



# Introduction to Tizen with Architecture Overview

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## Contents

- What is Tizen?
- Architecture
- Development Environment
- Strength
- Roadmap & Contributions
- Conclusions

A decorative graphic in the top right corner of the slide. It features a large white circle, a smaller white circle, and a blue and white striped circle. A white paper-like shape is curled up, revealing a blue background with a city skyline. Confetti in shades of blue, green, and white is scattered around the circles and the curled paper.

What is Tizen?

# What is Tizen?

- Open source project hosted by Linux Foundation



- Open source release
- SDK, platform development
- Community support
- Defines TCS and TCT
- Device profiles (Mobile,IVI, TV, etc.)



- TIZEN marketing and events
- Global partner / CP collaboration
- TIZEN Common Store
- TIZEN Device Certification
- TIZEN brand management

## 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>
  - 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+
	 docomo	 orange	 SAMSUNG	 SK telecom	 vodafone

## Standard-based, cross-category platform



7

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## Fully Open Source platform



8

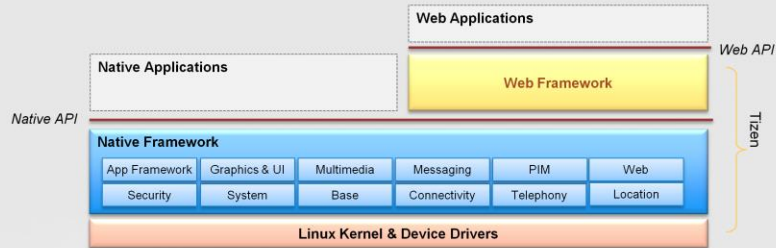
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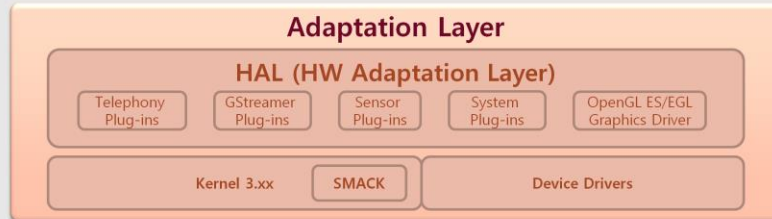
# Tizen Architecture

- **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)

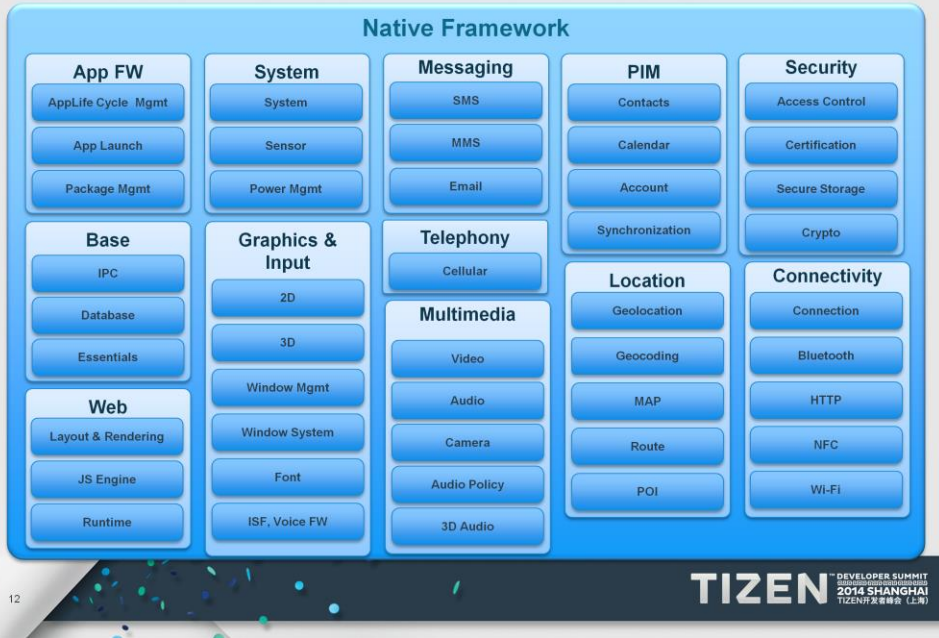


## Tizen Architecture | Linux Kernel & Device Drivers

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



# Tizen Architecture | Native Framework



12

## Tizen Architecture | Web FW

- Standard HTML5 + Tizen Device API



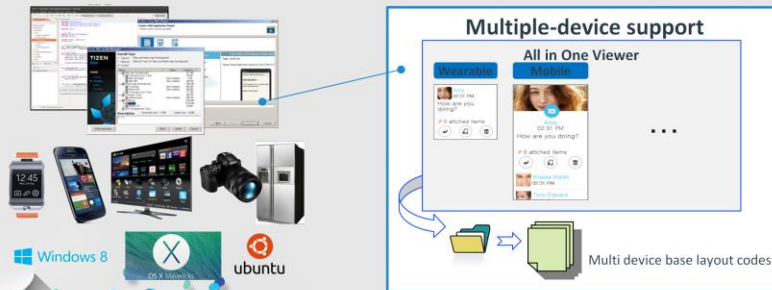
13

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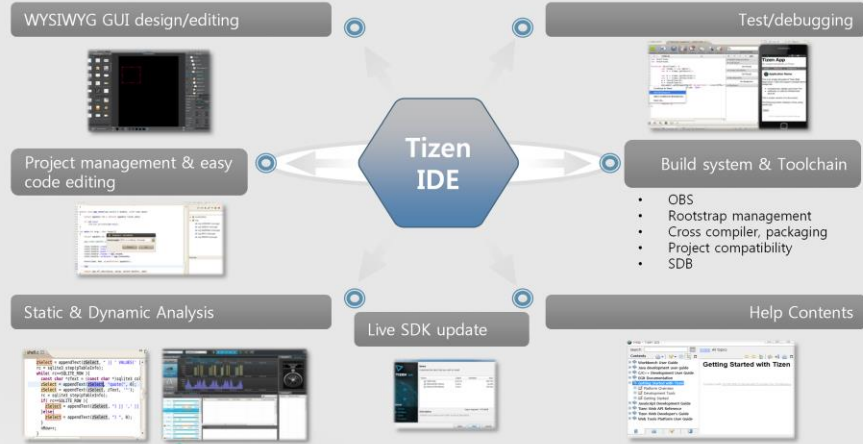
## Development Environment | Multi-devices

- 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



16

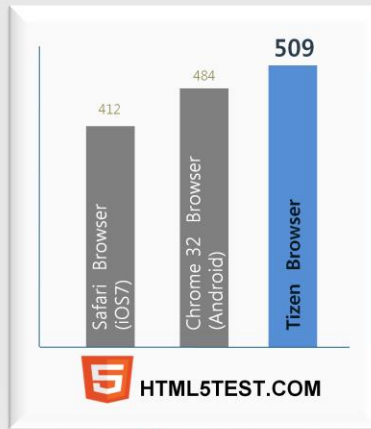
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## Open Standards | HTML5 support

- Tizen Browser supports brilliantly HTML5 for embedded devices



## 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

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## Performance | 2D/3D Graphics

- 2D Graphics: Cairo H/W Acceleration



- 3D Graphics: WebGL support



## 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

```
systemd 43 running in system mode. (+PAM -LIBRPM -AUDIT -SELINUX)
Welcome to Tizen 2.2.0 (Tizen)!
Starting Runtime Directory...
Starting Media Directory...
Starting File System Check on Root Device...
Starting Remount API VFS...
Starting POSIX Message Queue File System...
Starting Load Kernel Modules...
Starting Security File System...
Starting Configuration File System...
Starting FUSE Control File System...
Starting Debug File System...
Starting Audit Kernel Variables...
Starting Set Up Additional Binary Formats...
Starting Huge Pages File System...
Starting udev Kernel Device Manager...
Starting udev Coldplug all Devices...
Starting Snappy filesystem mounting...
Starting Generate environment from /etc/profile.d...
Starting Journal Service...
Starting Journal Service...
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```

## 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

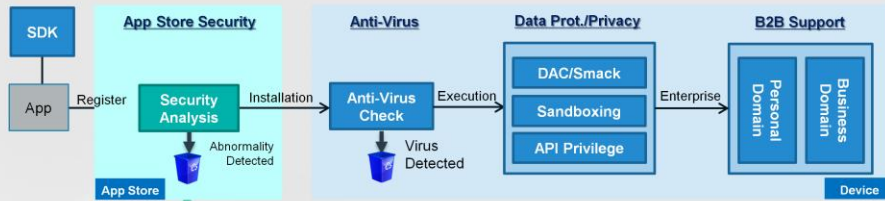


gstreamer OpenMAX IL

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## 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

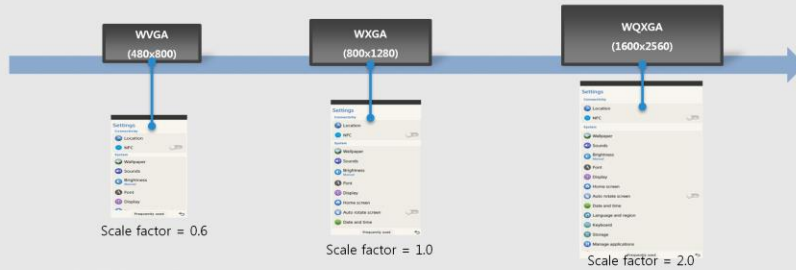


23

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## UI Scalability | Graceful resolution scaling

- Supports various resolutions (WVGA ~ QXGA) by adjusting scale factor on screen resolution & size







## Tizen Release Roadmap

Tizen 1.0	Tizen 2.0	Tizen 2.1	Tizen 2.2	Tizen 2.3	Tizen 3.0
Apr. 2012	Feb. 2013	May 2013	July 2013	Dec. 2014	May 2015
Web-centric platform	Web / Native framework	Hybrid, Web / Native, Smack Security, and Optimized Perf.	Commercial Ready w/ Enhanced UX	+ Wearable Profile	64bits support Multi-user Crosswalk

- **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)



※ Building Packages Locally with GBS:

<https://source.tizen.org/documentation/developer-guide/getting-started-guide/building-packages-locally-gbs>

- Tizen SDK

- A comprehensive set of tools for developing Tizen Web and Native applications.

<https://developer.tizen.org/ko/downloads/tizen-sdk/>



# 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)

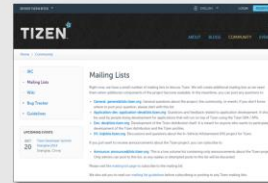
※ Contributing Code to Tizen

<https://source.tizen.org/ko/documentation/developer-guide/getting-started-guide/contributing-code-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/mailling-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



31

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