LAVA Project Update

Paul Larson
<paul.larson@linaro.org>

Linaro

About LAVA

- Framework used by Linraro for automated testing
- Extensible web frontend
- Device management and automated deployment
- APIs and command line tools
- Tools for automating test suites on Ubuntu and Android based Linaro builds
- Support for many popular low-cost ARM dev boards
    - beagleXM, Panda, Snowball, Origen, mx51evk, mx53qs...
    - Support for new boards is easy to add

How Linaro Uses LAVA

- Daily automated tests of multiple images and hardware packs on Linaro member hardware
- Automated tests of new kernels/features
- Android continuous integration testing
- Kernel continuous integration testing
- Platform enablement tests

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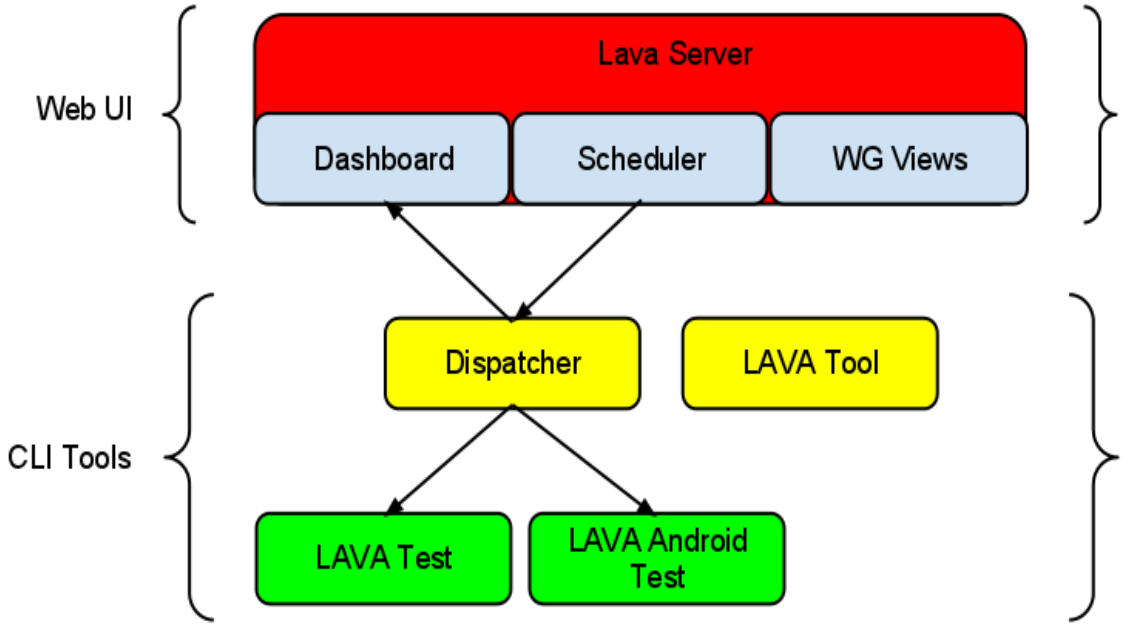
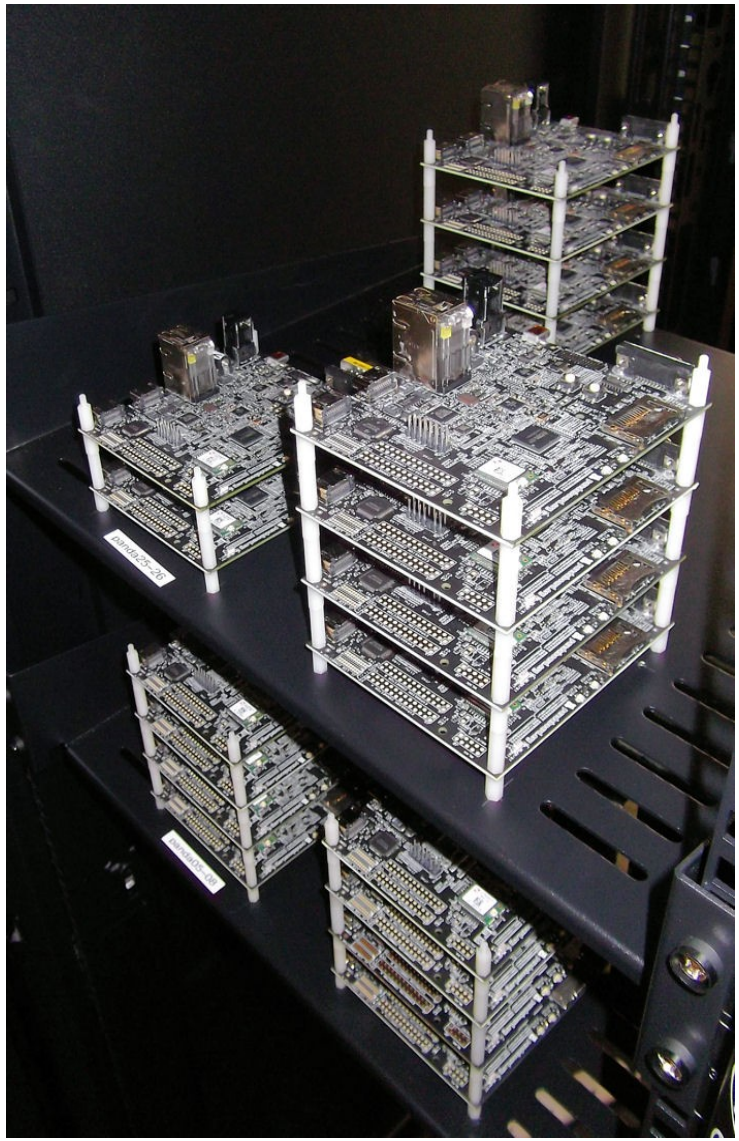
LAVA Architecture





Hardware Components

- Server(s)
- Network infrastructure
- Console servers
- Networked PDUs
- Racks of ARM Boards

LAVA Components

- LAVA Server
- LAVA Dashboard
- LAVA Scheduler
- LAVA Dispatcher
- LAVA Test / LAVA Android Test

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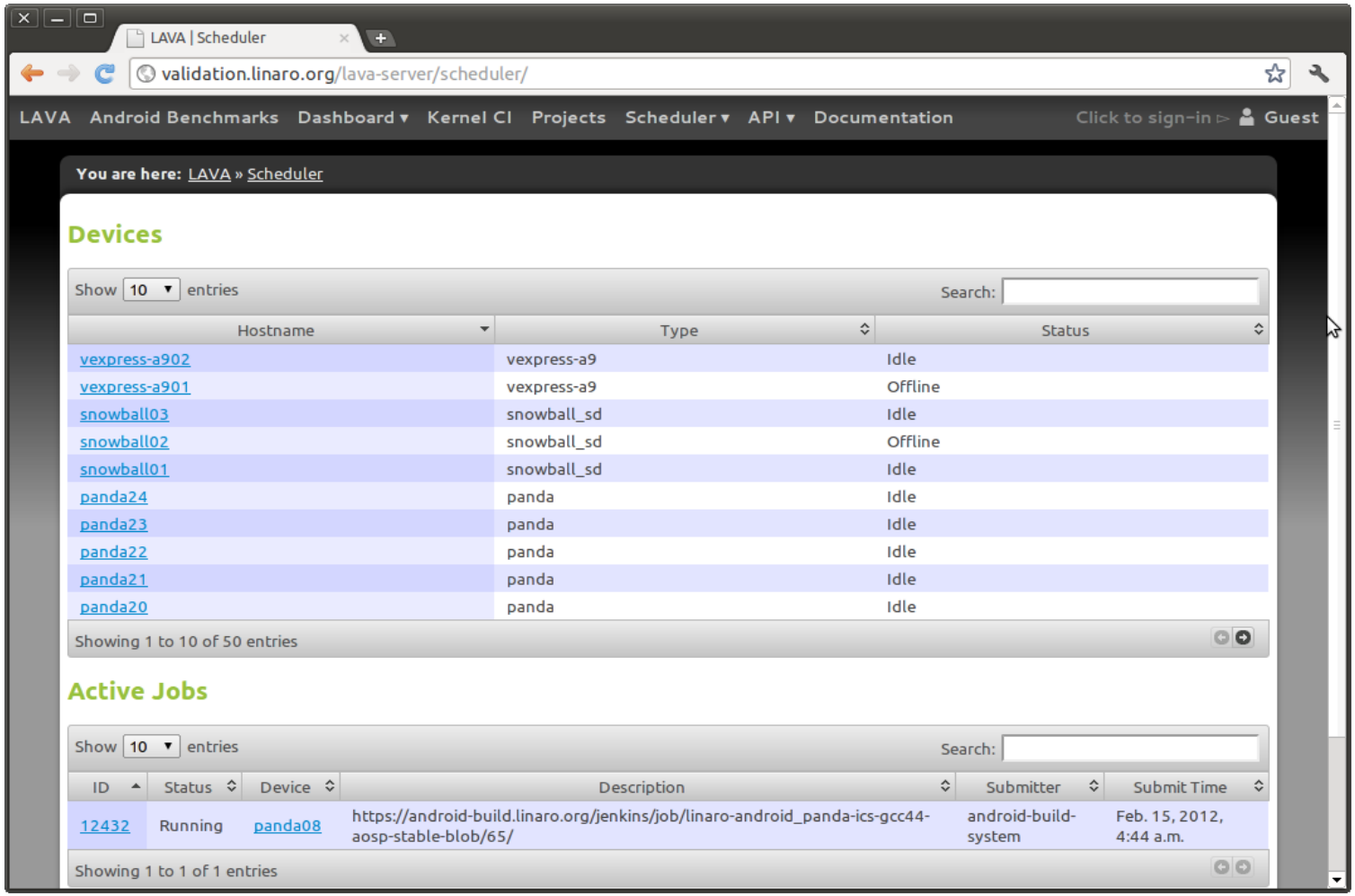
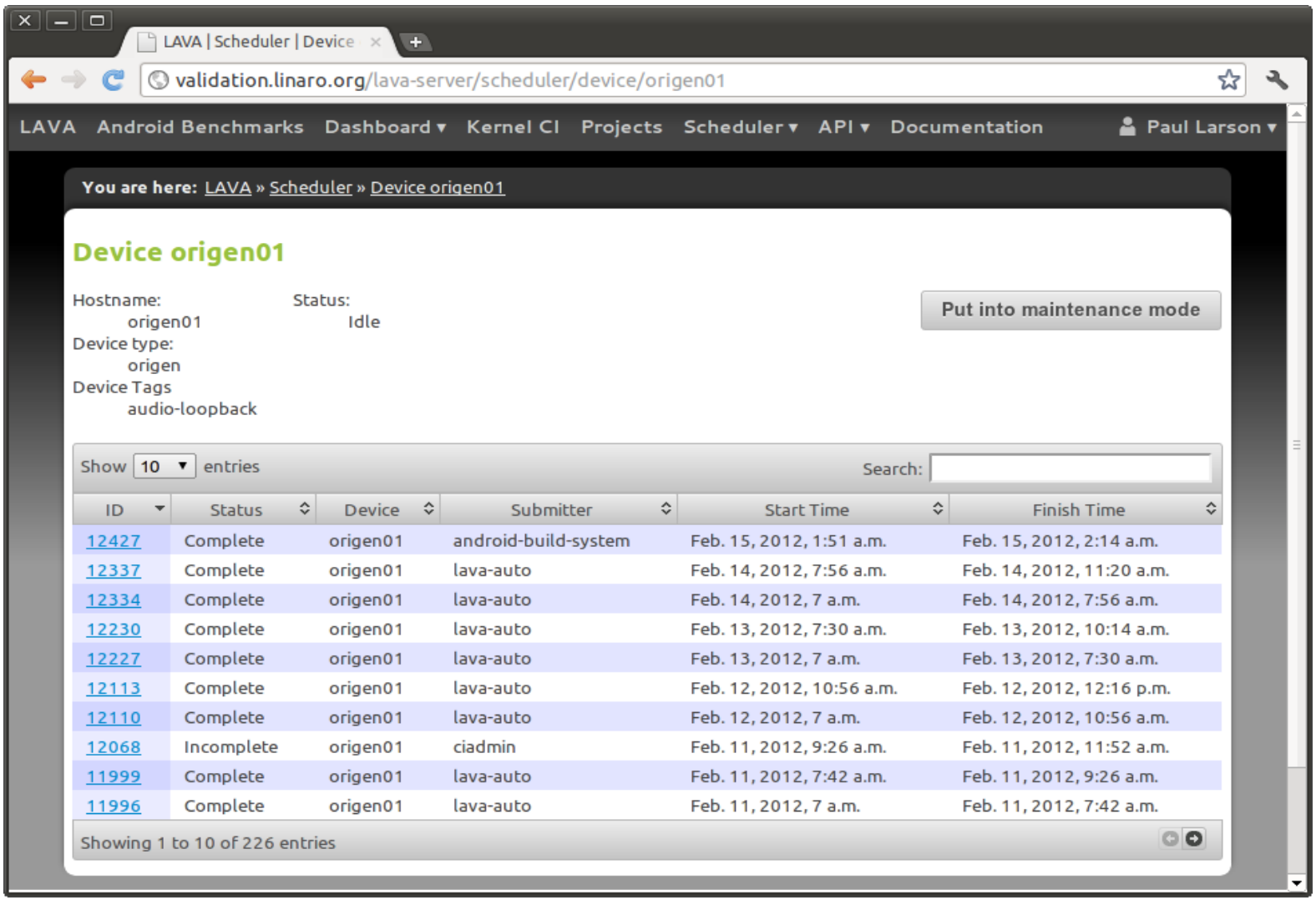
LAVA Scheduler

- Primary entry point for test jobs
- Displays current device status and current job status
- Provides XML-RPC API for job submission
- Provides command-line tools for job submission



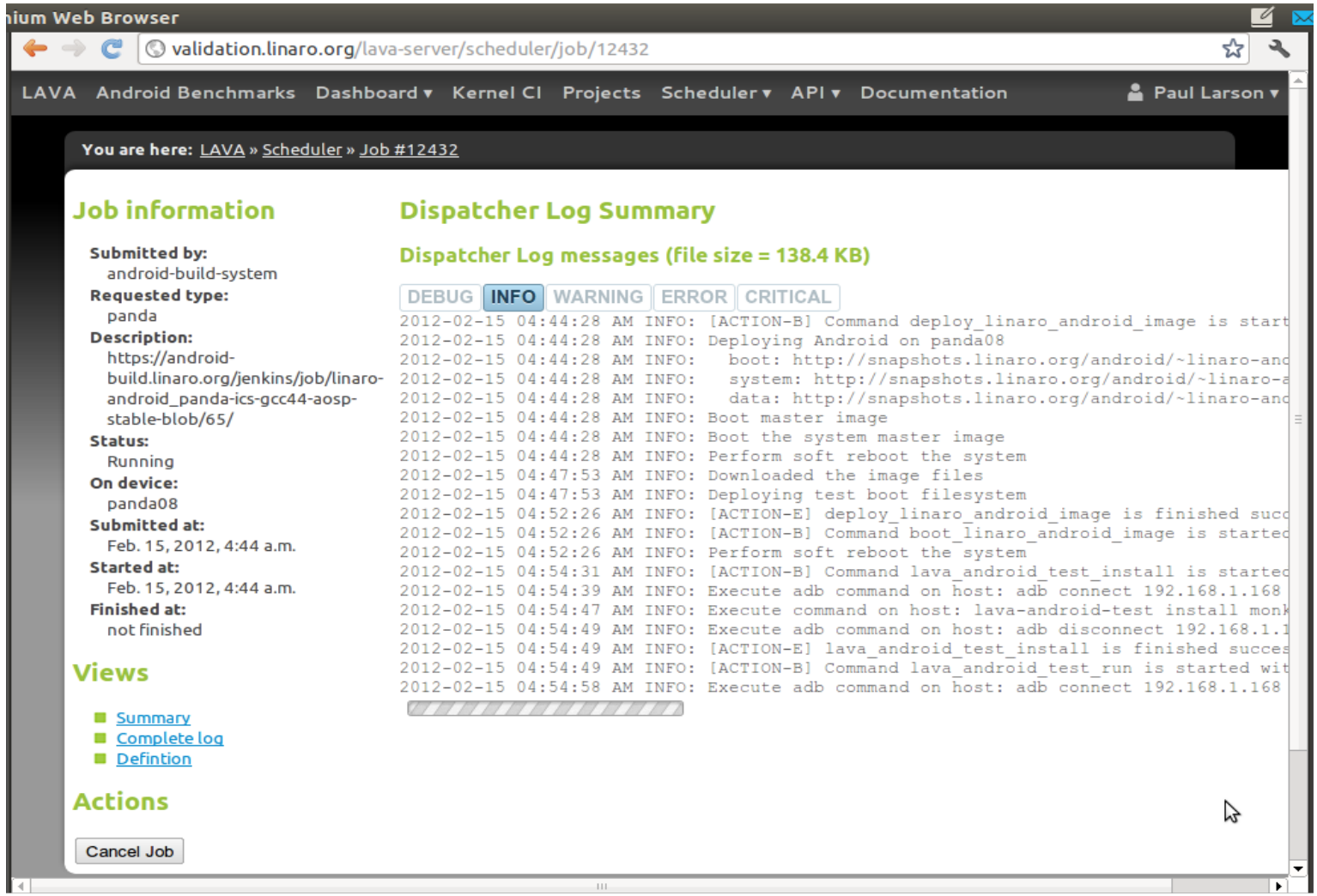
LAVA Scheduler

- Device Details
- Admin functions for taking boards offline for maintenance



LAVA Scheduler

- Live monitoring of jobs in progress
- Job Cancellation
- Results link (once the job is complete)



LAVA Dispatcher

- Talks to the individual test devices
- Based around running predefined 'actions'
  - Actions do things like deploying images, running tests, and submitting results
  - Actions can take parameters
  - New actions can be added in-tree, or as plugins
- Currently supports Linaro and Android image deployments
- Local board configuration details are stored in config files
  - inheritance for board type config, specific board config
- Can be used standalone, or kicked off by the scheduler daemon

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LAVA Test

- Provides a uniform interface for installing tests, running them, and parsing results
- Test wrappers act as the "glue" between individual test suites and LAVA
- Supports out-of-tree tests for tests that can't be included
- Test parameter defaults can be overridden
- Can be used standalone for convenient local execution

LAVA Android Test

- Provides the Above functionality for Android testing
- Uses ADB to talk to Android devices rather than running locally

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LAVA Dashboard

- Storage and retrieval of raw test results and attachments
- Provides XML-RPC API for results submission
- Provides command-line interface to the API

Some Terminology:

- Bundle Stream - A way of organizing related result bundles
- Result Bundle - a set of results submitted after a testing session, can contain multiple test runs, as well as other information about the system where the testing was performed
- Test Run - The results from a single test suite
- Test Case - The individual id and result of a single test within a test run

LAVA Server

- Server framework for LAVA web components
  - Ties together all the previous web components we've discussed
- Extensions can be written to add functionality
- Dashboard and Scheduler are the primary extensions
- Extensions can also be written to do things like special data or results handling (example: Kernel CI results)

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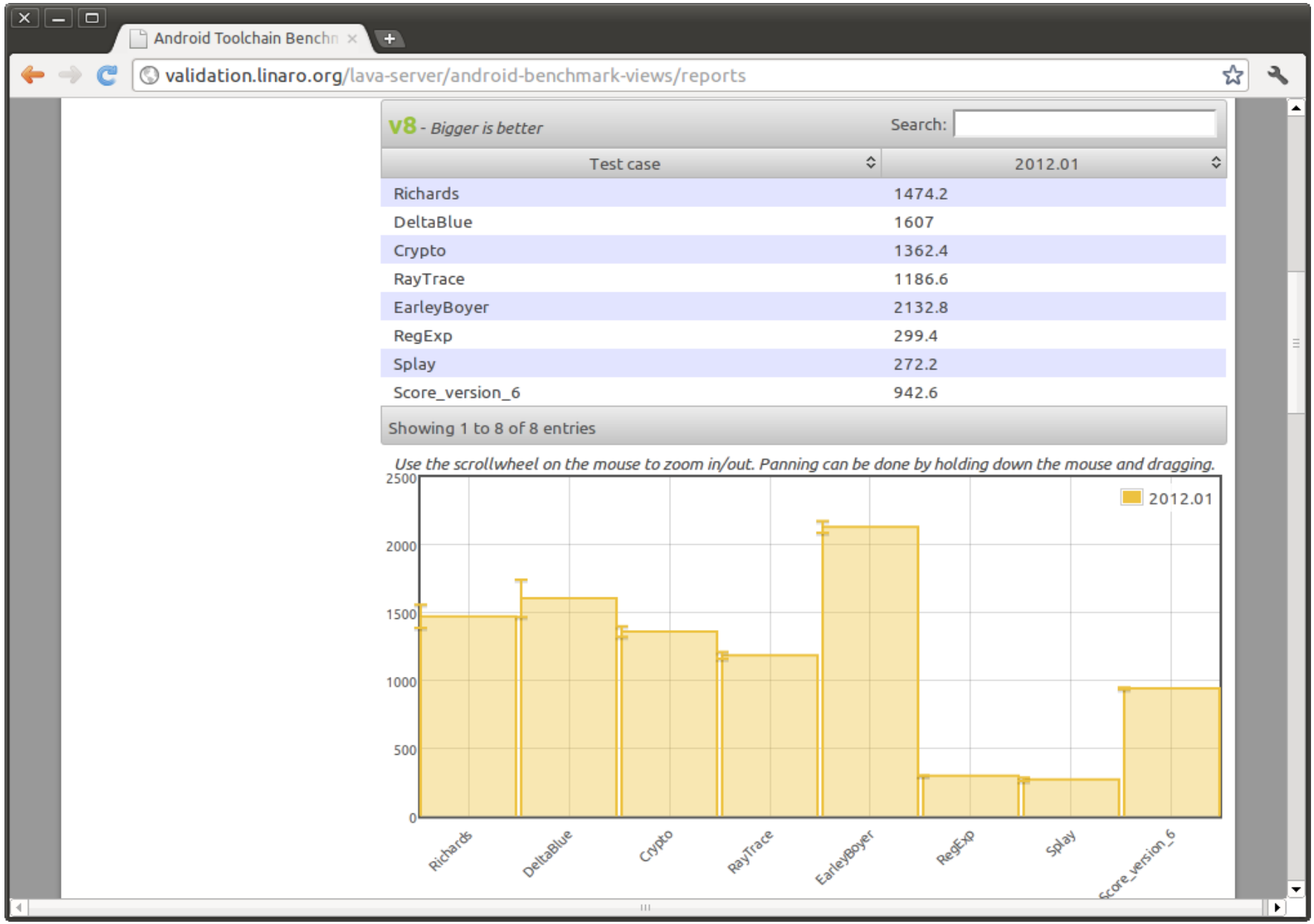
Extending LAVA Server

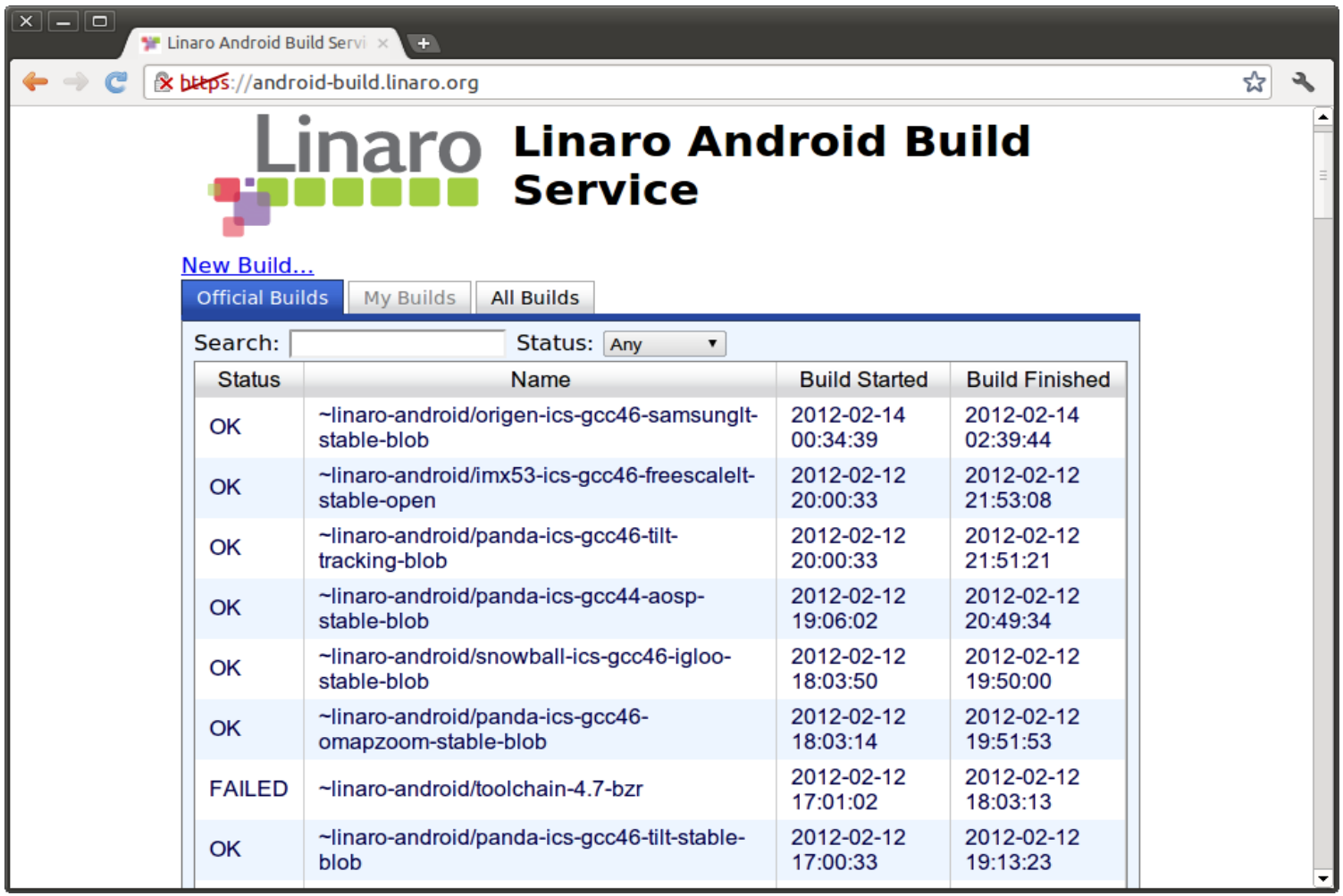
- You can use existing data in other extensions
  - Such as the dashboard or scheduler data
- Add new models for storing new things, or denormalizing existing data
- Create new views for visualizing your data
- Add new features not provided elsewhere
- Extend the xmlrpc API

An example: Android Benchmarks



Android CI Loop

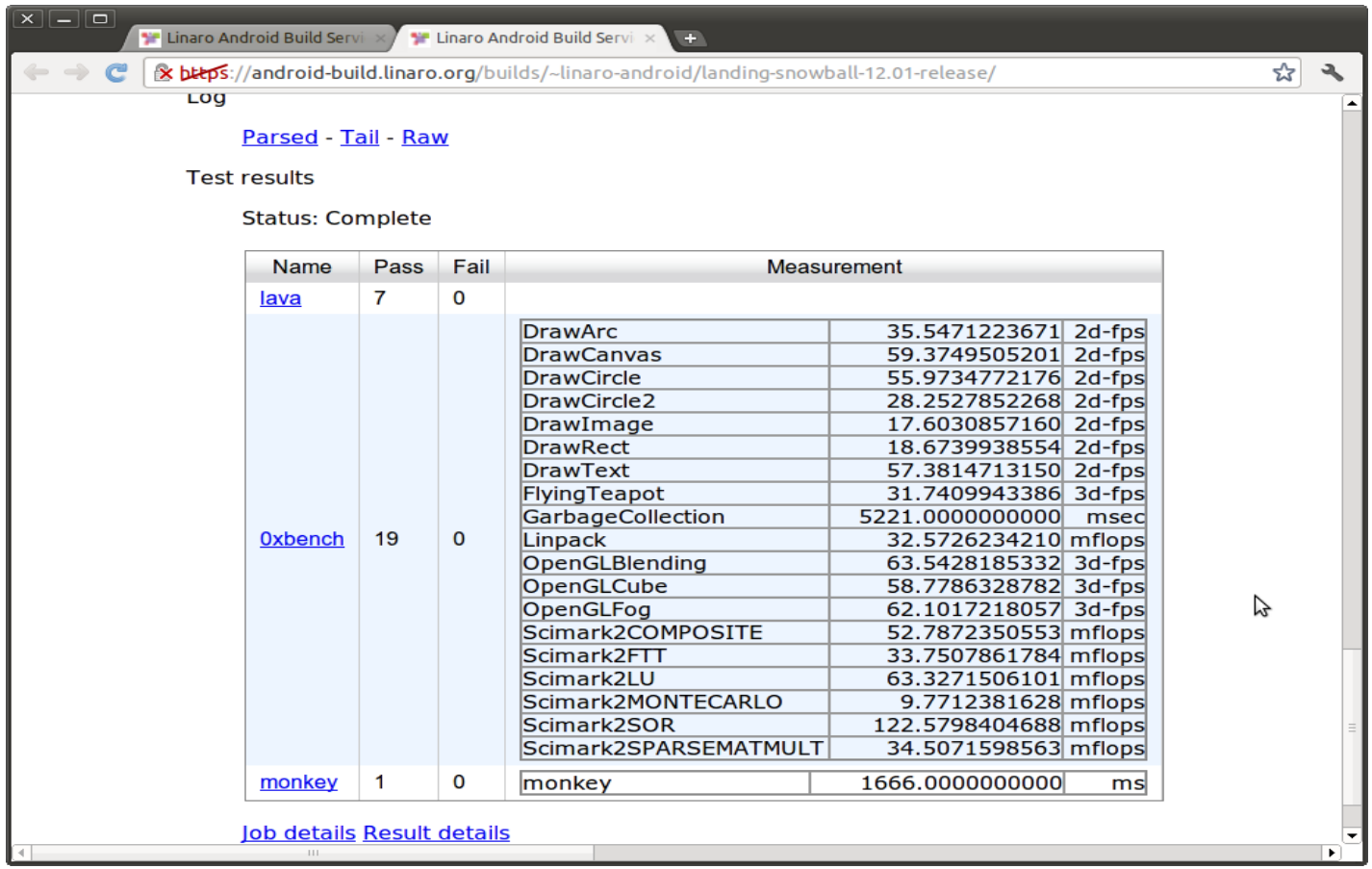
- Linaro android-build system - frontend to Jenkins
- Submit test job to LAVA Scheduler if successful
  - Test results submitted to LAVA Dashboard



Status	Name	Build Started	Build Finished
OK	~linaro-android/origen-ics-gcc46-samsungIt-stable-blob	2012-02-14 00:34:39	2012-02-14 02:39:44
OK	~linaro-android/imx53-ics-gcc46-freescaleIt-stable-open	2012-02-12 20:00:33	2012-02-12 21:53:08
OK	~linaro-android/panda-ics-gcc46-tilt-tracking-blob	2012-02-12 20:00:33	2012-02-12 21:51:21
OK	~linaro-android/panda-ics-gcc44-aosp-stable-blob	2012-02-12 19:06:02	2012-02-12 20:49:34
OK	~linaro-android/snowball-ics-gcc46-igloo-stable-blob	2012-02-12 18:03:50	2012-02-12 19:50:00
OK	~linaro-android/panda-ics-gcc46-omapzoom-stable-blob	2012-02-12 18:03:14	2012-02-12 19:51:53
FAILED	~linaro-android/toolchain-4.7-bzr	2012-02-12 17:01:02	2012-02-12 18:03:13
OK	~linaro-android/panda-ics-gcc46-tilt-stable-blob	2012-02-12 17:00:33	2012-02-12 19:13:23

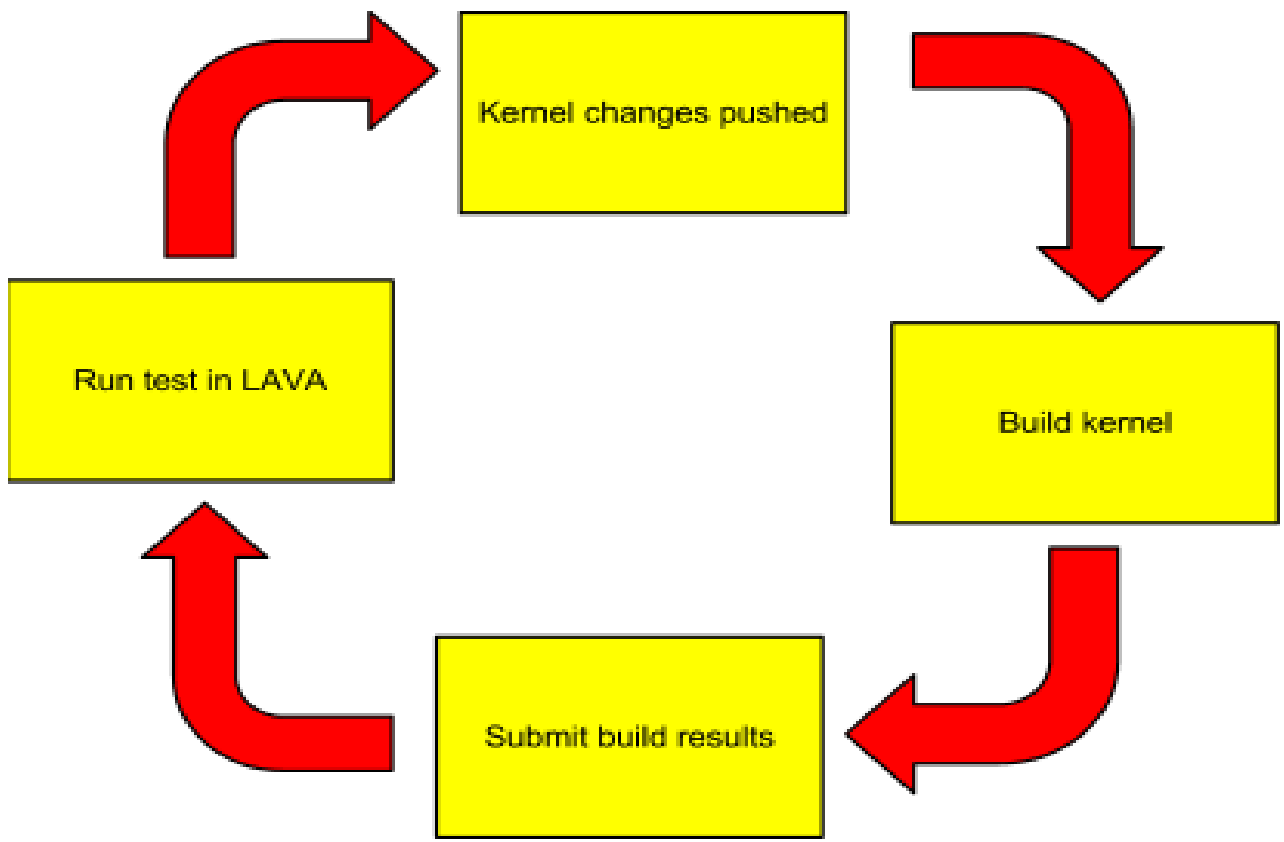
Android CI Loop

- JSON view of test results referenced by job id
- Results can be displayed on the android-build summary page



Kernel CI Loop

- Build system rebuilds trees when changes are detected
  - Build results submitted to LAVA Dashboard
- Submit test job to LAVA Scheduler if successful
  - Test results submitted to LAVA Dashboard
- LAVA Kernel CI View consolidates results



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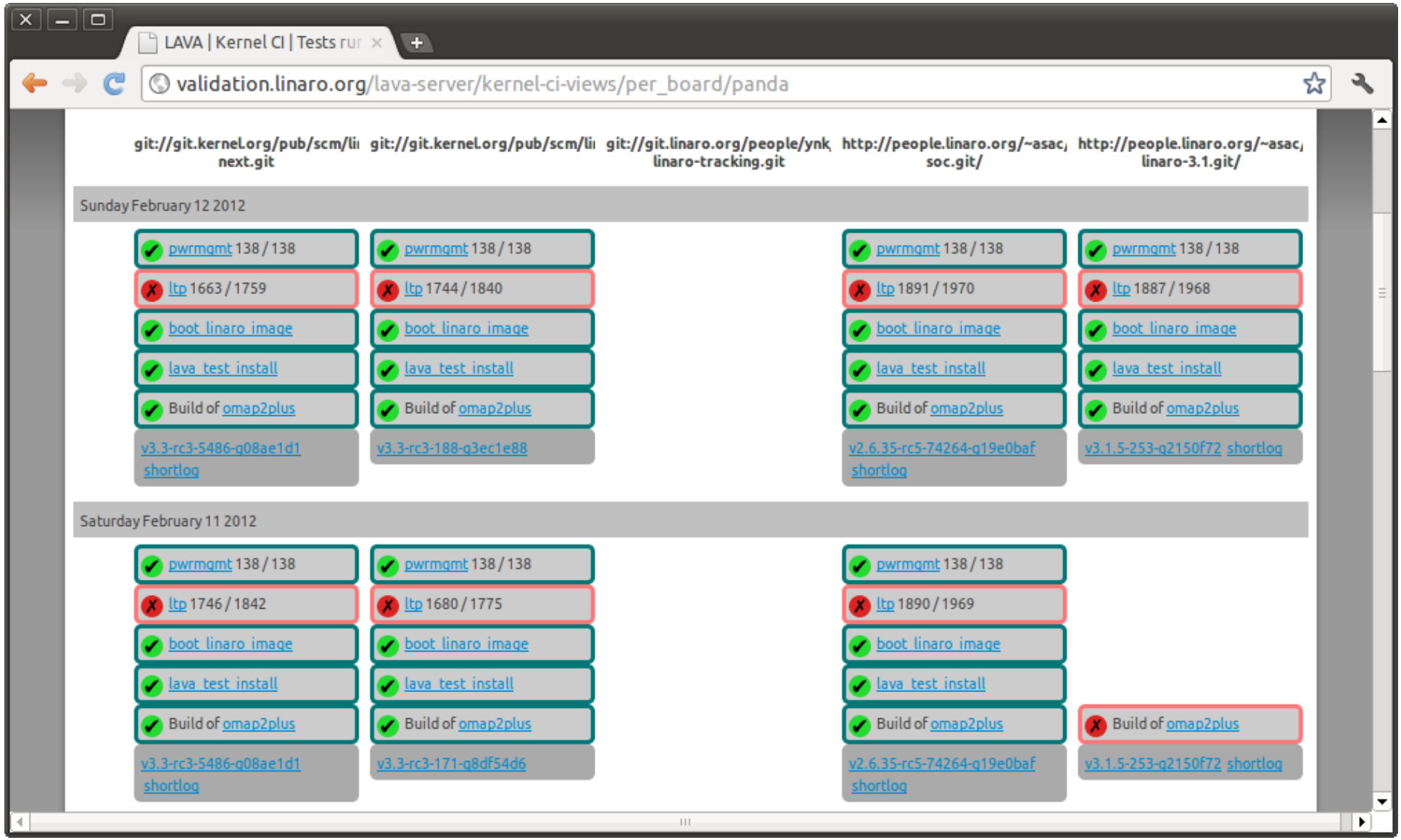

Kernel CI Results View

Installing LAVA

$ bzr branch lp:lava-deployment-tool

- Handles deployment of any LAVA component and dependencies
- Uses pypi and virtualenv
- Multiple instances allowed on the same server
- Sets up databases
- Copies everything needed (with dependencies) for offline installs
- Backup/Restore commands
- Upgrades supported

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Installing LAVA

$ lava-deployment-tool setup

- Installs virtualenv, pip, uwsgi and other dependencies that will be needed

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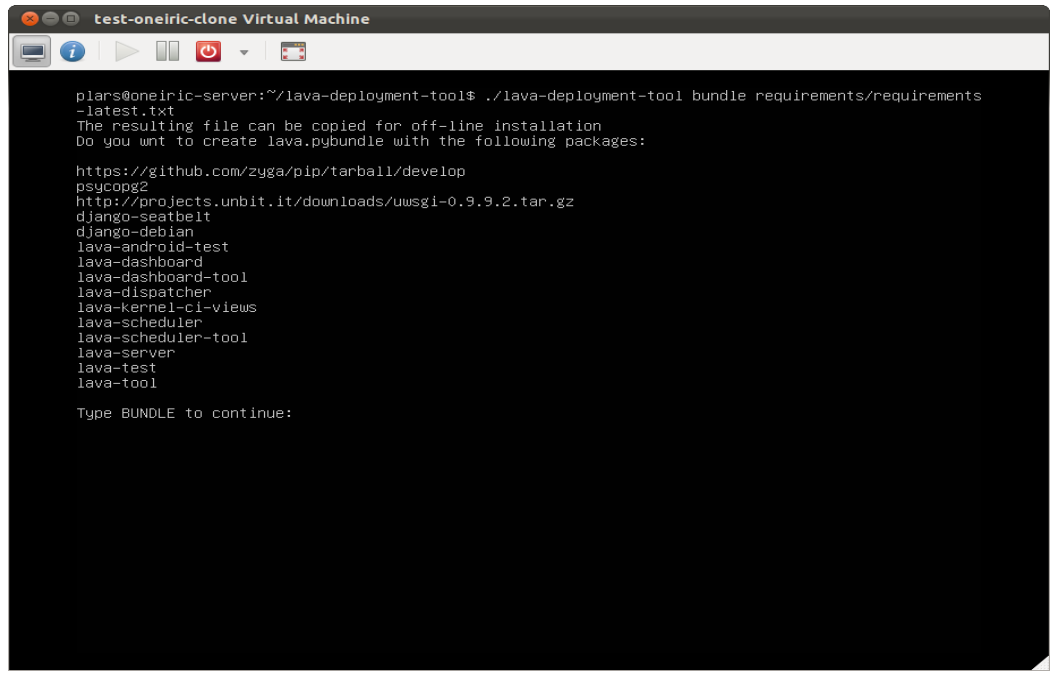
Installing LAVA

$ lava-development-tool bundle requirements/requirements-latest.txt

- Creates a bundle of software specified in the requirements file
- Also downloads dependencies
- Bundle can be moved to any system and installed later
- Can be used with python package index (pypi) or source repositories
- Can also be downloaded from https://launchpad.net/lava-project/+download



Installing LAVA

$ lava-deployment-tool install myinstance lava.pybundle

- Installs the software downloaded into the bundle
- Creates databases
- Runs migrations

```
plars@oneiric-server:~/lava-deployment-tool$ ./lava-deployment-tool install test lava.pybundle
====================
LAVA Deployment Tool
====================

Instance Configuration
----------------------

Before configuring your instance we need to ask you a few questions
The defaults are safe so feel free to use them without any changes

Note: it is safe to CTRL-C at this stage!

User account configuration
^^^^^^^^^^^^^^^^^^^^^^^^^^

We need to create a system user for this instance:
System user account configuration

User name:        'lava-test'
User description: 'User for LAVA instance test'

next   - Use the user name as is
edit   - Edit the user name
Please please decide what to do:
```

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Creating an Admin user

- The admin user can access the django admin panel
- give permissions to other users
- add bundle streams, devices, device_types, etc

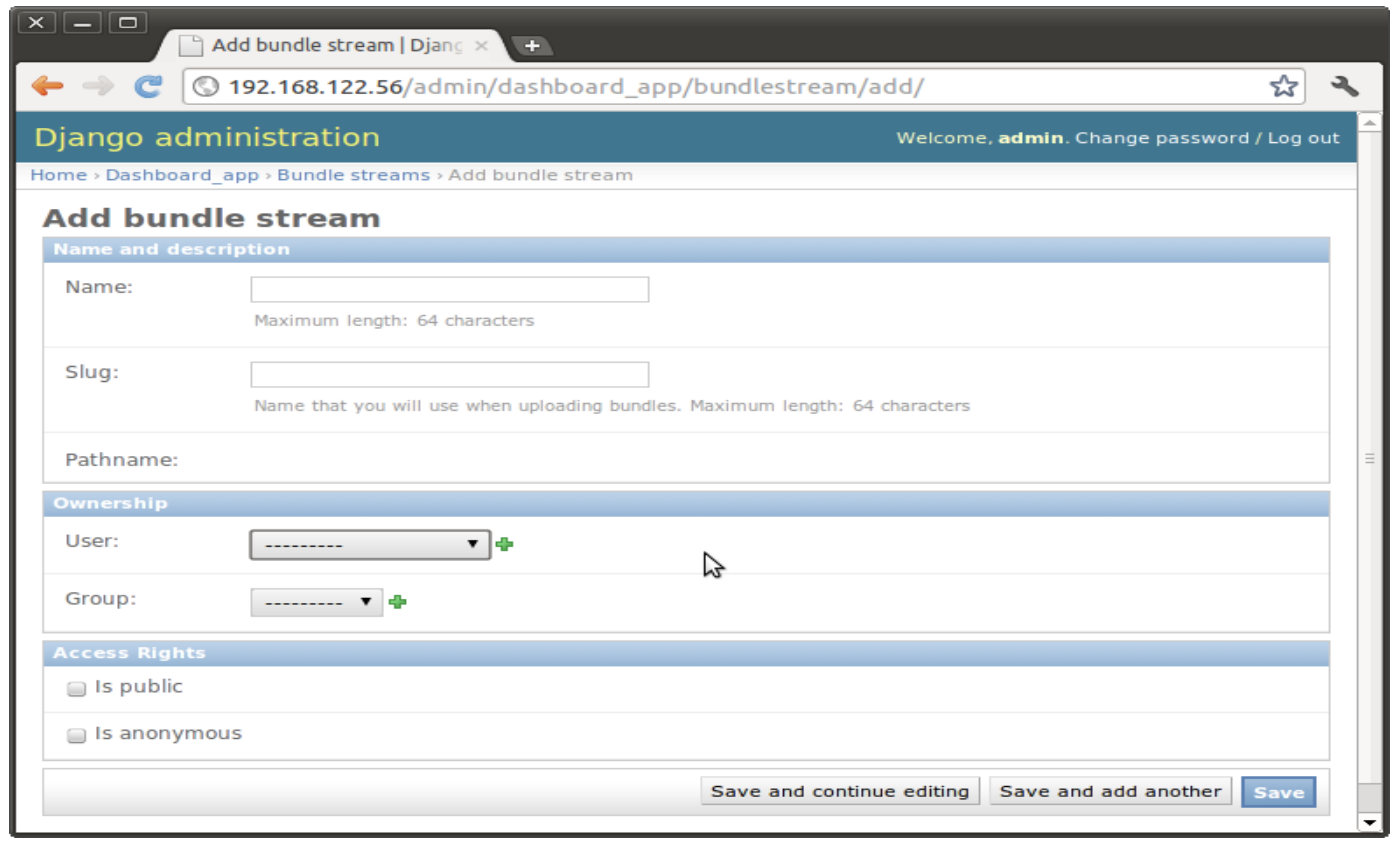
First, setup the virtual environment:
$ cd /srv/lava/instances/instance_name
$. bin/activate

Create the user, answer a few questions:
$ lava-server manage createsuperuser

Make a Bundle Stream

- Can be done from either the admin tool, or the command line

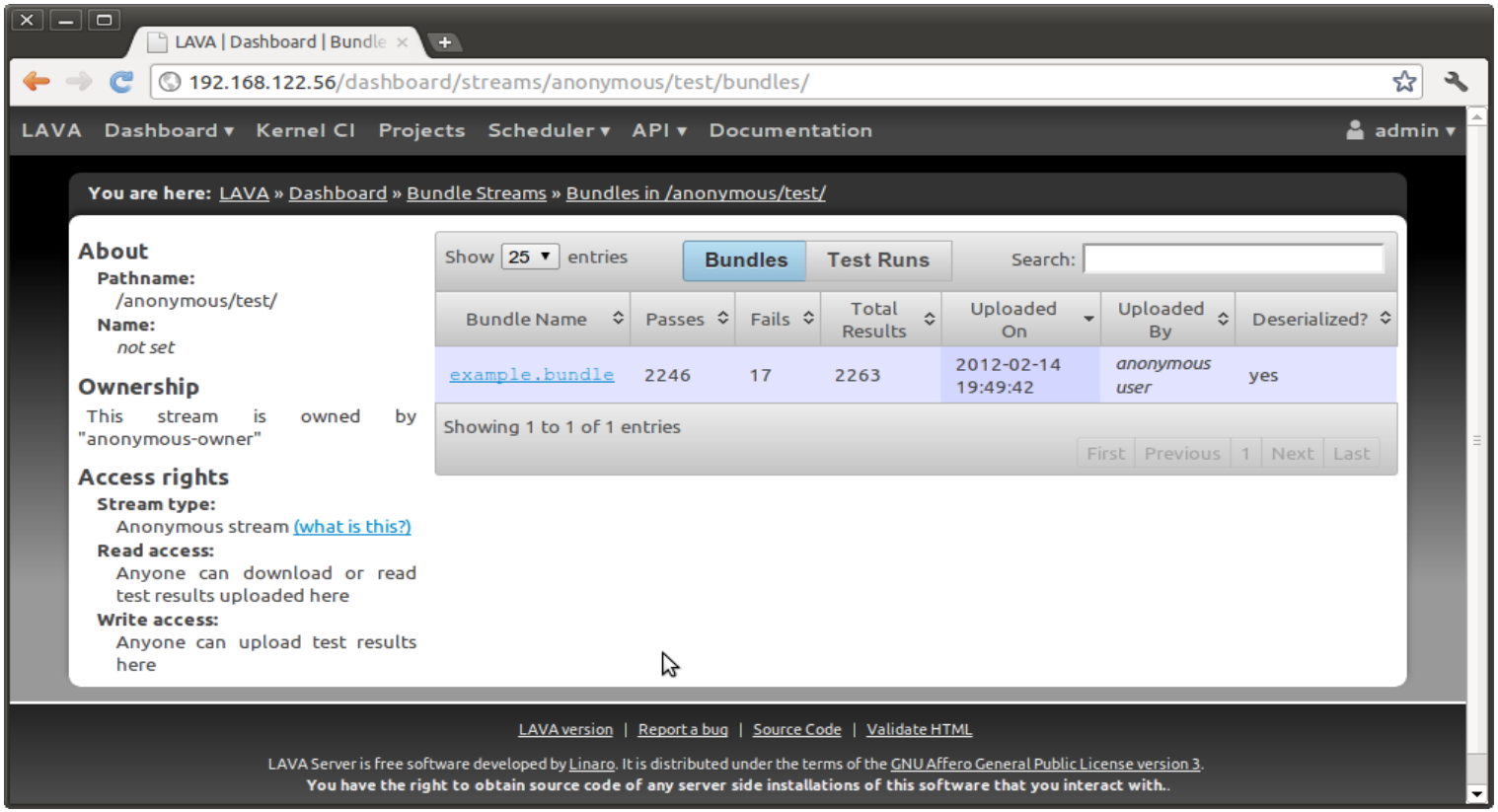
$ lava-dashboard-tool make-stream --dashboard-url http://localhost/RPC2 /anonymous/test/



Pushing a Test Result

- Normally this would happen as part of your test job

$ lava-dashboard-tool put --dashboard-url=http://localhost/RPC2 example.bundle /anonymous/test/



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Getting More Information

Documentation

- lava.readthedocs.org

Source

- http://launchpad.net/lava

Our system

- http://validation.linaro.org

IRC

- #linaro on freenode.net (I'm plars there)

Mailing list

- linaro-validation@lists.linaro.org
- linaro-dev@lists.linaro.org

Backup

Anatomy of a Test Job


```
{
  "timeout": 18000,
  "actions": [
    {
      "command": "deploy_linaro_image",
      "parameters": {
        "hwpack": "http://snapshots.linaro.org/oneiric/lt-origen-oneiric/20120210/0/images/hwpack/hwpack_linaro-lt-origen_20120210-0_armel_supported.tar.gz",
        "rootfs": "http://snapshots.linaro.org/oneiric/linaro-o-ubuntu-desktop/20120210/0/images/tar/linaro-o-ubuntu-desktop-tar-20120210-0.tar.gz"
      },
      "metadata": {
        "hwpack.build": "0",
        "hwpack.date": "20120210",
        "hwpack.type": "lt-origen-oneiric",
        "rootfs.date": "20120210",
        "rootfs.type": "linaro-o-ubuntu-desktop",
        "rootfs.build": "0"
      }
    },
    {
      "command": "lava_test_install",
      "parameters": {
        "tests": [ "glmemperf"],
        "timeout": 7200
      }
    },
    {
      "command": "boot_linaro_image"
    },
    {
      "command": "lava_test_run",
      "parameters": {
        "test_name": "glmemperf"
      }
    }
```

Anatomy of a Test Job

```
{
  "timeout": 18000,
  "actions": [
    {
      "command": "deploy_linaro_image",
      "parameters": {
        "hwpack": "http://snapshots.linaro.org/oneiric/lt-origen-oneiric/20120210/0/images/hwpack/hwpack_linaro-lt-origen_20120210-0_armel_supported.tar.gz",
        "rootfs": "http://snapshots.linaro.org/oneiric/linaro-o-ubuntu-desktop/20120210/0/images/tar/linaro-o-ubuntu-desktop-tar-20120210-0.tar.gz"
      },
      "metadata": {
        "hwpack.build": "0",
        "hwpack.date": "20120210",
        "hwpack.type": "lt-origen-oneiric",
        "rootfs.date": "20120210",
        "rootfs.type": "linaro-o-ubuntu-desktop",
        "rootfs.build": "0"
      }
    },
  {
    "command": "lava_test_install",
    "parameters": {
      "tests": [ "glmemperf"],
      "timeout": 7200
    }
  },
  {
    "command": "boot_linaro_image"
  },
  {
    "command": "lava_test_run",
    "parameters": {
      "test_name": "glmemperf"
  ....
```

Deploying a Linaro Image

Optional Metadata

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Anatomy of a Test Job


```
{
 "timeout": 18000,
 "actions": [
  {
   "command": "deploy_linaro_image",
   "parameters": {
    "hwpack": "http://snapshots.linaro.org/oneiric/lt-origen-oneiric/20120210/0/images/hwpack/hwpack_linaro-lt-origen_20120210-0_armel_supported.tar.gz",
    "rootfs": "http://snapshots.linaro.org/oneiric/linaro-o-ubuntu-desktop/20120210/0/images/tar/linaro-o-ubuntu-desktop-tar-20120210-0.tar.gz"
   },
   "metadata": {
    "hwpack.build": "0",
    "hwpack.date": "20120210",
    "hwpack.type": "lt-origen-oneiric",
    "rootfs.date": "20120210",
    "rootfs.type": "linaro-o-ubuntu-desktop",
    "rootfs.build": "0"
   }
  },
    {
     "command": "lava_test_install",
     "parameters": {
      "tests": [ "glmemperf"],
      "timeout": 7200
     }
    },
  {
   "command": "boot_linaro_image"
  },
  {
   "command": "lava_test_run",
   "parameters": {
    "test_name": "glmemperf"
   }
  },
  {
   "command": "submit_results",
   "parameters": {
    "stream": "/anonymous/lava-daily/",
    "server": "http://validation.linaro.org/lava-server/RPC2/"
   }
  }
 ],
 "job_name": "lt-origen-oneiric-20120210-0+linaro-o-ubuntu-desktop-20120210-0",
 "device_type": "origen"
}
```


Install lava-test and setup tests we intend to run

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Anatomy of a Test Job


```
{
 "timeout": 18000,
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  {
   "command": "deploy_linaro_image",
   "parameters": {
    "hwpack": "http://snapshots.linaro.org/oneiric/lt-origen-oneiric/20120210/0/images/hwpack/hwpack_linaro-lt-origen_20120210-0_armel_supported.tar.gz",
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    "hwpack.type": "lt-origen-oneiric",
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    "rootfs.type": "linaro-o-ubuntu-desktop",
    "rootfs.build": "0"
   }
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   "command": "lava_test_install",
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    "timeout": 7200
   }
  },
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   "parameters": {
    "test_name": "glmemperf"
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   "command": "submit_results",
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    "server": "http://validation.linaro.org/lava-server/RPC2/"
   }
  }
 ],
 "job_name": "lt-origen-oneiric-20120210-0+linaro-o-ubuntu-desktop-20120210-0",
 "device_type": "origen"
}
```


Boot into the test image

Anatomy of a Test Job


```
{
 "timeout": 18000,
 "actions": [
  {
   "command": "deploy_linaro_image",
   "parameters": {
    "hwpack": "http://snapshots.linaro.org/oneiric/lt-origen-oneiric/20120210/0/images/hwpack/hwpack_linaro-lt-origen_20120210-0_armel_supported.tar.gz",
    "rootfs": "http://snapshots.linaro.org/oneiric/linaro-o-ubuntu-desktop/20120210/0/images/tar/linaro-o-ubuntu-desktop-tar-20120210-0.tar.gz"
   },
   "metadata": {
    "hwpack.build": "0",
    "hwpack.date": "20120210",
    "hwpack.type": "lt-origen-oneiric",
    "rootfs.date": "20120210",
    "rootfs.type": "linaro-o-ubuntu-desktop",
    "rootfs.build": "0"
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  {
   "command": "lava_test_install",
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    "stream": "/anonymous/lava-daily/",
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  }
 ],
 "job_name": "lt-origen-oneiric-20120210-0+linaro-o-ubuntu-desktop-20120210-0",
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Run the test

Anatomy of a Test Job


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Submit the results

Anatomy of a Test Job


```
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```


Misc Setup stuff