Tizen IVI “from scratch”
Customizing, building and testing

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Open source development and integration:
- Maintainers in multiple domains on tizen.org
- Embedded systems for real-time multimedia:
  - Widi/Miracast stack
  - Wayland/Weston
  - Webkit2 browser with HW acceleration
- Applications: HTML5/CSS3, jquery, jqmobi, Cordova

Location: Vannes (Brittany), France
Agenda

- Tizen & Tizen:IVI : short introduction
- From source code to target devices
- Customize
- Build
- Flash, Run, Test !
Tizen: a short introduction
Definition

- Open source project
- Hosted at the Linux Foundation
- Innovative Web-based platform for multiple devices
- Sponsored by worldwide companies
  - Samsung & Intel are two big contributors
- Built on industry standards:
  - GNU/Linux kernel, GNU libc
  - POSIX
  - W3C
  - Many upstream Open Source projects
Tizen Profiles

- Multiple vertical profiles (derived from Tizen:Generic)
  - IVI
  - Mobile
  - Future: other devices (TV, ...)
- Each profile adds its own enhancements
- Tizen packaging format: RPM
From source code ...
... to target devices
1: Source code

Remote

Local

GIT Repositories

Clone source repo

Developers

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2: Developer local build

GIT Repositories

Clone source repo

Developers

Build

RPM Repository

Build depends

Local build (GBS)

Patched sources

New Binary

GIT Repositories

Clone source repo

Developers

Build

RPM Repository

Build depends

Local build (GBS)

Patched sources

New Binary
3: Verify & push for review

- RPM Repository
- Local build (GBS)
- Patched sources
- Build depends
- New Binary
- Test
  - BAD
  - OK

- Gerrit
  - Push for review
- Developpers
- New Binary
- Patched sources
- Local build
- Build depends
- RPM Repository
4: Review & Merge

Gerrit

GIT Repositories

Developers

Reviewers

Test

Build request

Accept and Merge

Push for review

Review

Reject

OK

BAD

4: Review & Merge

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5: Centralized build

Reviewers

Accept and Merge

Build request

GIT Repositories

Accept build request

OBS & Workers

Release Managers
6: Publish repositories

Build

Accept build request

Release Managers

OBS & Workers

Publish

RPM Repository

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7: Assemble binary images

- RPM Repository
- Assemble binary image (MIC)
- QA Images
- Snapshot Images

RPMs + QA RPMs → Assemble binary image (MIC) → Publish → RPM Repository → Snapshot Images

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8: installation on a target device

Assemble binary image (MIC) → Snapshot Images → Flash / Install → Target device

QA Images → Snapshot Images → Flash / Install → Target device

Flash / Install
9: QA report & bugs

- Target device
- QA Engineers
- Bug Tracker
- Bug Reports
- Release Images
- QA Report

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Customize
Why customizing?

- Many reasons!

- On the software side, the vendor has to keep control from end to end:
  - Private sources
  - Custom hardware
  - Custom middleware
  - Extra APIs
  - Custom applications
  - Custom release & upgrade procedures
How to customize?

Reference Apps

R1  R2  ...  Rn
Tizen Middleware  Tizen WRT
Low Level APIs
Adaptation
Kernel  bootloaders  ...

Custom components

Custom applications

C1  C2  ...  Cn
Custom Middleware
Custom adaptation
Kernel  bootloaders  ...

Applications

R1  R2  ...  Rn
C1  C2  ...  Cn
Tizen Middleware  Tizen WRT  Custom Middleware
Low Level APIs
Adaptation
Kernel  bootloaders  ...

tizen.org

private

Customized profile
A proposal for a private infrastructure

- Upstream GIT
  - Clone & rebase
  - Private git

- Developers build
  - Review
  - Open build service
  - Developers build

- QA Team
  - Target device

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Stability in movement

- Use **tizen.org as upstream** for your private git repos
- Add customizations:
  - new private repositories
  - private local branches on upstream projects
- Get the benefits from continuous integration on tizen.org and **keep synced** (git rebase).
- Run a **private** build infrastructure
- Generate **private** binary images for devices
- **Fast** development cycles: build / run / test / fix
Build system
Open Build Service (OBS)

- Open and complete platform for building a whole Linux distribution (used and maintained by openSuse)
- Provides the infrastructure to build software packages for various hardware architectures
- Fast builds: builds are distributed on multiple workers.
- Smart builds: continuous evaluation of the packages dependencies inside the whole project. After a change on a given package, only the needed dependent packages are rebuilt.
Tizen build service

- It's a public, online OBS (read only): build.tizen.org
- Multiple HW architectures depending on the project: Intel archs (x86_64, ia 32), ARM (armv7l, aarch64 soon)
- Main projects:
  - Tizen:Generic X11
  - Tizen:Generic Wayland
  - Tizen:IVI
  - Tizen:Mobile
- 1 git repo on review.tizen.org == 1 source package in OBS
- Binary repos are available on download.tizen.org
Private setup: our experience

- Used for more than 1 year to ease development of major Tizen features when a lot of packages are involved: porting Web Runtime to x86_64, Tizen:Generic setup, Multiuser mode (Tizen 3), ...

- 15 people, **15 desktop computers** bought in 2012 (core i7 IvyBridge, 16GB RAM)

- Server side: we used the official OBS Appliance

- **No dedicated workers.** We use the developers' computers as workers.
  - 15 x 8 cores = 120 cores availables for build most of the time
  - Reduced contention between desktop activity and build activity by tuning workers config: cgroups, memory, ...

- Benchmark: a Tizen profile is usually rebuilt from scratch in **4 hours**
Flash, Run, Test!
Binary Images

- Binary images are automatically created when the OBS finishes a build cycle and publishes a new RPM repository.
- Special QA images are built with extra packages
  - Allow ssh and automatic login (no manual password)
  - Extra QA tools to run test suites automatically and upload reports
Run & Test

- Developers and QA teams can pick the images in different formats:
  - RAW images (to be dumped on a HDD)
  - LiveUSB images (for USB sticks)
- The images can be shared easily worldwide to other teams.
- The target devices can be installed manually
- Useful for development and manual QA tests
QA automation: our experience

- Dedicated target devices for automated tests
- Boot on LAN on a custom Linux distro that runs a flashing tool: the device is flashed with the fresh Tizen snapshot and rebooted.
- At the end of the boot procedure, the QA tests start automatically
- A final test report is sent to a QAResport server
- Useful to check: sanity, performances, power consumption tests ... on every snapshot!
Pointers
Links – Tizen

- Main site: tizen.org
- Tizen Association: www.tizenassociation.org
- Applications Development: developer.tizen.org
- Platform Development: source.tizen.org
- Snapshots: download.tizen.org
- Documentation: developer.tizen.org/documentation
- Wiki: wiki.tizen.org
- Bugs: bugs.tizen.org
Links – Tizen IVI

- General info: wiki.tizen.org/wiki/IVI
- GENIVI: genivi.org
- Bugs: bugs.tizen.org/jira/browse/TIVI
- Mailing list: lists.tizen.org/listinfo/ivi
- Releases and repositories: download.tizen.org/snapshots/tizen/ivi
Links – Tizen build tools

- Development tools: download.tizen.org/tools
- GBS: source.tizen.org/documentation/reference/git-build-system
- MIC: source.tizen.org/documentation/reference/mic-image-creator
- OBS: openbuildservice.org
- GERRIT: code.google.com/p/gerrit
- GIT: git-scm.com
Upstream projects

- Linux Kernel, SMACK, systemd, dbus
- OpenSSL, Sqlite
- X, Wayland, EFL, Enlightenment, Cairo
- Connman, BlueZ, oFono, wpa_supplicant
- Gstreamer, PulseAudio
- Webkit
- Eclipse (SDK)
- Qemu, U-boot (emulator)
- GCC, llvm, cmake, git (build)
- … and more ...