Introduction to Tizen with Architecture Overview

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- Development Environment
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What is Tizen?
What is Tizen?

- Open source project hosted by Linux Foundation

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<th>TIZEN Association</th>
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<td>• TIZEN marketing and events</td>
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<td>• Global partner / CP collaboration</td>
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<td>• TIZEN Common Store</td>
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<tr>
<td>• TIZEN Device Certification</td>
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<td>• TIZEN brand management</td>
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- Open source release
- SDK, platform development
- Community support
- Defines TCS and TCT
- Device profiles (Mobile, IVI, TV, etc.)
What is Tizen? (Pronounced “Tie Zen”)

- **Tizen is an open source, standards-based software platform**
  - Smartphones, tablets, netbooks, in-vehicle infotainment devices, TVs, and more.
  - [https://www.tizen.org](https://www.tizen.org)
  - Tizen evolution since Apr. 2012
    1.0(Web FW), 2.0(+Native FW),
    2.1(+Optimization), 2.2(+Enhanced UX), 2.3(+Multi-profile)

- **Tizen provides a robust and flexible environment for application development, based on HTML5**
  - HTML5: the preferred development environment for apps/services for the future
  - Robust capabilities and cross platform flexibility
What is Tizen?

- Tizen Association
  - An industry consortium is comprised of
    - Key service providers
    - Device manufacturers and silicon suppliers
  - Guiding the industry role of Tizen includes gathering of
    - Requirements, identification and facilitation of service models
    - Overall industry marketing and education.

Tizen Association Members

- Huawei
- Fujitsu
- Intel
- KT
- LG U+
- NTT Docomo
- Orange
- Samsung
- SK Telecom
- Vodafone
Standard-based, cross-category platform

Common & Profile-Specific Compliance Rules

for mobile

for TV

for camera

for printer

for IVI

for PC
Fully Open Source platform
Architecture
Tizen Architecture

- Web API
  - Web is the primary application development environment for Tizen
- Native API
  - Fast, light-weight, scalable native applications can run smoothly on any Tizen mobile phones (from low-end to high-end)
Tizen Architecture | Linux Kernel & Device Drivers

- Linux Kernel
- Device Drivers
- Hardware Adaptation Layer
  - Plug-ins
- OpenGL ES/EGL Graphics Driver
  - DRM based graphics stack

![Adaptation Layer Diagram]

**HAL (HW Adaptation Layer)**
- Telephony Plug-ins
- GStreamer Plug-ins
- Sensor Plug-ins
- System Plug-ins
- OpenGL ES/EGL Graphics Driver

**Kernel 3.xx** SMACK **Device Drivers**
**Tizen Architecture | Web FW**

- Standard HTML5 + Tizen Device API

**Web Framework**

<table>
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<tr>
<th>Device API</th>
<th>W3C</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>HTML 5</td>
<td>Web GL</td>
</tr>
<tr>
<td>NFC</td>
<td>CSS3</td>
<td>Typed Array</td>
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<tr>
<td>Bluetooth</td>
<td>Geolocation</td>
<td>Full Screen API</td>
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<td>Media Contents</td>
<td>Touch Event</td>
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<td>PIM</td>
<td>Battery Status</td>
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<td>System Info</td>
<td>File</td>
<td>URI Scheme</td>
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<tr>
<td>File System</td>
<td>App Cache</td>
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**TIZEN**
Development Environment
Development Environment | Multi-devices

- Integrated SDK that supports a wide range device profiles
- Responsive UI for “Easy to make Auto-layouting”
- Working on Multi-OS
  - c.f. Windows 7/8, Mac OSX and ubuntu Linux
Development Environment | All-in-one suite

- Tizen SDK provides various tools and documents integrated with IDE

- WYSIWYG GUI design/edtiting
- Test/debugging
- Project management & easy code editing
- Build system & Toolchain
  - OBS
  - Rootstrap management
  - Cross compiler, packaging
  - Project compatibility
  - SDK
- Static & Dynamic Analysis
- Live SDK update
- Help Contents
Strength
Open Standards | HTML5 support

- Tizen Browser supports brilliantly HTML5 for embedded devices

![Diagram showing HTML5 support comparison between browsers](HTML5TEST.COM)
**Open Standards | W3C API support**

- **Tizen defines Device APIs according to WebIDL**
  - WebIDL is a W3C specification for a format to describe interfaces
  - 1. Numerical constants avoided but string enumerations are used
  - 2. Time consuming methods are defined as asynchronous calls
  - Apps using W3C standards can use Tizen's Device API so it can run any device features

- **Ready to open for W3C standards**
  - Minimize incompatibility due to proprietary solution
Performance | 2D/3D Graphics

- 2D Graphics: Cairo H/W Acceleration
- 3D Graphics: WebGL support

2D Canvas perf. score

3.49 2.80*

WebGL (Aquarium : fps)

60 28*

* Stock Browser

Web Game Applications
Performance | Boot Time Optimization

- **Systemd-based Configurable Service and Booting**
  - Advanced service & daemon management
    - Execute threaded applications in parallel
    - Easier to optimize booting time.
    - Easier to configure service bring up and management

- **Result: Optimized Booting Time**
  - NX300M: 0.5sec
  - Phone: 11sec
High Quality Audio/Video | Rich multimedia support

- Tizen supports High Quality Video Playback based on Plug-in architecture on Gstreamer
  - Plays virtually every media formats without transcoding
  - Supports rich media for Browser and web applications
  - Provides embedded video rendering for various type of graphic surfaces
Strong Security | Secure architecture

- Securing major points in the whole application life cycle
  - App Store Security (Static Analysis)
    - Security Analysis for abnormal application behaviors
  - Anti-Virus Framework
    - Anti Virus Check for malicious application filtering
  - Data Protection and Privacy
    - Access Control enforcement for managing user data protection & privacy
  - B2B Support
    - Domain Separation for Enterprise users
UI Scalability | Graceful resolution scaling

- Supports various resolutions (WVGA ~ XQXGA) by adjusting scale factor on screen resolution & size
Roadmap & Contributions
## Tizen Release Roadmap

<table>
<thead>
<tr>
<th>Tizen 1.0</th>
<th>Tizen 2.0</th>
<th>Tizen 2.1</th>
<th>Tizen 2.2</th>
<th>Tizen 2.3</th>
<th>Tizen 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web-centric platform</td>
<td>Web / Native framework</td>
<td>Hybrid, Web / Native, Smack Security, and Optimized Perf.</td>
<td>Commercial Ready w/ Enhanced UX</td>
<td>+ Wearable Profile</td>
<td>64-bits support Multi-user Crosswalk</td>
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- **Key Features of Tizen 3.0**
  - 64-bit ARM support
  - Multi-user
  - Crosswalk / BLINK
  - SMACK – 3 domain security & Cynara
  - New Configuration System – BUXTON
  - KDBUS
  - 3D UI & Rendering Engine
  - Common Connectivity Framework
  - Part of Wayland, Enlightenment Window Manager
How to Work

• Build your source code using GBS (GIT Build System)

  ![Diagram of GBS build process]

  Building Packages Locally with GBS:

• Tizen SDK

  • A comprehensive set of tools for developing Tizen Web and Native applications.
How to Work

- Contributing Code to Tizen
  - Submit a patch to the Gerrit
  - Review a patch on the Gerrit
  - Submit a package to the build system
  - Review and accept a package on the build server (for release engineer only)
    - Contributing Code to Tizen

- Participating in Tizen Community
  - File bugs or add additional information to existing reports in JIRA
    - https://www.tizen.org/community/bug-tracker
  - Community discussions occur on mailing lists
    - https://www.tizen.org/community/mailing-lists
  - Real-time discussions are held over IRC
    - https://www.tizen.org/community/irc
  - Contribute to our wiki documentation
    - https://www.tizen.org/community/wiki
Conclusions
Conclusions

- Tizen is playground of developers, manufacturers, service providers and users.

- Tizen:
  - Fully Open Source platform under Linux Foundation
  - Standard-based, cross category platform
  - A Great Platform for Smart Devices

- Tizen evolution continues for upcoming new devices such as IoT, Robot
Thank you!

Q&A