Introduction to Tizen Mobile & Wearable Profile

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Tizen Overview
Tizen...

- Is **W3C** standard-based
- Has strong industry support
- Is open source project
- Covers multiple profiles

- **Releasing Profiles**
- Preparing Profiles
- Potential Profiles

Common & Profile-Specific **Compliance Rules**
Release History

1.0

Web-centric Platform
- Highest HTML5
- Tizen Device Web API
- Web UI framework

Feb. ‘13

Web/Native Framework
- Native API
- Unified SDK for Web & native
- WebKit2

2.0

May ‘13

Hybrid Web/Native, Enhanced Security and Performance Optimization
- Hybrid Web/Native app.
- Systemd

July ‘13

2.1

Commercial Ready w/ Enhanced UX
- H/W Menu & Back key
- UI Customizer

Nov. ‘13

2.2

2.2.1

Minor Update
- App. installation in SD card
Add-on SDK
- OpenCL & WebCL
- In app purchase

Oct. ‘14

2.3

Multi-profile, New Native Framework
- Mobile/ Wearable profile
- New native subsystem

Apr. ‘12

Linux kernel
2.6.36

3.0 w/ 3.4 features (e.g., CMA/IOMMU, eMMC 4.5, V4L2)

Oct. ‘14

Linux kernel
3.4
Tizen Mobile Profile
Architecture Overview

- **Kernel:** Linux kernel + device drivers
- **Native Subsystem:** core functionalities for Tizen platform
- **Web Framework:** web environment above Native subsystem
- **API**
  - Native API: *direct access* to core functions in mobile profile
  - Web API: *web-style* (i.e., JS, markup) *access* to W3C standard and device functions
Native Subsystems

- Providing platform functions
  - Expose Native API
  - Implement core functionalities
  - Support Web functionalities
- Unified management for
  - Communication
  - Sensor value retrieval
  - Launching applications
  - Window for apps with E17
  - Power consumption control
  - Security enforcement with SMACK
  - Package un/installation and upgrade
  - And more…
- Flexible architecture with plugins
  - Service extension
  - Hardware abstraction
Web Framework

- **W3C standard Web APIs**
  - W3C/HTML5 markup, CSS and JavaScript APIs
- **Supplementary APIs**
  - De-facto APIs (e.g., Khronos and Mozilla)
- **Tizen device APIs**
  - Advanced access to the device’s platform capabilities

- **UI framework**
  - jQueryMobile-based
  - Tools support (e.g., widgets, events, effects, animation)
Native Applications

• Application written in Native API for Tizen (C language)

• Packaged into .tpk with privileges and features

• Full access to device features

• User interface:
  • Enlightenment Foundation Libraries (EFL)

• Device features (Tizen defined + OSS)
  • App framework: application, package, etc.
  • Social: contacts, calendar, etc.
  • Multimedia: image, video, audio, etc.
  • Other device-related features
Web Applications

- Application written in Web API for Tizen
- Packaged in W3C widget with configuration
- Limited access to device features via Tizen Web Device API
- User interface:
  - W3C/HTML5, CSS3
  - Tizen Web UI FW
- Device features (Tizen defined + W3C)
  - W3C/HTML5 and de-facto Supplementary APIs
  - Tizen Web Device APIs
Tizen Wearable Profile
Architecture Overview

- **Kernel**: Linux kernel + device drivers
- **Native Subsystem**: core functionalities for Tizen platform
- **Web Framework**: web environment above Native subsystem
- **API**
  - Native API: direct access to core functions by restricted developers
  - Web API: web-style (i.e., JS, markup) access to W3C standard and device functions
Architecture Comparison

Mobile Profile

Native API

Native Subsystems
- Application Framework
- Security
- Content
- Social
- Messaging
- Web
- Network & Connectivity
- Host Conn.
- Graphics & UI
- Base & OSS

Kernel

Linux Kernel & device drivers

Web Applications

Web Framework
- W3C/HTML5
- Video
- Touch
- CSS3
- WebGL
- Worker

Device APIs
- BT
- LBS
- NFC
- Msg
- Call

Web UI FW

Web Runtime

Web API

Wearable Profile

Native API (internal only)

Native Subsystems
- Application Framework
- Web
- Context
- Host Conn.
- Base & OSS

Kernel

Linux Kernel & device drivers

Web Applications

Web Framework
- W3C/HTML5
- Video
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- CSS3
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Device APIs
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- Call

Web UI FW

Web Runtime

Web API

Preloaded Native Applications
Wearable Profile Features | Lightweight Components

- **Fit for wearable device**
  - **Webkit engine**: W3C APIs (scalable vector graphics, WebSQL, web message, drag&drop, session history etc.) and Device APIs (account, archive, bookmark, calendar, call, contact, push message, secure element etc.)
  - **EFL**: emotion, clipboard, copy & paste, optimized theme for wearable UX, unused elementary resources
  - **X server & Window manager**: simplified window policy for wearable UX
  - **Bluetooth**: GATT client, user-space HID
## Native Subsystems

### Mobile Profile

#### Native Subsystem Decomposition

<table>
<thead>
<tr>
<th>App FW</th>
<th>System</th>
<th>Messaging</th>
<th>Social</th>
<th>Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>AppLife</td>
<td>System (system-server)</td>
<td>SMS (msg-svc)</td>
<td>Contacts (contacts-svc)</td>
<td>Access Control (Smack)</td>
</tr>
<tr>
<td>Cycle Mgmt (appcore)</td>
<td>Sensor (sensor-fw, plugin)</td>
<td>MMS (msg-service)</td>
<td>Calendar (slp-calendar)</td>
<td>Certification (cert-svc)</td>
</tr>
<tr>
<td>App Launch (AUL, app-svc)</td>
<td>Device Mgmt (device)</td>
<td>Email (email-svc)</td>
<td>Account (accounts-svc)</td>
<td>Secure Storage (secure-storage)</td>
</tr>
<tr>
<td>Package Mgmt (slp-pkgmgr)</td>
<td></td>
<td></td>
<td></td>
<td>Crypto (OpenSSL)</td>
</tr>
</tbody>
</table>

#### Base & OSS

<table>
<thead>
<tr>
<th>IPC (D-Bus)</th>
<th>Database (SQLite)</th>
<th>Util (glib, ...)</th>
<th>Essentials (glibc, ...)</th>
<th>Web Layout &amp; Rendering (WebKit/EFL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>JS Engine (JavaScriptCore)</td>
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</table>

#### Web

<table>
<thead>
<tr>
<th></th>
<th>Network &amp; Connectivity</th>
<th>Multimedia</th>
<th>Location</th>
<th>Security</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Connection (ConnMan)</td>
<td>Video (Gstreamer, plugin)</td>
<td>Geolocation (Geoclue, plugin)</td>
<td>Access Control (Smack)</td>
</tr>
<tr>
<td></td>
<td>Bluetooth (Bluez)</td>
<td>Audio (Gstreamer, PulseAudio)</td>
<td>Geocoding (Geoclue, plugin)</td>
<td>Certification (cert-svc)</td>
</tr>
<tr>
<td></td>
<td>HTTP (libsoup, libcurl)</td>
<td>Camera (Gstreamer)</td>
<td>MAP (Geoclue, plugin)</td>
<td>Secure Storage (secure-storage)</td>
</tr>
<tr>
<td></td>
<td>NFC (nlo-manager, plugin)</td>
<td>Audio Policy (audio-session-manager)</td>
<td>Route (Geoclue, plugin)</td>
<td>Crypto (OpenSSL)</td>
</tr>
<tr>
<td></td>
<td>Wi-Fi (wpa_supplicant)</td>
<td>3D Audio (OpenAL)</td>
<td>POL (Geoclue, plugin)</td>
<td>Graphics &amp; UI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2D (EFL, cairo)</td>
</tr>
<tr>
<td></td>
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<td>3D (OpenGL ES)</td>
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<td></td>
<td>Window Mgmt (e17)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Window system (X11)</td>
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</tbody>
</table>

#### Context

|                               | Activity-Gesture Recognition (context svc) | sync-fw, plugin |                              |                              |

#### Content

|                               | synchronizati |                              |                              |                              |

#### Security

|                               | Access Control (Smack) | Certification (cert-svc) | Secure Storage (secure-storage) | Crypto (OpenSSL) |

#### Graphics & UI

|                               | 2D (EFL, cairo) | 3D (OpenGL ES) | Window Mgmt (e17) | Window system (X11) |

#### Context/Activity

|                               | Activity/Gesture Recognition (context svc) | sync-fw, plugin |                              |                              |

#### Multimedia

|                               | Video (Gstreamer, plugin) | Audio (Gstreamer, PulseAudio) | Camera (Gstreamer) | Audio Policy (audio-session-manager) | 3D Audio (OpenAL) | POL (Geoclue, plugin) |

#### Location

|                               | Geolocation (Geoclue, plugin) | Geocoding (Geoclue, plugin) | MAP (Geoclue, plugin) | Route (Geoclue, plugin) |

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#### Graphics & UI

|                               | 2D (EFL, cairo) | 3D (OpenGL ES) | Window Mgmt (e17) | Window system (X11) |

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#### Graphics & UI

|                               | 2D (EFL, cairo) | 3D (OpenGL ES) | Window Mgmt (e17) | Window system (X11) |
## Native Subsystems

### Wearable Profile

#### Native Subsystem Decomposition

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<tr>
<td>AppLife Cycle Mgmt <em>(app-core)</em></td>
<td>System (system-server)</td>
<td>Activity/Gesture Recognition <em>(context svc)</em></td>
<td>Access Control <em>(Smack)</em></td>
</tr>
<tr>
<td>App Launch <em>(AOL, app-svc)</em></td>
<td>Sensor (sensor-tw, plugin)</td>
<td></td>
<td>Crypto <em>(OpenSSL)</em></td>
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<tr>
<td>Package Mgmt <em>(slp-pkgmgr)</em></td>
<td>Device Mgmt <em>(device)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Base &amp; OSS</strong></td>
<td><strong>Connectivity &amp; Host Connection</strong></td>
<td>*<em>JS Engine (JavaScriptCore)</em></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Util <em>(f1on, ...)</em></td>
<td>Host Connection <em>(GIC, WMS)</em></td>
<td></td>
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<tr>
<td>Essentials <em>(glibc, ...)</em></td>
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<td>*<em>Font (Fontconfig, freetype)</em></td>
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</table>
Web Framework

Mobile Profile
Web Framework

Wearable Profile

Web Framework

Device API
- Application
- Lifecycle
- Bluetooth
- Media Contents
- Notification
- Storage
- Power Controls

W3C
- HTML
- CSS
- Application
- Touch Event
- Battery Status
- File
- App Cache

Web Worker
Web Audio
WebSocket

Supplementary
- Web GL
- Typed Array
- Viewport Metatag

Web UI Framework
- Widgets
- Themes (CSS+Images)

Pure JS
Application Model

- **Companion type**
  - One actual application consisting of host app and wearable app via connectivity

- **Standalone type**
  - Independent wearable app without host app or device
Wearable Profile Features | Power Saving

- Bluetooth low energy (BLE)
- Sensor hub
- Dynamic display rate
- Application freezer
- Dynamic Voltage & Frequency Scaling (DVFS)
Wearable Profile Features | Enhanced Web Performance

- **Downsizing webkit2**
  - Feature out unused functionalities (e.g., SVG*, WebSQL)
- **Add multimedia features**
- **Lightweight web widgets and themes**
  - Replace bottleneck point on performance with pure JavaScript
  - Optimize launching time
Upcoming Tizen Platform
Tizen 3.0 @ tizen.org

• Until 2.3, source code uploaded to tizen.org only at milestones
  • Platform development has not been shown to public
  • No continuity and transparency

• From 3.0, development and contribution are made at tizen.org
  • For specific purposes (e.g., commercialization), main code tree can be pulled out and built anywhere by anyone

• Moved from in-out to out-in development
Development Infrastructure

- **Platform development discussion**
  - dev@lists.tizen.org

- **Bug Tracker**
  - Tracking Tizen bugs, gathering feature requests, and more: [http://bugs.tizen.org/](http://bugs.tizen.org/)

- **3.0 features**
  - “Tizen Features” @ JIRA > Projects > Tizen Features: [https://bugs.tizen.org/jira/browse/PTF](https://bugs.tizen.org/jira/browse/PTF)

- **3.0 APIs discussion**
  - tsg-arch-api@lists.tizen.org
  - “Tizen APIs” @ JIRA > Projects > Tizen APIs: [https://bugs.tizen.org/jira/browse/PTAPI](https://bugs.tizen.org/jira/browse/PTAPI)

- **Tizen modules**
  - Git repositories
  - Development on **tizen** branch
Tizen 3.0 Major Features

• Upgraded core platform and tool-chains
• Multi-user
  • Multiple user supports with privacy protection
• 64bit architecture support
  • ARM and IA support
  • Performance improvements
  • Larger memory address space
• 3D UI framework
  • 3D rendering engine for 2D & 3D objects in 3D world
  • Dynamic animation library
Closing
Summary

• Tizen is W3C standard-based, cross category, strongly industry supported open source software platform under Linux Foundation

• Architecture
  • Mobile profile
    • Linux Kernel 3.4
    • Native subsystems and Web FW
    • Native and Web application
  • Wearable profile
    • Similar architecture to mobile profile
    • Diet for resource restrict device with wearable application
    • Customization: power saving, better web performance, lightweight components

• Join Tizen 3.0 Development @ tizen.org
  • Your contributions and suggestions are welcome at dev@lists.tizen.org
Thanks !!

Contact: steve.jun@samsung.com