies. Lab locations can be found here: [http://kernelci.org/sponsors/](http://kernelci.org/sponsors/)
kernelCI Details cont’d

- Recommended Test Automation Framework (TAF) is LAVA but can support others to automate the tests.
  - More on LAVA: [https://validation.linaro.org/](https://validation.linaro.org/)
- Types of tests being run
  - boot tests
    - pass/fail tests
  - Formed last May, now **over 1 Million** boot tests have been executed on ~160 unique boards, 3 architectures and 29 unique SoCs across the board farms! And growing faster than ever.
- Future
  - Extend to support
    - LTP
    - kselftests
    - Can add own
- Frequency of test runs
  - Boot tests run every time a tree changes
**kernelCI System Overview**

1. Upstream tree changed
2. Fetch git kernel tree repo
3. Build
4. Publish build to kernelCI-backend
5. Submits jobs to the Labs (LAVA)
6. LAVA request build download
7. Fetch jobs
8. Perform tests
9. Results pulled from LAVA
10. Pull from frontend
11. UI Dashboard
kernelCI “API” Pointers

- Pointers to “API” documentation from previous slide
  - LAVA API
    - [https://validation.linaro.org/api/help/](https://validation.linaro.org/api/help/)
  - Jenkins distributed builds
    - See Jenkins distributed builds info: [https://wiki.jenkins-ci.org/display/JENKINS/Distributed+builds#Distributedbuilds-Howdoesthiswork%3F](https://wiki.jenkins-ci.org/display/JENKINS/Distributed+builds#Distributedbuilds-Howdoesthiswork%3F)
  - Kernel CI API
    - [https://api.kernelci.org/](https://api.kernelci.org/)
  - User Interface
    - Uses kernelCI-backend to accumulate results and kernelCI-frontend for UI at kernelci.org
      - [https://github.com/kernelci/](https://github.com/kernelci/)
kernelCI Getting Involved

- As an ARM embedded platform supplier, provide your ARM target hardware!
  - Linaro or Members of the labs will take it from there!
  - Contact information and requirements for what must be included can be found under the FAQ’s here: [http://kernelci.org/faq/](http://kernelci.org/faq/)
- Hard way: Set up your own lab! This presentation provides the links to getting started guides and other information related to this.
- To add a tree, requests sent to info@kernelci.org
  - Must be accountable to keep it maintained
    - Will receive email build reports from backend with warning/errors (summary for each tree change/build)
- Contribute to LAVA (Python Open Source Project)
  - [https://validation.linaro.org/static/docs/deprecated/development.html?highlight=contributing#contributing-upstream](https://validation.linaro.org/static/docs/deprecated/development.html?highlight=contributing#contributing-upstream)
- Join and extend kernelCI. See the Upstream Kernel CI Project Wiki:
  - [https://wiki.linaro.org/ProductTechnology/kernelci.org](https://wiki.linaro.org/ProductTechnology/kernelci.org)
- IRC: Freenode - #kernelci
LAVA Lab, Cambridge
Overview

- LAVA Lab is responsible for providing a wide variety of Linaro Member ARM SoC based hardware and software devices for the development and automated testing of the engineering output of Linaro, primarily through LAVA.

- Leverages the same infrastructure as shown in the kernelCI System Overview slide earlier in this presentation.
  - Goes beyond kernel/minimal user space and entire builds including user space can be verified.
  - System integration testing - bringing work products from all Linaro teams together.

- LAVA Lab is the central development lab for Member Hardware that is being used by the Linaro engineering teams for development.
Overview

- Visible through http://validation.linaro.org
- Over 180 boards (device types) currently in the lab
  - Can be seen here: https://validation.linaro.org/scheduler/alldevices
- Supports Member Engineering efforts for Linaro.
  - Consists of Member hardware to support Linaro Engineering activities.
  - Runs production LAVA instances
  - Qualify w/ Usage Plans and Test Plans
    - developed per team
Leveraging the LAVA Lab

- Members can access (most) idle boards and use for development, validation, and test purposes.
  - To access idle boards and run own experiments, see hacking sessions documentation [https://validation.linaro.org/static/docs/hacking-session.html](https://validation.linaro.org/static/docs/hacking-session.html)
  - How do I know I can use a board?
    - [https://validation.linaro.org/scheduler](https://validation.linaro.org/scheduler) → note the restricted column
    - Some boards restricted, but still may be able to request permission
  - To use the lab hardware, must request access permission by sending email to [automation@linaro.org](mailto:automation@linaro.org) asking for LAVA Lab Job Permission privileges
Leveraging the LAVA Lab cont’d

- Adding a platform to the LAVA Lab
  - Can be used for member builds and made available for download at [http://www.linaro.org/downloads/](http://www.linaro.org/downloads/)
  - These platforms / builds can be integrated into various Working Groups
  - Note that platforms can be added with restricted access
  - How to request getting a platform added to Linaro CI
    - [https://wiki.linaro.org/Platform/CI-bring-up](https://wiki.linaro.org/Platform/CI-bring-up)
ARMv8 Server Cluster
Overview

- Allows vendors to build applications on ARMv8 hardware giving them a place to test / tune applications
- Location: Austin, Texas
- Buildout started in early 2015
- Populated with Linaro Member ARMv8 Server HW
  - APM (Applied Micro - x-gene Cores) Systems [50 systems]
  - AMD Servers [6 systems]
    - Linaro Members can use, non-Members must sign an NDA
  - Others, and more coming…
- Bootloaders installed per rack
  - 1 rack is uboot, so primarily Ubuntu
  - 2nd rack is UEFI, so primarily for Redhat/Fedora
Overview cont’d

● Servers deployed with both Redhat/Fedora, CentOS, Debian, and Ubuntu OS’s
  ● RedHat - REL usage requires NDA as well
  ● RPB (Reference Platform Build) to be supported soon

● Support Metal as a Service (MAAS) as well as VM’s deployed using OpenStack

● Example Use cases
  ● Debian project using three servers for native ARM 64-bit compilation for jessie release and onward. Key to Debian 8.0 64 bit support!
  ● OpenStack validation by LEG
  ● Ceph file system testing (LEG)
  ● Researchers testing and porting server applications. See BKK-305a ARMv8 Server Lab Users BOF presented by Kitayama-san.
  ● Node.js project leveraged to support ARM64 release.
Overview cont’d

● Blog on the lab rollout here
  https://www.linaro.org/blog/armv8-server-lab/

● Blog on rack deployment challenges here
  https://www.linaro.org/blog/ubuntu-rack-deployment-within-the-armv8-server-lab/
Leveraging the Server Colo

- ISV’s and Community members may apply for access here: http://www.linaro.org/leg/servercluster/
  - Linaro Members have priority
  - Private access to provisioned systems
  - 1-2 week leases for build and test (can be extended)
  - At no cost
  - Includes access to the “control node” to be able to power systems on and off and to gain access to serial terminal.
  - Only port that can get to lab is port 22
    - ssh -L8000:localhost:80 r1-a14.aus-colo.linaro.org to get around it…
    - sshuttle is a “poor man’s vpn” to not have to do port forwarding….
What’s Next? Developer Cloud
Overview

- Deployment announced this week at Connect
  - Next phase extending the ARMv8 Server Cluster

- A 64-bit ARM server deployment for the purpose of evaluating, developing, and maturing ARM-based clouds

- Multiple Members have donated servers for the farm
  - Currently 5 members contributing servers
    - Initially 20 physical systems
    - Located in Cambridge and Austin labs
    - Starting out with ~200+ guest instances available for testing
      - Initially all KVM-based eventually adding containers
  
  - Dev Cloud is architected so that contributing Members can attain confidential feedback (metrics) on their deployed systems
    - From provisioning of compute nodes to supporting billing mechanisms, etc.
    - Support for debugging, profiling, porting and regression testing all on ARM Server instances
Overview cont’d

● Will leverage
  ● The Reference Software Platform (RSP) Lead Project
  ● OpenStack as the Cloud Mgt foundation
  ● Developers, ISV’s and 3rd party software developers for porting, debugging and validation
  ● Initial OS’s to support are CentOS and Debian
    ● Guest instances are up to end user
    ● In the future, plan to extend to use others such as Ubuntu, Suse, REL and even Windows
      ● May require partner agreements / SLA’s

● An ideal proof-point for ARMv8 solutions
Overview cont’d

● Dev Cloud Security Considerations
  ● Dev Cloud support of individual Data Centers will provide an easy way to create access controlled farms
  ● Leverage OpenStack → Keystone Identity Services
    ■ Security policy, authentication, and authorization
    ■ Supports LDAP if needed
  ● Provisioned as a Private Cloud
  ● Will support multi-tenancy
Getting Involved

- **Vision**: Extend the Dev Cloud into individual Data Centers. Linaro can help set these up, and these “distributed” Data Centers can federate extend the Dev Cloud.
- Linaro will support (provide the “bits” for) a Member or partner to create their own isolated test cloud (assumes on validated platforms)
- **Platform Provider**: Contact devcloud@linaro.org to add ARM servers to the Dev Cloud or begin the creation of own Data Center
- **ISV’s**: Fill out the request that the following page: [http://linaro.cloud](http://linaro.cloud)
- Provide Member engineers to maintain / monitor the Dev Cloud, CI, QA tests, etc.
- Monitor this new deployment here: [https://www.96boards.org/developercloud/](https://www.96boards.org/developercloud/)
Q & A

- Ideas for follow-on sessions?
- Next-level dive into specific areas such as Dashboard navigation, Member Builds, etc.?