Fuego
Japan Hackathon 2017

Dec 2, 2017

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Fuego Maintainer

Sony Electronics

Welcome!

- Thank you for coming and spending some time on Fuego

Welcome!

- Thank you for coming and spending some time on Fuego
- Note: We haven't done this before
  - You are all guinea pigs

Agenda

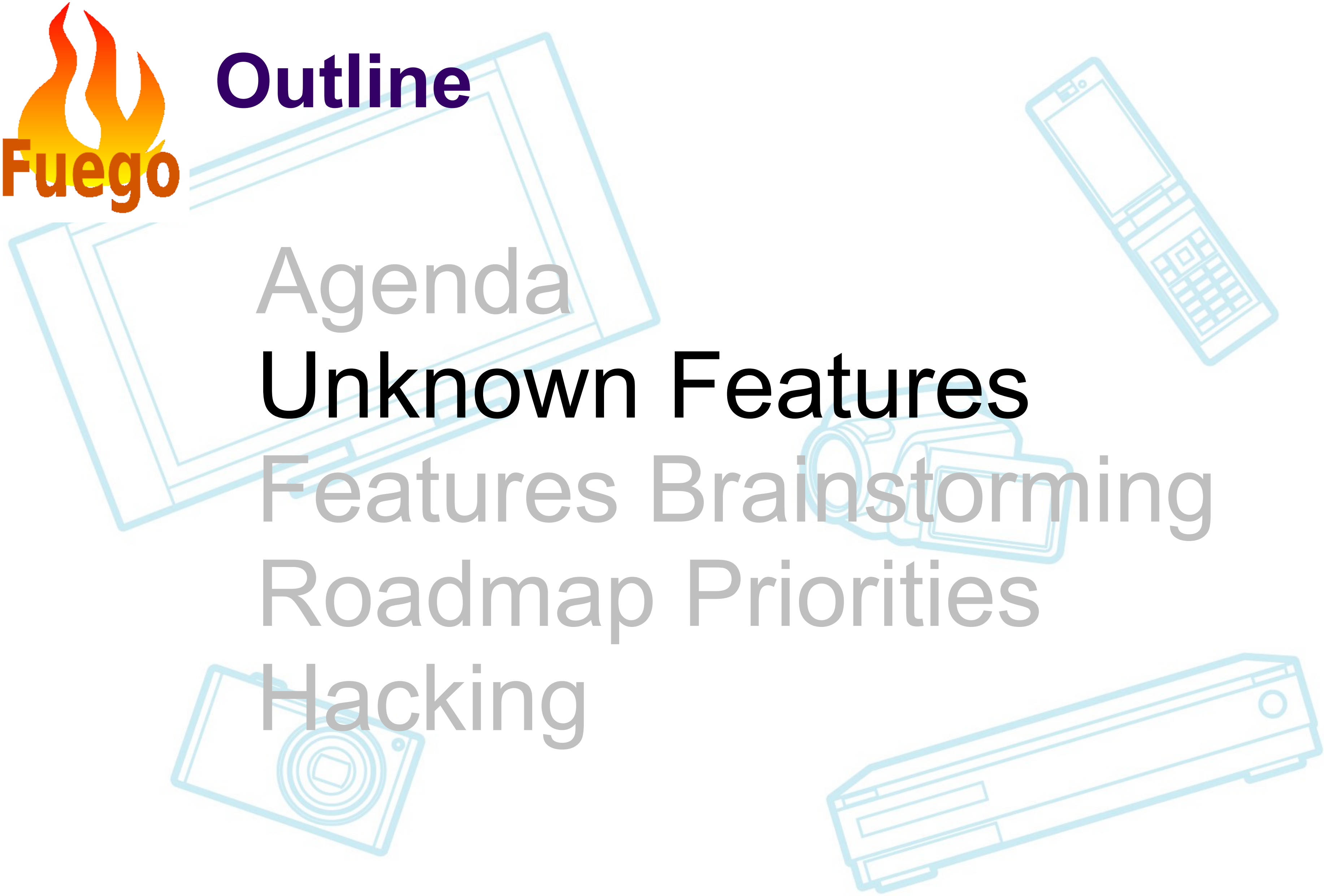
- Hackathon Timeline
  - Welcome 10:30
  - Presentations/Discussion 10:45-11:30
  - Project selection/Hacking setup 11:30-12:00
  - Lunch 12:00-13:00
  - Hacking 13:00-16:30
- Presentations/Discussion
  - Unknown features
  - Features Brainstorming
  - Roadmap priorities

Hackathon setup

- Network Details
  - SSID: XXX-XXXXXX
  - WEP Key: xxxxxxxxxxxxxxxxx
- Wiki account:
  - Create an account, right now, at:
    - http://fuegotest.org/wiki/FrontPage
  - Bookmark: http://fuegotest.org/wiki/Japan_Fuego_Hackathon_2017
- Hardware setup:
- Software setup:
  - Local repository or SSH to “theFalcon”

Fuego

Outline



- Agenda
- Unknown Features
- Features Brainstorming
- Roadmap Priorities
- Hacking

Unknown Features

- Can run ftc outside the container
- per_job_build test variable
- Test variables in the board file
- Dynamic board variables
- ftc add-view
- FUEGO_DEBUG bitmasks
- Add jobs to multiple boards
- Jenkins search for job
- Jenkins history
- Jenkins console log links and menus

Can run ftc outside the container

- Useful to be able to run commands straight from host
- Can use environment variable to specify the container name
  - FUEGO_CONTAINER
  - Otherwise, uses first running container with the word 'fuego‘ in its name
- Requires extra packages installed on host:
  - python-lxml, python-jenkins, python-requests, python-yaml

per_job_build test variable

- Default build behavior:
  - Tests with same PLATFORM (toolchain) share the same build directory
  - This is done to save time and space
- per_job_build forces Fuego to use a different build directory for each job
  - Important if a spec has variables that affect the build
    - e.g. board1.default.Functional.sometest vs. board1.build_with_debug.Functional.sometest
  - Used with Functional.kernel_build, where spec can indicate a whole different source base

Test variables in the board file

- Test variables from test specs are generated with the test prefix:
  - Overlay system converts “my_var” in the spec to FUNCTIONAL_TEST_MY_VAR
- You can declare these in the board file, and they take precedence over ones declared in the spec
- Examples:
  - FUNCTIONAL_LTP_SKIPLIST
  - FUNCTIONAL_HELLO_WORLD_ARGS
- Useful because:
  - Can override variables on a per-board basis

Dynamic board variables

- You can use dynamic board variables to store test variables temporarily for a board
- How to use:
  - ftc set-var - to set a variable
  - ftc query-board – to see variables
  - ftc delete-var – to remove a variable
- Dynamic vars are stored in /fuego-rw/boards/<board>.vars
- Can use at command line, or in a test

ftc add-view

- Handy command to quickly create Jenkins views
- Can create with job regex or job list
- How to use:
  - ftc add-view name <regex>
  - ftc add-view name =<joblist>
- “ftc add-view name” (with no job specification) creates a regex using name:
  - e.g. ftc add-view myboard
  - e.g. ftc add-view LTP

FUEGO_DEBUG bitmask

- Select Fuego subsystem to see debug messages for
- FUEGO_DEBUG=non-zero
  - Debug the main script (all bash activity)
- Additional bit values:
  - 2 = debug the parser
  - 4 = debug the results saver
  - 8 = debug the chart generator code
- FUEGO_DEBUG=1 -> shell messages
- FUEGO_DEBUG=15 -> everything

Add jobs to multiple boards

- Can add jobs for multiple boards with a single ftc command
- How to use:
  - Just use multiple boards, separated by commas, with ‘ftc add-job’:
- Examples:
  - ftc add-job -b board1,board2,board3 -t Functional.sometest
  - ftc add-jobs –b board1,board2 –p testplan_ltsi

Jenkins search

- Can use Jenkins search to get a quick list of jobs matching a name
- Very handy for quickly finding jobs
  - Fuego job lists can get long, especially for multi-board farms
- Don’t have to create a view

Jenkins history

- Jenkins history is shown per-view (!!)
- You can examine history of runs per-node, per-job, or for arbitrary set of tests
  - May have to create a view with the jobs you are interested in

Jenkins console log links and menus

- Can click on links in console log
- Links:
  - Upstream project
  - Jenkins user
  - Node
  - Anthing starting with ‘http’
- Some items provide menus of Jenkins actions
  - e.g. Build history for node

Agenda

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Brainstorming ideas

- Current features
- Tim’s roadmap
- Daniel’s To-Do list (refactored)
- Feedback from BOFs
- Miscellaneous items

1.1 Feature list

- Jenkins front end
  - Also has a command line interface (“ftc”)
- Containerized
- Overlay system, for customization
  - Boards, distros, specs, plans
- Build system
- Test are driven from host
- Multiple Transports
- Collection of Tests
- Results parsing and post-processing

Version 1.2.1 Features

- Unified Output Format
- Test dependency system
- Complex pass criteria handling
- Dynamic board variables
- Charting
- Test source from git repositories
- Transport modifications
- Test improvements

Roadmap

- Recent past:
  - Priority was stuff affecting test API or test packaging
    - Needed before big push for new tests
- Near future:
  - Documentation
    - Conversion to reStructuredText
    - Refactoring
    - Tutorials
  - New tests for AGL, LTSI, CIP
    - What tests to tackle next?

Roadmap (cont.)

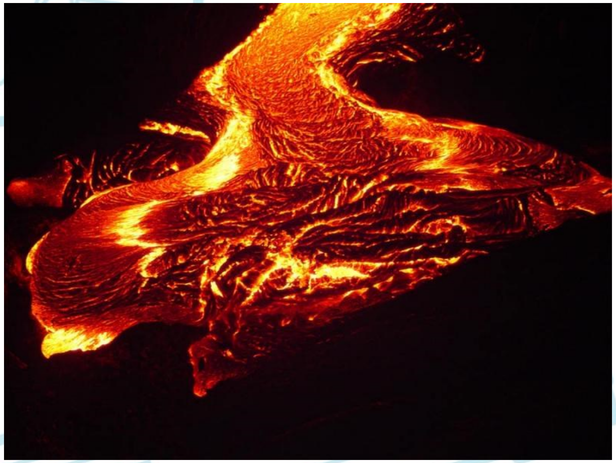
- Near future (cont.):
  - Testplan enhancements
    - Controlled test sequences
      - Similar to Jenkins pipelines
      - Processing multiple steps (provisioning, testing, notifications, report generation) in sequence
    - More fields for plan configuration
  - Report generator and more charting control
    - Now that we have unified output, we can do queries, and different output formats

Roadmap (cont.)

- Near future (cont.):
  - System provisioning support
    - Install of software under test
      - Has been out-of-scope for Fuego
    - e.g. AGL image deploy, LTSI kernel update, etc.
    - Full automation requires board management API
    - Looking at labgrid as possible solution
- Long-term
  - Distributed test network
  - Hardware testing

Other Priorities

- LAVA integration
  - We have everything needed for transport integration
  - Need test-level integration
    - Separate build phase
    - Deploy to LAVA server
    - Create LAVA test that does:
      - Execute test on board
      - Collect results



To-Do from Daniel

- Provisioning ideas:
  - Provide deploy and boot as in LAVA
    - Deploy: prepare nfs/tftp
    - Boot: poweron board/reboot/ssh
  - Deploy the OS (Provisioning)
    - 1) hawkbeat/ostre... also tests the updates
    - 2) u-boot serial port with pexpect
    - 3) TFPT/NFS or NBDroot
    - 4) Fastboot
  - Update filesystem on the SD card by using update software
    - 2 partitions

To-Do from Daniel (cont.)

- Parallel testing on same device types
  - Use Jenkins labels
- Multi-node tests like in LAVA
- Auto-generate timeouts
- Support matrix of boards/tests
  - Fuzz coverage combinations
- Bisects
- Kernel CI integration

To-Do from Daniel (cont.2)

- LAVA support
  - Just open a hacking shell?
  - Or submitting YAML jobs?
- REST API instead of master-slave model
- Support for read-only filesystems
  - Create a ramfs?
- Support for including strace output or running gdb remotely

To-Do from Daniel (cont.3)

- Ability to deploy standard distributions (for testing the kernel, hardware, or apps!)
  - Yocto based generic filesystem
  - Debian, others
- Allow to enter easily into a developer shell
  - $ fuego shell
- Login
  - support user, root password, ssh key [?]

To-Do from Daniel (cont.4)

- Tests:
  - RT-tests
    - LTP
    - rt-tests
    - rt-eval (disturbance)
  - Software update tests
- Disturbance loads
  - stress, hackbench, ...
  - Power cut tests
    - target_poweroff/poweron
  - Simulate application environment..

Other ideas

- Create an interface to install and list new tests
  - Finish “ftc install-test” ?
  - Add remote support to “ftc list-tests”?
- Plugin system like avocado (for ftc)
- Ability to run tests already in the target
  - LTP does this, but need to support general mechanism
- ADB Transport
- Configurable Jenkins port (8090 default?)

Notes from ELC 2017 BOF

- ADB support
  - Run adbd outside container (on host), and container doesn’t have to know about usb changes
- Could use transport=local for host as DUT
  - Now currently used for docker container as DUT
- Bypassing build step
  - It’s OK to have something as a build cache, but make sure not to lost ability to build from source
  - Don’t allow “magic binaries” that someone can’t rebuild

Notes from ELC 2017 BOF (2)

- Bisect
  - Should be a tool outside Fuego to bisect based on Fuego test result
  - Ftc needs to return proper error code
  - Maybe provide an example for how to do it
- Image Deploy, re-flash
  - Since LAVA does these, and AGL already uses LAVA, these are not high priority at the moment

Ideas from ELCE 2017

- Greg KH (and other mainline developers) need localhost board
  - Maybe can use something simpler than ssh to localhost?
    - We have transport=local, but that only works inside the container (is that right?)

Miscellaneous ideas

- HealthCheck test
  - Ftc target-status
  - Already have:
    - ftc run-test –b <board> -t Functional.fuego_board_check
- Automatic board installation /wizard
  - ftc find-board
- Use “ftc run-test” in Jenkins, instead of direct invocation of main.sh
  - This is what avocado does
- Send results to a centralized repository

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Roadmap priorities

- See http://fuegotest.org/wiki/JFH17_Discussion_Notes

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Hacking

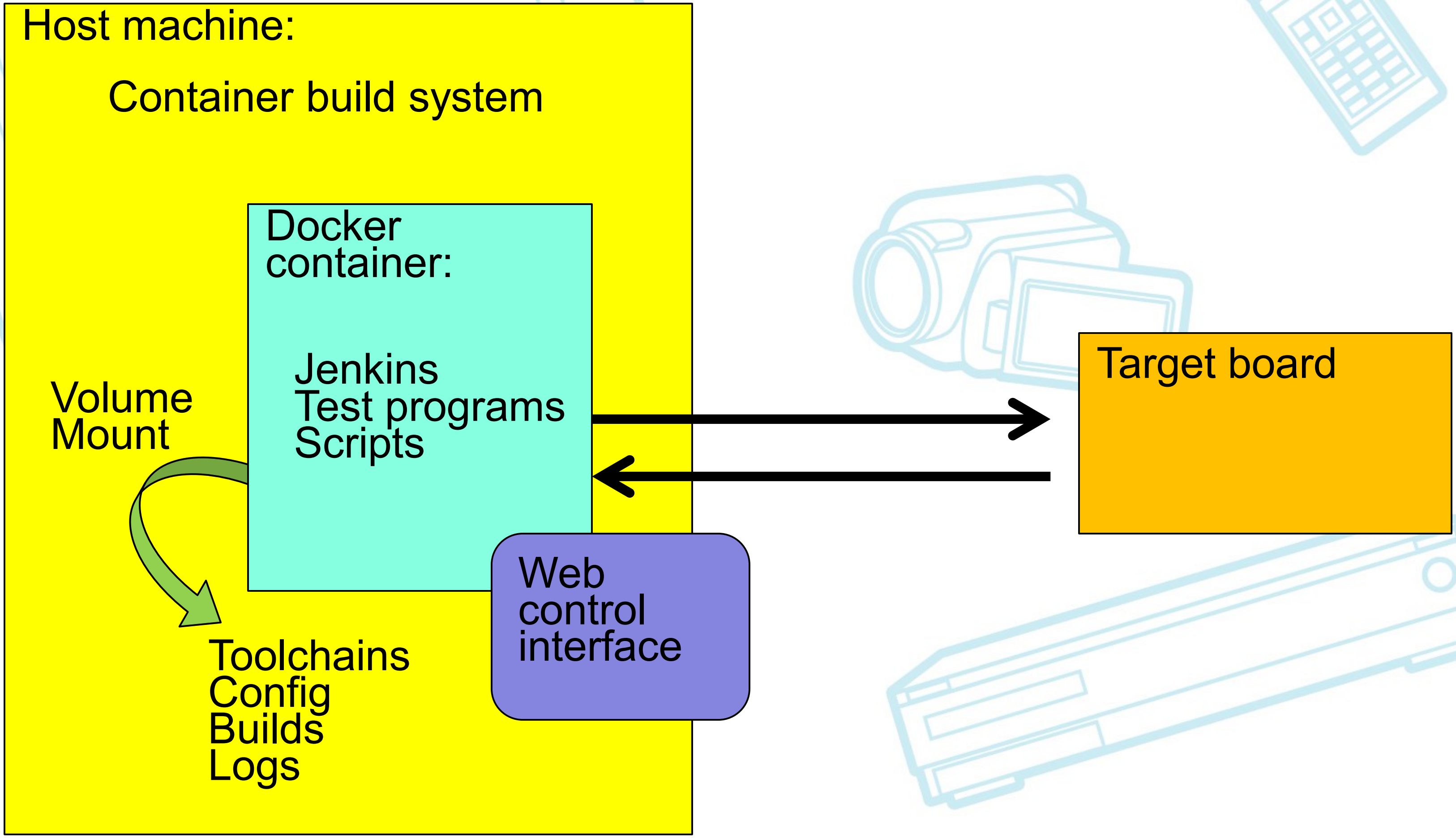
- Survey of room
  - How many experienced vs new Fuego users?
- Projects
  - Project leaders
  - Type:
    - training/issue detection
    - problem investigation
    - feature development
  - Project list:
    - See http://fuegotest.org/wiki/JFH17_Hacking_Guide
- Setup

Fuego reference materials

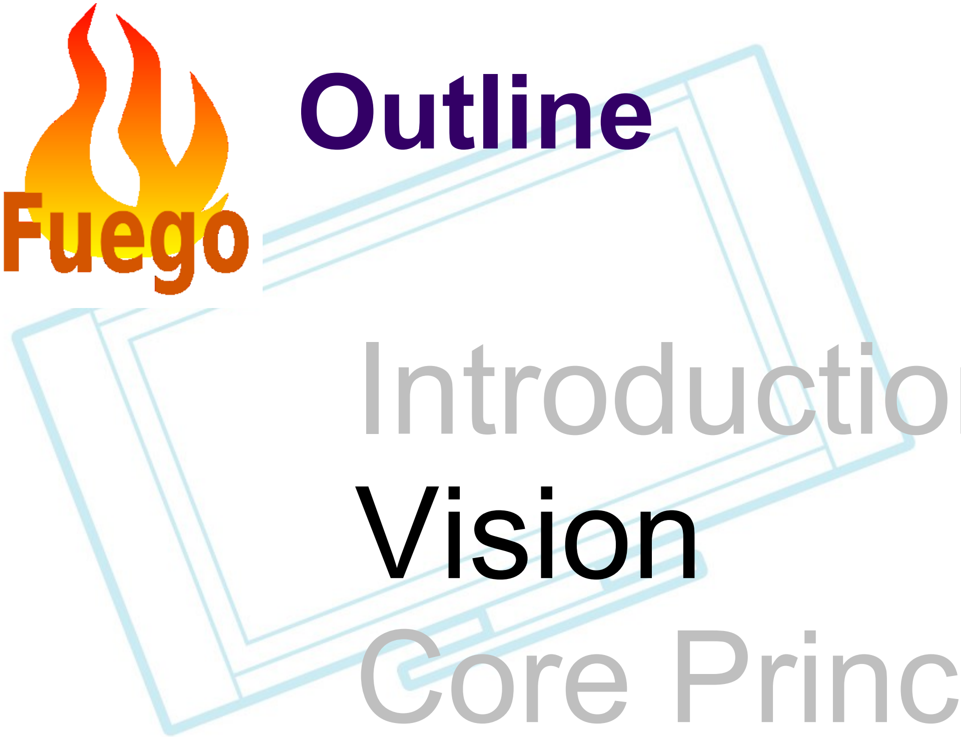
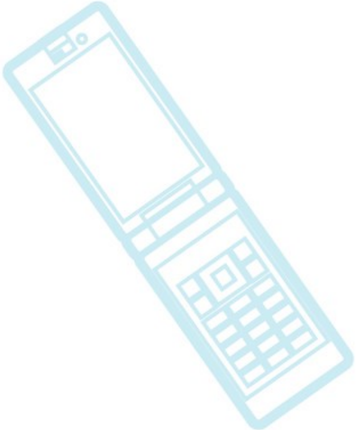
Micro-Introduction

Fuego = (Jenkins + host scripts + pre-packaged tests) inside a container

Architecture Diagram



Outline

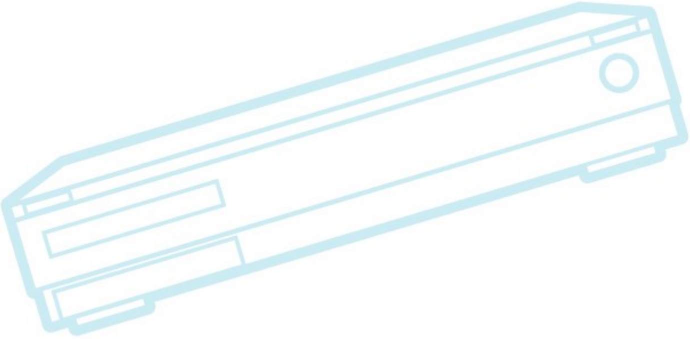
Introduction

Vision

Core Principles

Diagrams

Resources



Vision – super high level

Do for testing
what open source
has done for coding

- Significant parts of the test process are unshared, ad hoc, private, etc.
  - For no good reason – most QA doesn't need to be proprietary
    - There are OSS frameworks and test programs but parts are missing to create a open testing community.
- Fuego Goal:
  - *Promote the sharing of tests, test methods, and results, the way code is shared now*
    - Make it easy to create, share and discover tests
    - Make test results easy to share and evaluate

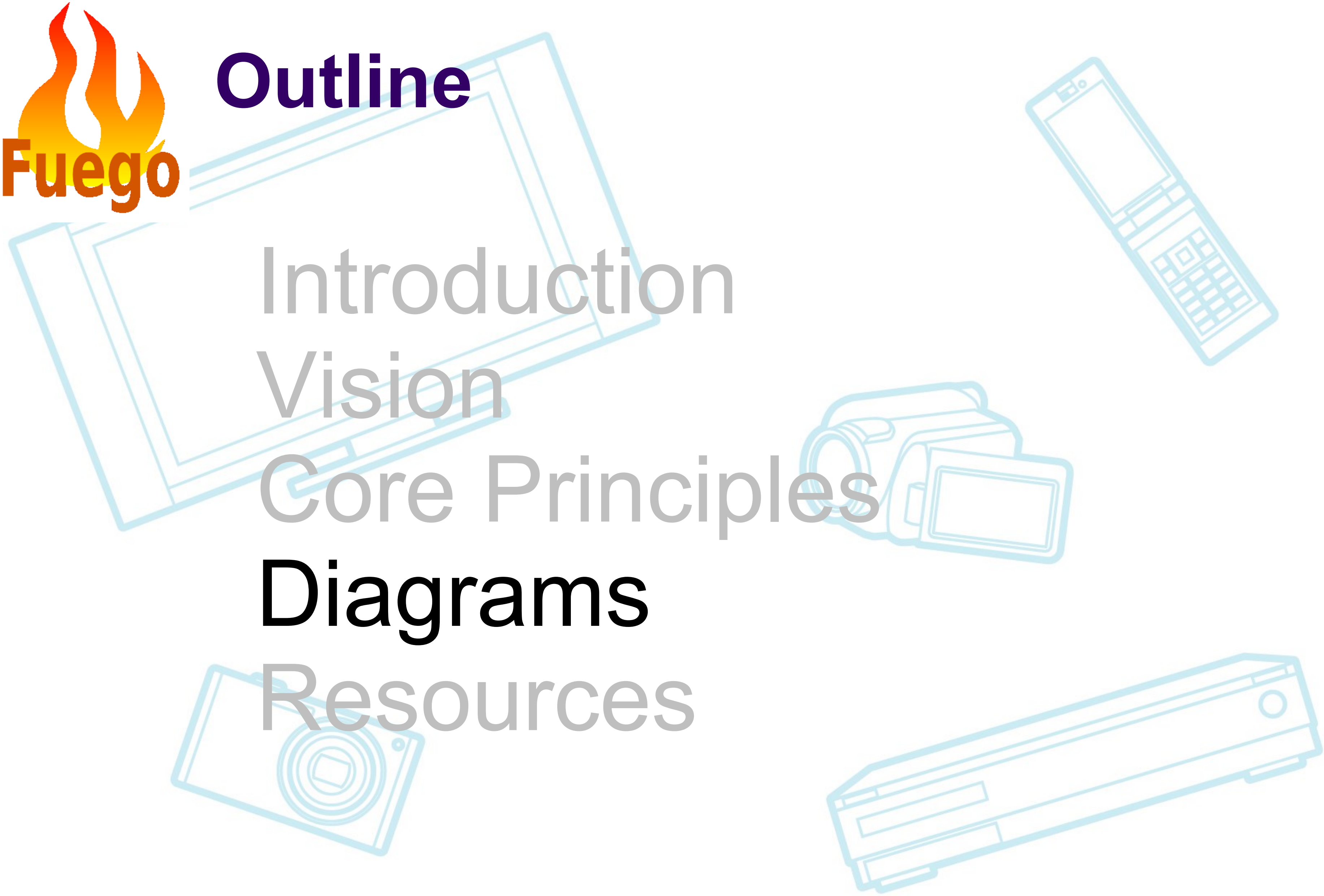
Outline

- Introduction
- Vision
- Core Principles
- Diagrams
- Resources

Core principles

- Actually finds bugs
- Allows sharing
- Usable by wide audience
  - Minimal requirements
  - Customizable
- Applicable to embedded
- Easy to use
- Scalability via decentralization

Outline



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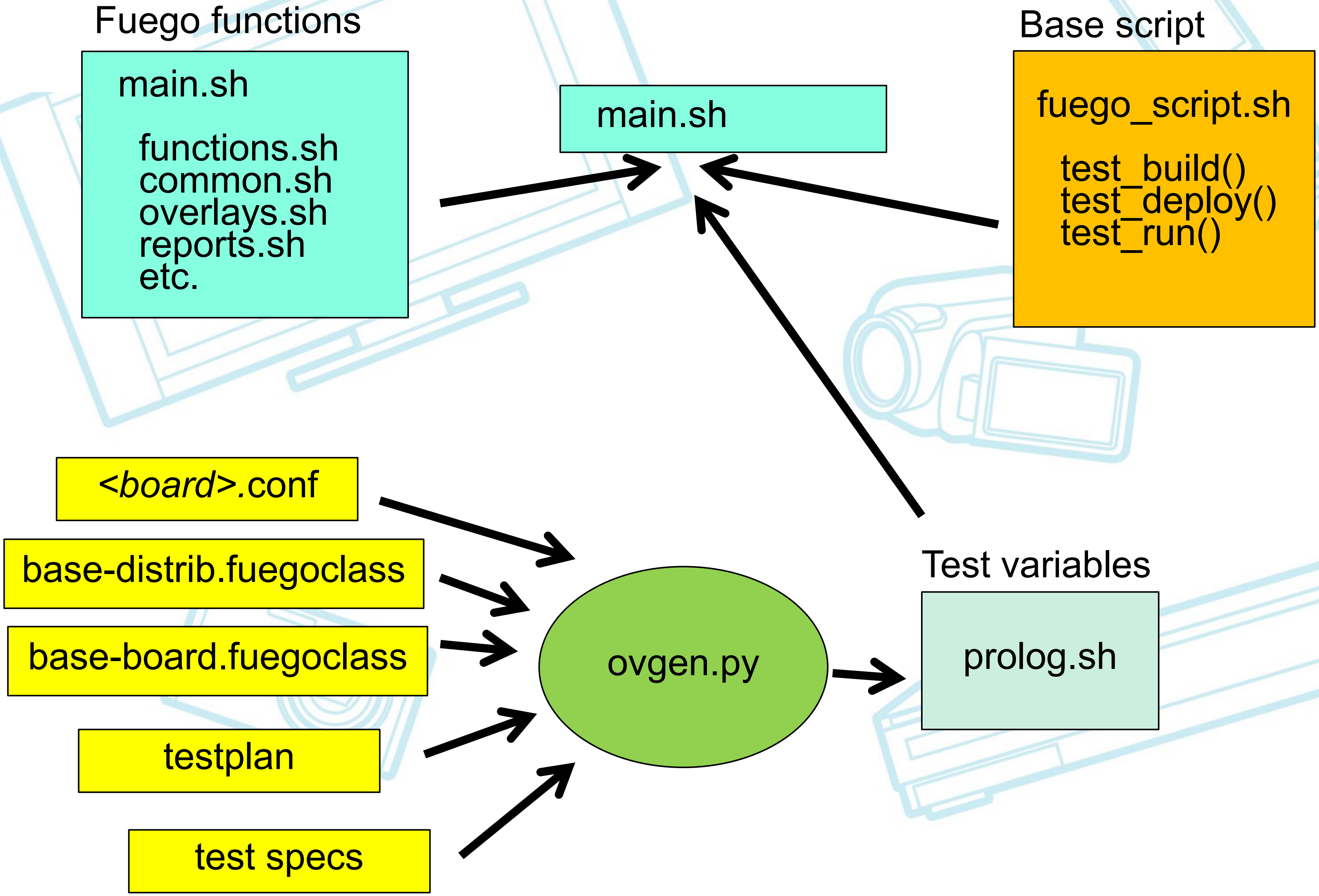
Overlay processing



Fuego functions

main.sh

functions.sh
common.sh
overlays.sh
reports.sh
etc.

main.sh

Base script

fuego_script.sh

test_build()
test_deploy()
test_run()

<board>.conf

base-distrib.fuegoclass

base-board.fuegoclass

testplan

test specs

ovgen.py

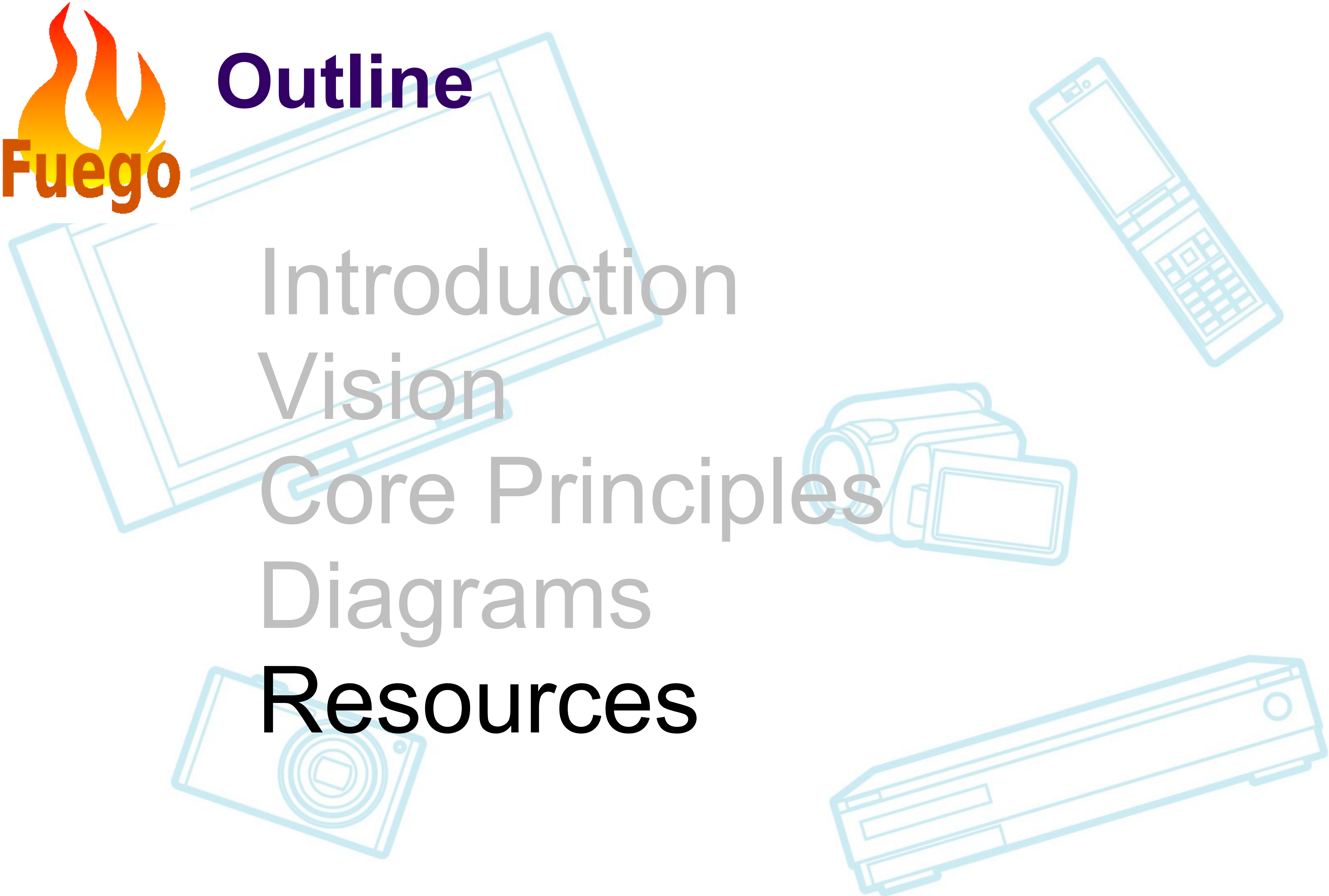
Test variables

prolog.sh

Comparison of Fuego and Lava

Assumption	Fuego	LAVA	Jenkins
Board starting status	Board is running	Board will be provisioned and booted	Node is running
Test initiated by:	Manual, Jenkins trigger	External job insertion?	Jenkins trigger
Test software availability:	Source included, test binary is built and deployed to target	Is in distro or on target, or is installed during test	Builds software – no built-in deploy - left as exercise for test developer
Test scheduling	By Jenkins, cli has none, no target reservation system	By LAVA	By Jenkins
Results processing	Log parsing, send results to server (prototype)	Collect results?	Visualization for common formats (TAP, junit, xunit)

Outline



Introduction

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Resources

- Fuego web server:
  - http://fuegotest.org/
  - wiki: http://fuegotest.org/wiki
- Mailing list:
  - https://lists.linuxfoundation.org/mailman/listinfo/fuego
- Repositories:
  - https://bitbucket.org/tbird20d/fuego
  - https://bitbucket.org/tbird20d/fuego-core

Fuego

It’s hot!

Fuego