Testing with volcanoes

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Fuego + LAVA Embedded testing going distributed

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Releases, CI and automated tests for Automotive Grade Linux (AGL)

--> AGL ... what ? visit us in building AW !

Interests: Linux, electronics, SDR

Hobbies: amateur radio (ham radio), travelling



Topics

- Testing today
- Existing Tools
- The problem with testing on HW !
- A solution ...
- Demo
- HowTo
- Good/Bad
- Next
- QA ?!

Testing today

A lot of manual work involved
Reproducability ?!

Testing today

Availability of the HW ?! Availability of the Results ?!

http://free-electrons.com/wp-content/uploads/2016/08/small_drawer.jpg

Testing

How do you

yourself:

Ask

develop code ?

-> distributed !





10

18



today

1761

60

Existing Tools

- Autotest <u>https://autotest.github.io/</u>
- Jenkins + homebrew
- manual

"non-distributed"

- LAVA http://validation.linaro.org
- Fuego <u>http://elinux.org/Fuego</u> / <u>http://bird.org/fuego/FrontPage</u>

"distributed"

• KernelCI - <u>https://kernelci.org/</u>

LAVA

URL: <u>http://validation.linaro.org</u>

Framework to test on target hardware, evolved around the Linux kernel on ARM devices.

- + Very good support for board farms
- A lot of boot and deployment mechanisms supported (u-boot/fastboot/pxe, nfs/tftp/usb)
- + Slave/Worker runs even on RaspberryPi
- Initial learning curve quite steep, complex set-up
- Debian packages only

Welcome to LAVA

LAVA is an automated validation architecture primarily aimed at testing deployments of systems based around the Linux kernel on ARM devices, specifically ARMv7 and later. The current range of boards (device types) supported by this LAVA instance can be seen on the scheduler status page which includes details of how many boards of each type are available for tests and currently running jobs.

LAVA components

- O Dashboard viewing results of tests run by you or others, depending on your group membership. (JSON submissions only)
- .II Results viewing results of pipeline tests run by you or others. (YAML pipeline submissions only.)
- Im Scheduler jobs are scheduled on available devices and the scheduler pages allow you to view current and past jobs as well as submit new jobs.
- **#** API information on how to interact with LAVA and export data from LAVA using XMLRPC.
- O Help documentation on using LAVA, worked examples and use cases, developing your own tests and how to administer a LAVA instance of your own.
- L Sign In once you are logged in, LAVA will build a profile for you which provides access to jobs you submit or mark as favourites, your bundle streams containing results of those tests and your filter or image report subscriptions which can alert you to changes in sets of results.



Fuego

http://elinux.org/Fuego

Fuego = (Jenkins + abstraction scripts + pre-packed tests) inside a container

Evolved out of LTSI-Kernel Project

- + Large number of tests
- + Reporting
- heavy setup (jenkins/java)
- "Local Lab" (not distributed)

Test Automation Framework

0. History	Benchmarks	Functional	all	batch runs	+						
Latest test	s runs							<u>*</u> 2			
Test		Run	Run			ie	Platform SDK	Device			
Benchmark.dbench		<u> #3</u>	<u></u>		Apr	3, 2016 4:21:28 PM		bbb-poky-sdk			
Benchmark.dbench		<u>_#2</u>	<u>♀#2</u>		Apr	3, 2016 4:07:22 PM		bbb-poky-sdk			
Benchmark.Dhrystone		<u>_</u> #1	<u>●#1</u>			3, 2016 4:07:08 PM		bbb-poky-sdk			
Functional.bzip2		<u>♥</u> <u>#1</u>	<u>♀#1</u>			3, 2016 4:06:56 PM		bbb-poky-sdk			
Functional.posixtestsuite		<u>\ #1</u>	<u> </u>			3, 2016 3:59:44 PM		bbb-poky-sdk			
Benchmark.dbench		<u>●</u> <u>#1</u>	<u>♀</u> <u>#1</u>			3, 2016 3:58:22 PM	bbb-poky-sdk				
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est Run st	atistics							<u>.</u>			
Status of t	he test run				Des	cription	Number of test runs				
•					Faile	d	1				
e					Unst	able	0				
•					Suco	ess	5				
۵					Pend	ling	54				
0					Disa	bled	0				
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add description

Problem: How to distribute tests and aggregate Results

We develop in a distributed manner, on platforms w/o access to all target hardware.

How can we make sure our changes work on target devices ?

So: a) distribute the tests

b) aggregate results

a) distribute the tests

- ✓ Latest LAVA has a new implementation "v2" or "pipeline". This newer version enables slave-labs to attach to the master over a zmq pipe with encryption.
- ✓ This means we can have "Satellite Labs"
- ✓ No need to have all hardware in one place
- ✓ Only requirement is:
 - (remote-) controlled power switch / relay
 - \circ serial
 - network (int/ext)
- ✓ --> "SETI-at-home" for tests on hardware



b) aggregate results

- Just running tests is not enough !
- The data needs to be parsed and aggregated and post-processed and stored

We give Fuego a spin here:

- Large set of built-in tests with existing parsers
- Possibility to post-process and aggregate the results

FUEGO + LAVA

The LAVA support for FUEGO is a proof-of-concept right now. It uses:

- the calls to TARGET_SETUP_LINK and the new TARGET_TEARDOWN_LINK
- call to lava-tool

LAVA job template settings file (<board>.lava) LAVA job template (<board>.lava.yaml)

still uses ssh, thus LAN/VPN req.
still uses simple "hacking" session



... pray to the demo gods ...

HowTo

Check <u>https://bitbucket.org/dl9pf/fuego</u> branch "next", AAA_QUICKSTART.md .

- setup LAVA, create user, create token
- git clone --branch next <u>https://bitbucket.org/dl9pf/fuego.git</u>
- git clone --branch next <u>https://bitbucket.org/dl9pf/fuego-core.git</u>
- cd fuego/ && ./install.sh
- ./fuego-host-scripts/docker-create-container.sh
- ./fuego-host-scripts/docker-start-container.sh
- fuego-create-node --board raspberrypi3 docker
- fuego-create-jobs --board raspberrypi3 --testplan testplan_default --distrib nosyslogd.dist
- You need to edit conf/boards/raspberrypi3.lava and conf/boards/raspberrypi3.lava.yaml for your setup

The the repo in a few days for updates ... WIP

The Good

- The chosen path to create a new "session or job" for each test is quite reliable.
- LAVA board handling proves to be very stable and reliable
- Fuego works in this mode 'out of the box'

The Bad

• Fuego:

- There were predefined timeouts in Fuego -> now waaaay to small
 - These need to be done more fine-grained or dynamic
- Fuego keeps the board 'open' even during compilation and postprocessing
 - That needs to be split into separate and independent execution phases

• LAVA:

- lava tool should expose more information about the pipline progress
 - E.g. I would easily like to block until the login is up (and not until all is done)
- Better way to expose the terminal to client/downstream applications.

Whats Next ?!

....

- Cleanup (PoC on-top of -next ;))
- Interaction with the Fuego transport layer/subsystem
- pool one lava session for multiple tests in a row (to save setup/bootup time!)
- alternative to ssh for the transport for the terminal

We need you !

• Try it yourself !

- Check out the projects like LAVA and Fuego
- Contribute to projects like KernelCI

My call to action:

• Let's work out ways to test collaboratively and share the results !

Links, References and Docs

- Fuego: <u>http://elinux.org/Fuego</u>
- LAVA: <u>http://validation.linaro.org</u>
- KernelCI: <u>http://kernelci.org</u>
- Automotive Grade Linux: <u>www.automotivegradelinux.org</u>



QA

KernelCl

www.kernelci.org

Frontend for aggregating tests, test-results across multiple combinations of:

- architecture (arm, aarch64, x86, amd64)
- Kernel Config options
- branches
- target boards

Available Boot Reports

The results shown here cover the last 14 days of available data starting from Wed, 01 Feb 2017 (time is UTC based).

25	- boot reports	per page					Q Filter the re-			sults	
Tree 🕸	Branch 👫	Kernel 🎝	Board Model	Defconfig	Arch.	Lab Name	11	Date	↓₹	Status	
stable	local/linux-3.12.y	v3.12.70	imx6q-sabrelite_rootf	multi_v7_defconfig	arm	lab-collabora	2	017-02-	01	 Image: A second s	Q
stable	local/linux-3.12.y	v3.12.70	omap4-panda	multi_v7_defconfig+	arm	lab-collabora	2	017-02-	01	×	Q
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drm-tip	local/drm-tip	v4.10-rc6-1021-g	qemu-aarch64,legacy	defconfig+CONFIG	arm64	lab-baylibre- seattle	2	017-02-	01	~	٩
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