



# LINUXCON

## JAPAN 2012

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## **Introduction to Tizen and Tizen Mobile Architecture**

Seokjae Jeong, Samsung Electronics

# Agenda

Tizen Introduction

Tizen Architecture Overview

Tizen Core Services

# Tizen Introduction

# What is Tizen\*? (Pronounced Tie Zen)

Tizen\* combines the communities and the best technologies under one unified environment

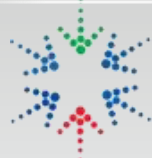
# TIZEN™



MeeGo

Strong developer community

NEW



LiMo

Broad service provider support



# Key Tizen™ Highlights

- Tizen is a cross-architecture, open source software platform
- Comprehensive standards-based HTML5 implementation
- Linux Foundation project based on Linux & other open source **components**
- Device segments: Smartphones, Tablets, Netbooks, In-vehicle infotainment devices, Smart TVs, and more.

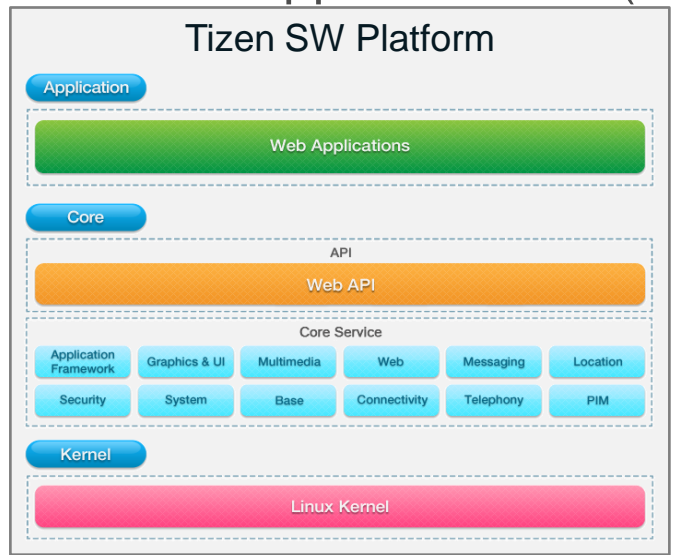


- Tizen Association: an industry consortium consisting
  - Key service providers
  - Device manufacturers and Intel

Tizen Association Members	Operators						
	OEMs						

# Tizen Release

- Open Source Release
  - Tizen Alpha, Beta: '12.1.9, '12.2.27
  - Tizen 1.0 Larkspur: '12.4.30
- ❖ Tizen Larkspur scope
  - Platform Source Code: Web API, Core Services (Frameworks), Linux Kernel
  - SDK: Web App. Dev. Env. (Host OS: MS-Windows, Ubuntu Linux)



# Tizen Developer Conference

- <https://www.tizen.org/conference>
- The first annual Tizen conference
  - Hyatt in SF, CA, May 7-9<sup>th</sup>, 2012
- Four keynotes
- Forty seven technical presentations
  - About Tizen Platform and SDK
  - On-line slides along with video or audio streaming
- Tizen Developer Contest (~Aug. 7, 2012)
  - <https://www.tizen.org/blogs/jabancroft/2012/announcing-tizen-developer-contest-intel>
- Remembrances
  - Tizen reference device distribution by LF.
  - Offsite party at The California Academy of Science.



# Tizen Roadmap

- Tizen 1.0 Larkspur (Apr. 30, 2012)
- Tizen 2.0 Magnolia (End of 2012)
  - Native APIs, more Web APIs, Security Enhancements, etc.

2012												2013		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar

**Tizen 1.0**



**Tizen 2.0**



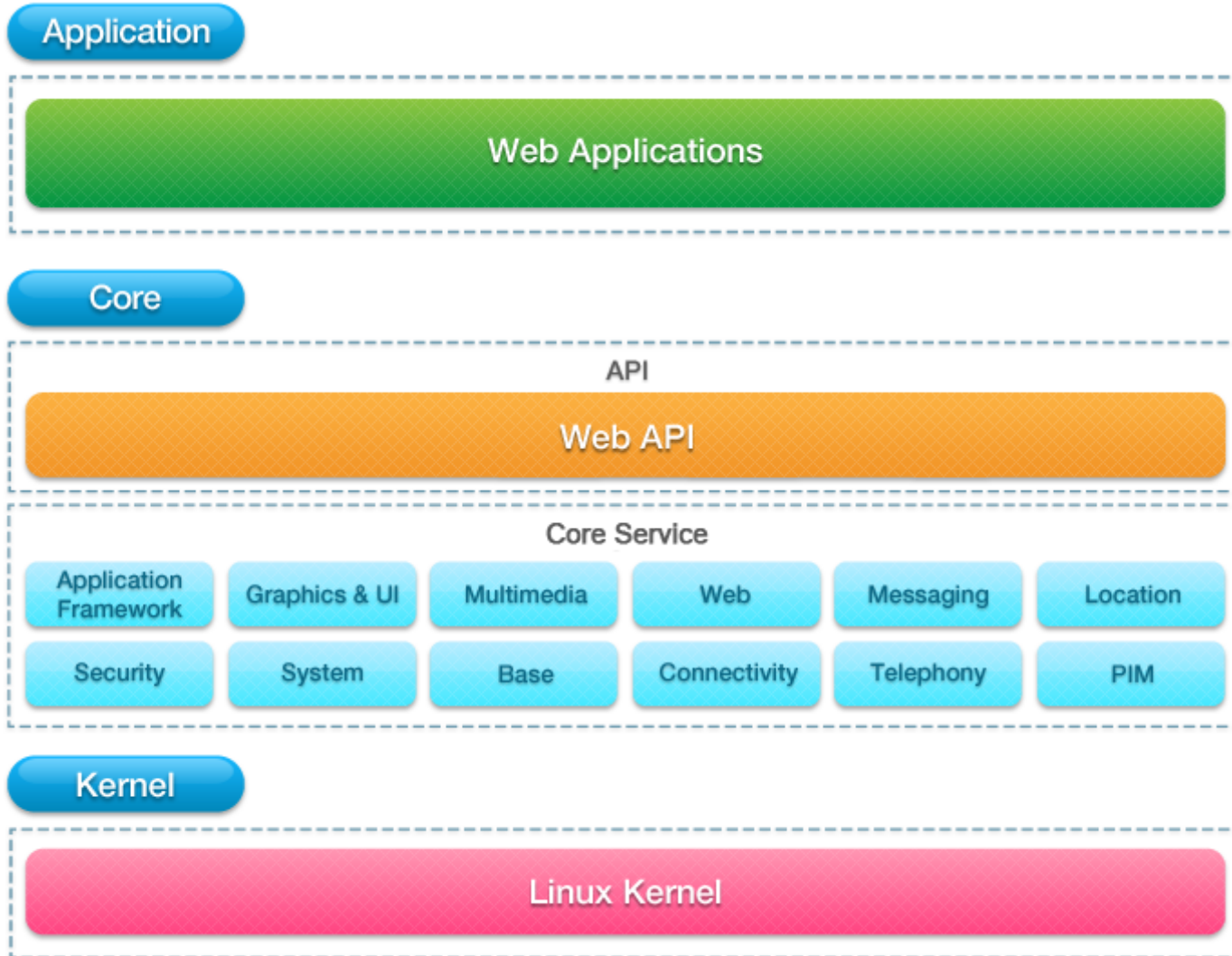


# Tizen Open Source Information

- Visit
  - <http://www.tizen.org>
  - <http://developer.tizen.org/sdk>
  - <http://source.tizen.org/>
  - <https://developer.tizen.org/documentation>
- Community
  - Mailing lists: <http://www.tizen.org/community/ mailing-lists>
  - IRC Channel: #tizen
  - Wiki: <https://www.tizen.org/community/wiki>
  - JIRA: <http://bugs.tizen.org>

# Tizen Architecture Overview

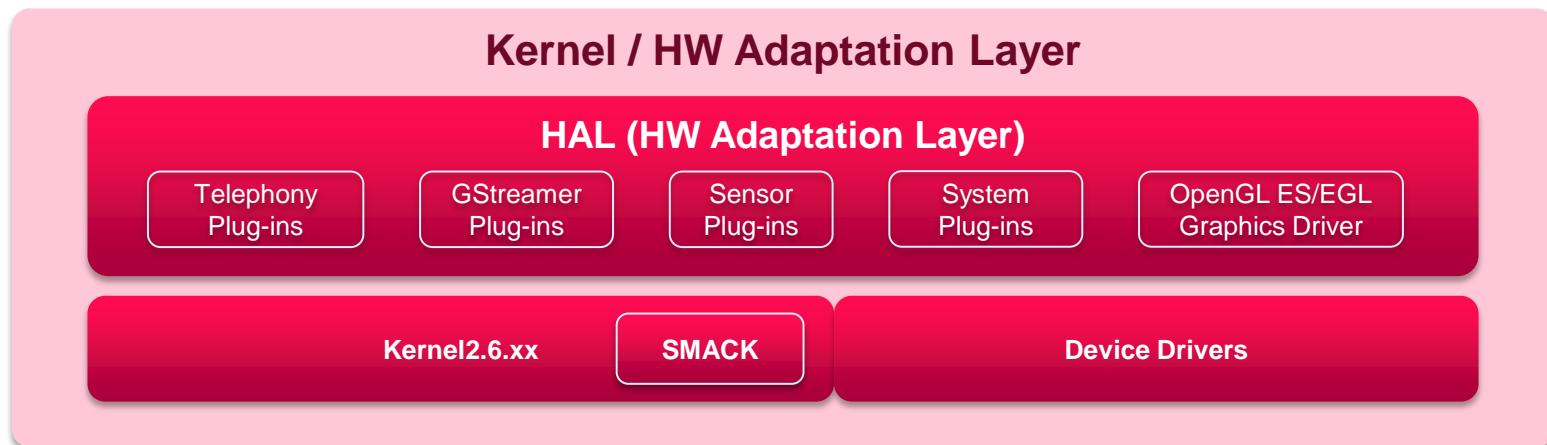
# Tizen SW Architecture (for Mobile)



# Kernel and Hardware Adaption

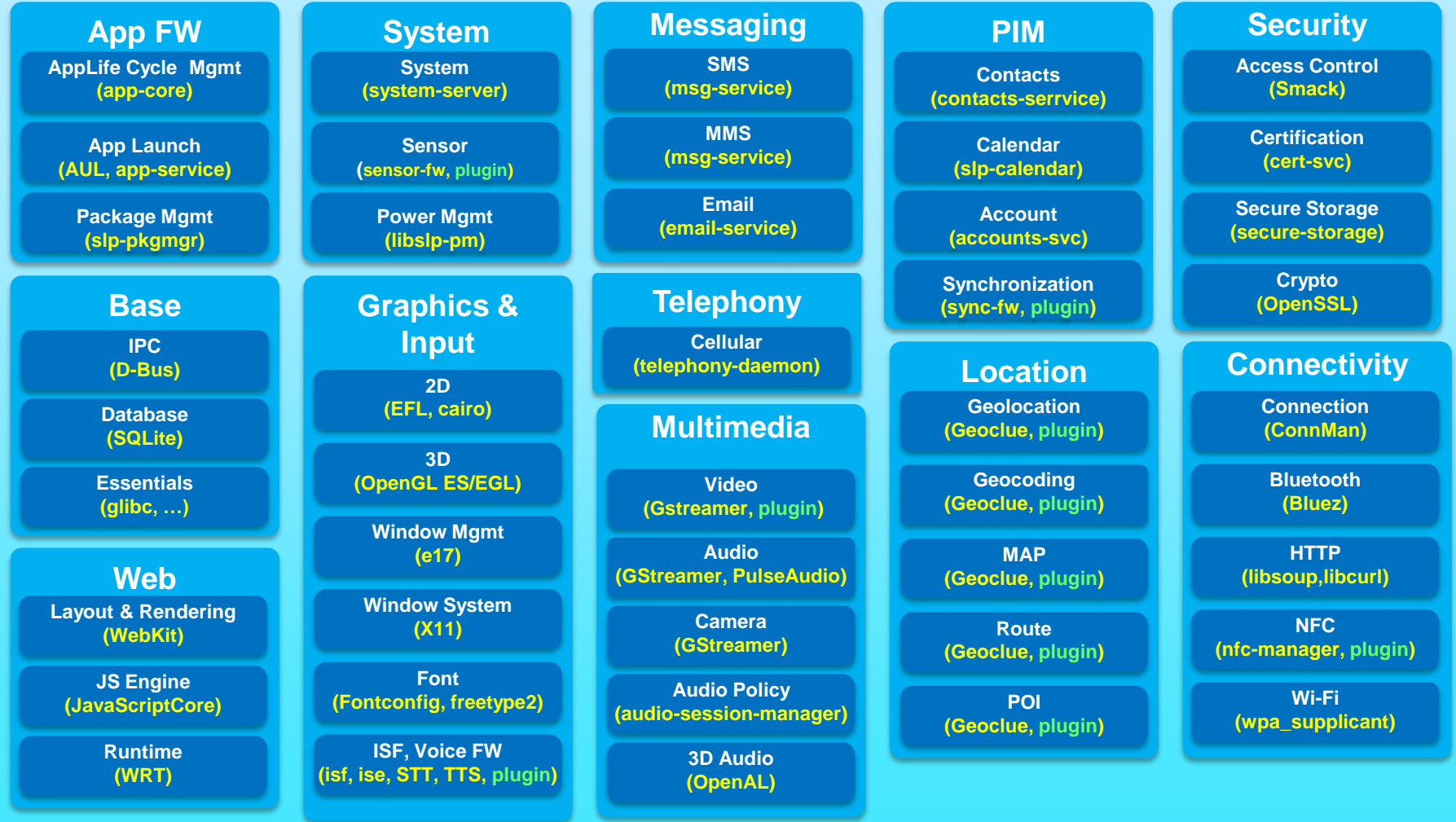
## ● Features:

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



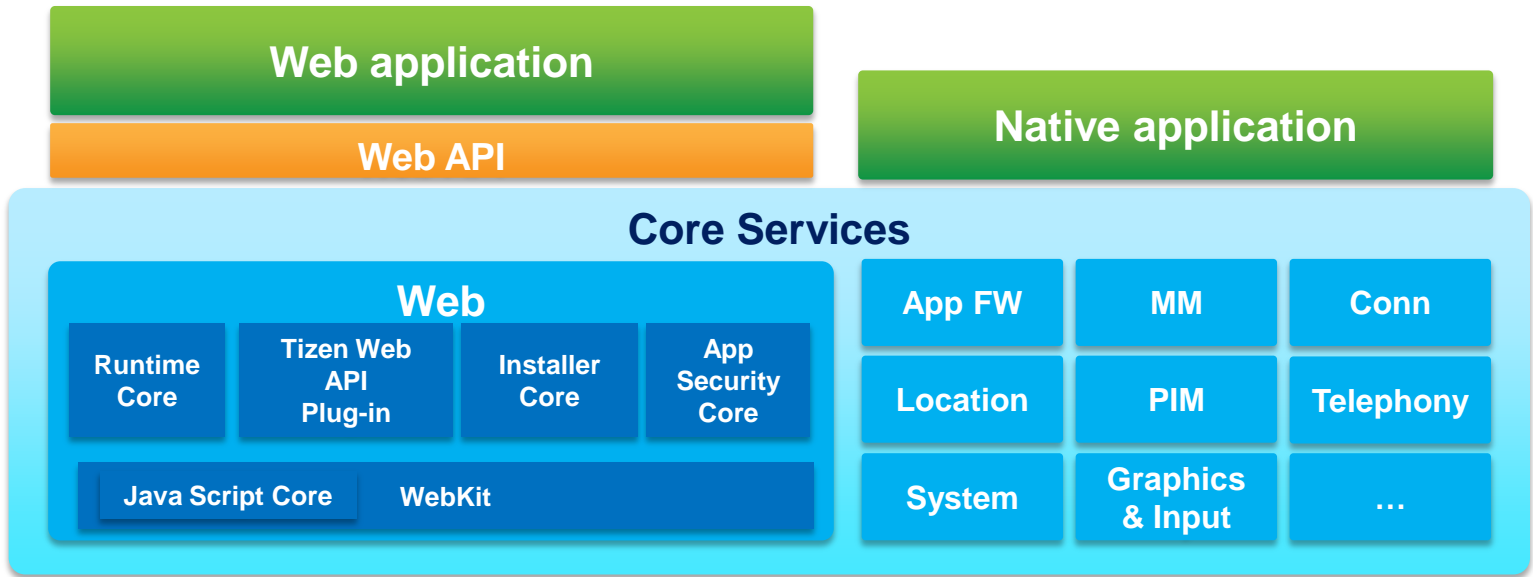
# Tizen Core Services (Mobile)

## Core Services



# Tizen Applications

- **Web Application**
  - ✓ Web is the primary application development environment for Tizen
  - ✓ SDK is available for Web App development
  - ✓ Commercial grade Sample Apps will be available soon
- **Native Application**
  - ✓ Available for device implementers through components in Core Service



# Tizen Web Application

## ● Web Application Fundamental

- ✓ W3C/HTML5 Base
- ✓ Device integrated API support
- ✓ jQuery Mobile based UI Widgets

## ● Device API

- ✓ Access to the platform capabilities
- ✓ Support Features: BT/NFC/System Info./App Management etc.
- ✓ Additional APIs will be added in the future e.g. Accounts, Automotive

```
// Define success callback
function successCallback(contacts) {
    console.log(contacts.length + " contacts found.");
}

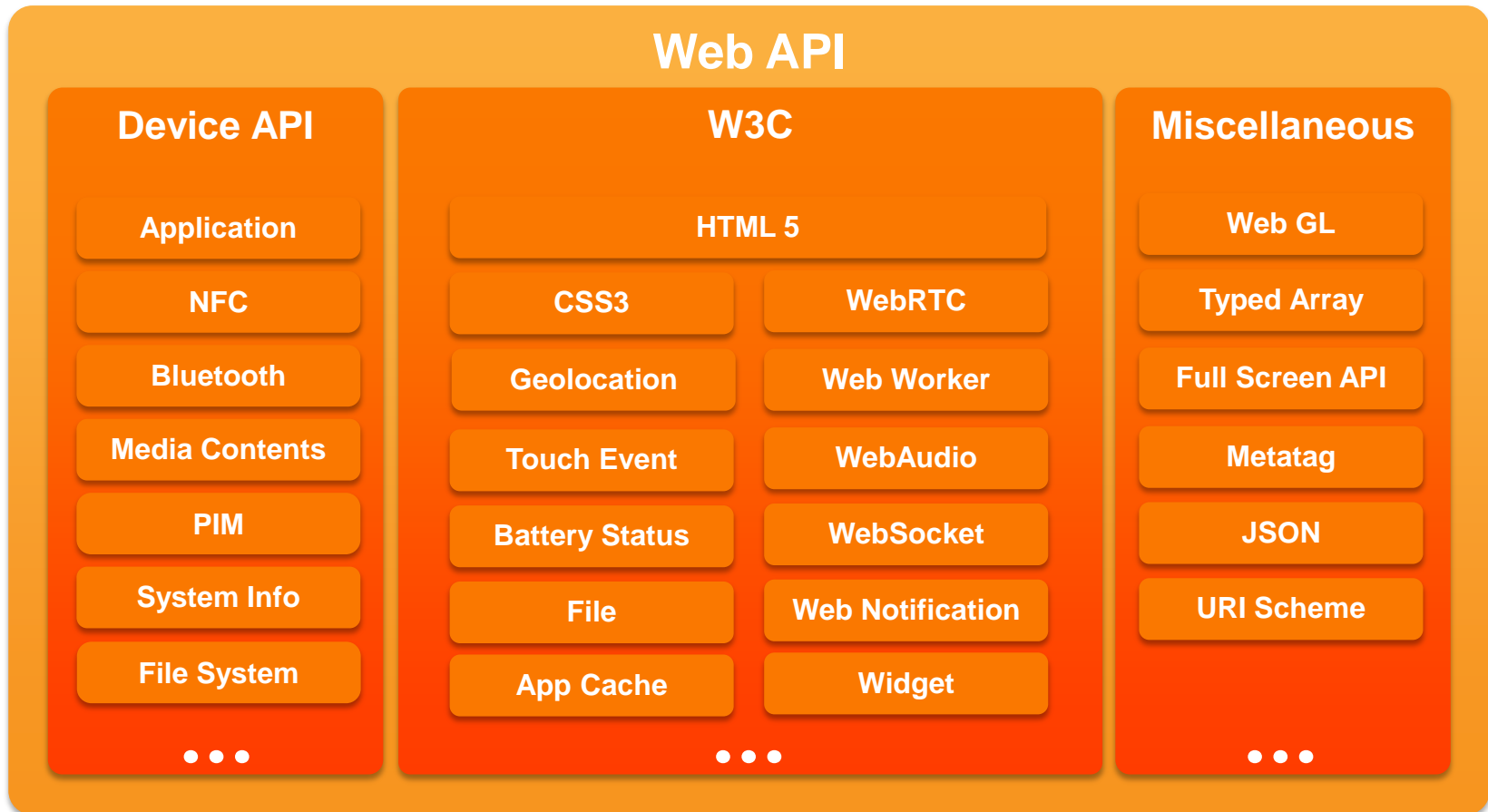
// Define error callback
function errorCallback(error) {
    console.log("An error occurred: " + error.message);
}

// Create an attribute filter based on first name: "First name should contain 'Chris' (case insensitive)"
var filter = new tizen.AttributeFilter("name.firstName", "CONTAINS", "Chris");
// Send request on contact address book.
tizen.contact.getDefaultAddressBook().find(successCallback, errorCallback, filter);
```

# Tizen Web API

- Standard HTML5 + Tizen Device API

- <https://developer.tizen.org/documentation>



※ Tizen WebAPIs are not forking W3C APIs!



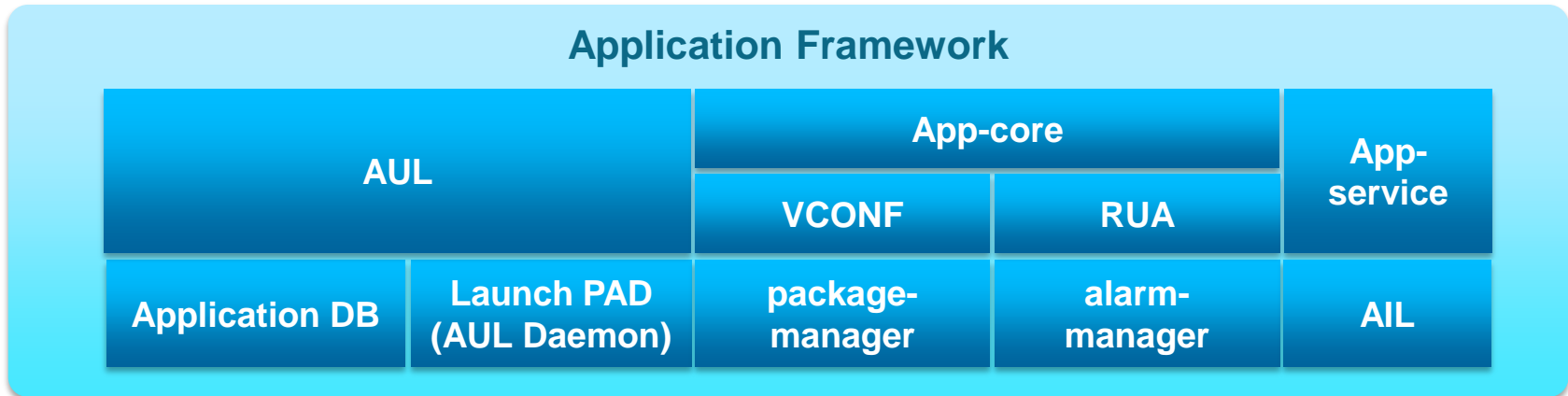
# Tizen Core Services

# Application Framework

## ● Provides

- ✓ Launching Application (aul, app-svc)
  - Explicit or implicit information (Combination of Action, URI, and MIME) can be used to determine an app to launch
  - Allowed to launch different type of app (i.e. Web to Native and Native to Web)
- ✓ Application life cycle management and handling system events (app-core)
  - Getting app state change notification or system events through main loop
  - Then, calling registered callbacks for the events
- ✓ Installing/Uninstalling application (package manager)
- ✓ Managing application launched history (librua)
- ✓ Setting an alarm to launch at specific time (alarm-manager)

- AUL : Application Utility Library
- RUA : Recently Used Application

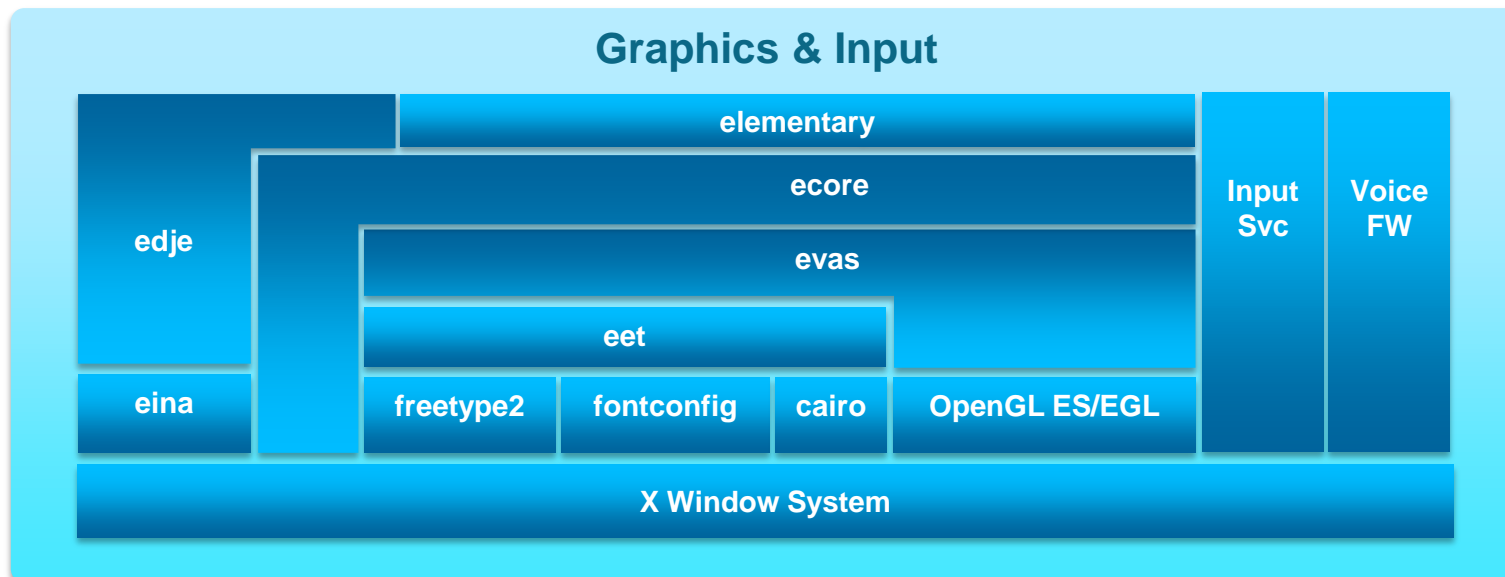


# Graphics & Input

## ● Consists of:

- ✓ Enlightenment Foundation Libraries
  - Rich Widgets multiple theme supports by Elementary
  - Retained mode canvas by Evas (Scene-graph, OpenGL ES back-end)
  - Compositing Window Manager
- ✓ Window System based on X11
- ✓ 3D (OpenGL ES), Font (freetype2, fontconfig)
- ✓ Input Service (SCIM), Voice FW (STT, TTS),

Tizen Graphics Core –  
The Scenegraph (Evas)  
Carsten Haitzler,  
Samsung



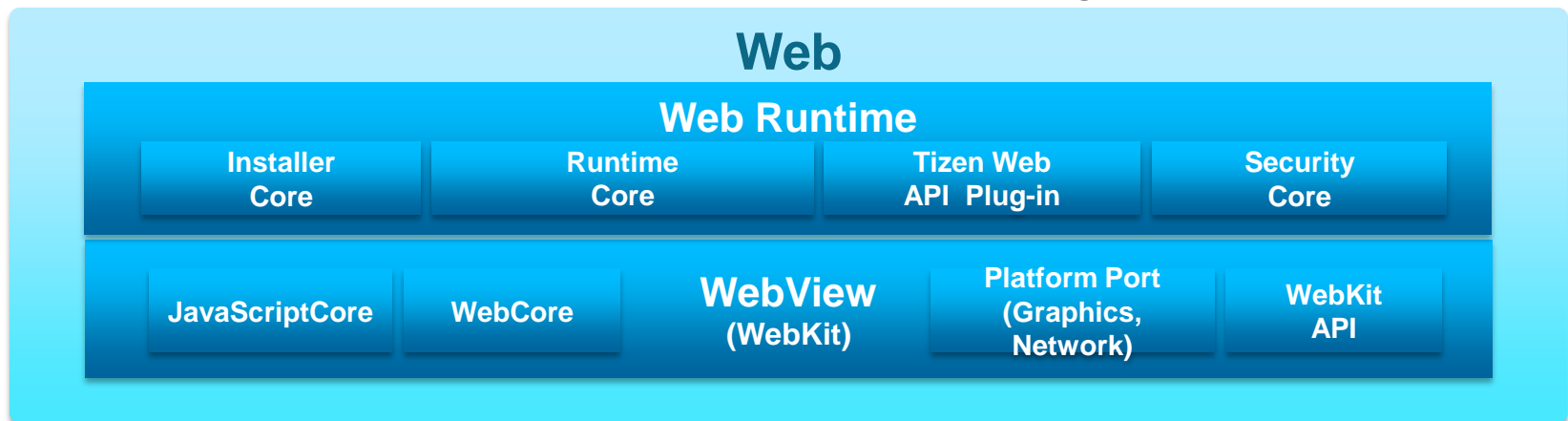
# Web

## ● Provides:

- ✓ Best Web experience with Browser and packaged Web Apps
  - Focusing on functionality(HTML5), performance (UI Responsiveness, 2D/3D Acceleration, JS Engine), Standard Compliance(W3C)
  - More device feature accessibility through Tizen Device API
  - jQuery Mobile based Tizen Web UI FW enables easy Web App development

## ● Consists of:

- ✓ WebView (WebKit /EFL): JavaScriptCore, WebCore(HTML5/W3C API implementation), WebKit API
- ✓ Web Runtime: Execution environment for packaged Web Apps



# Multimedia (1/2)

## ● Provides:

- ✓ Playback of audio and video contents (local and streaming)
- ✓ Capturing images and recording audio and video
- ✓ 3D Audio Sound (OpenAL) specially for games
- ✓ Scanning & Playback of radio
- ✓ Determining audio policy
- ✓ Extracting and displaying media content information



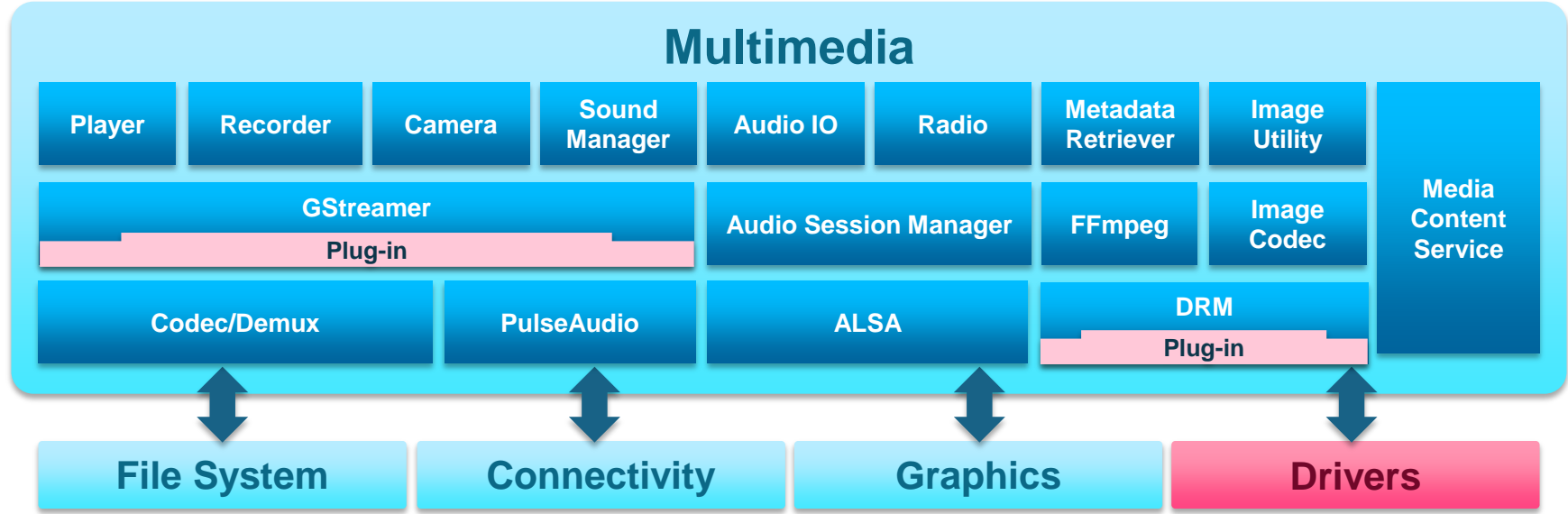
## ● Features:

- ✓ High Quality Video Playback
  - Full HD(1080P) Playback (with HW codec & Render Optimization)
  - Support for various kind of Multimedia Streaming (HTTP, RTP/RTSP)
  - Support for HTML5 Video and embedded playback in Web Browser
- ✓ High Quality & High Speed Camera/Recorder
  - High Quality Image Capture & Video Recording
  - Support for various kind of shooting mode (single,continuous,paronama,etc)

# Multimedia (2/2)

## ● Key Components:

- ✓ GStreamer: Audio, Video, Recording, Streaming, Editing, Etc
- ✓ Audio Session Manager: Sound Policy Management
- ✓ PulseAudio: Software mixing multiple audio streams
- ✓ Multiple-Format Codec: Various support of codec
- ✓ Media Content Service: Content management for media files
- ✓ Audio I/O: Accessing raw audio buffer to manipulate



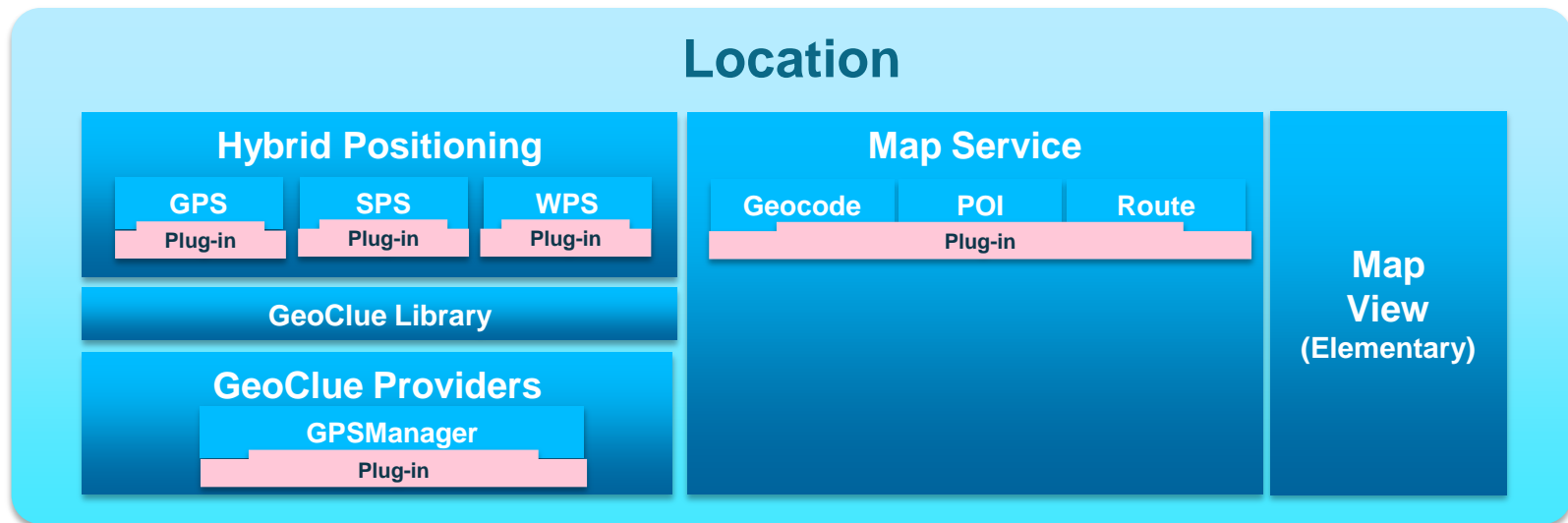
# Location

## ● Provides:

- ✓ Hybrid position information (GPS, SPS, WPS)
- ✓ Map Service (Geocode, POI, Route)

## ● Key Components:

- ✓ GeoClue: Deliver location info from various positioning sources
  - GeoClue library: An open source geo-information library
  - GeoClue Providers: Implement the GeoClue library API
  - Currently GPS Manager in GeoClue Providers is provided



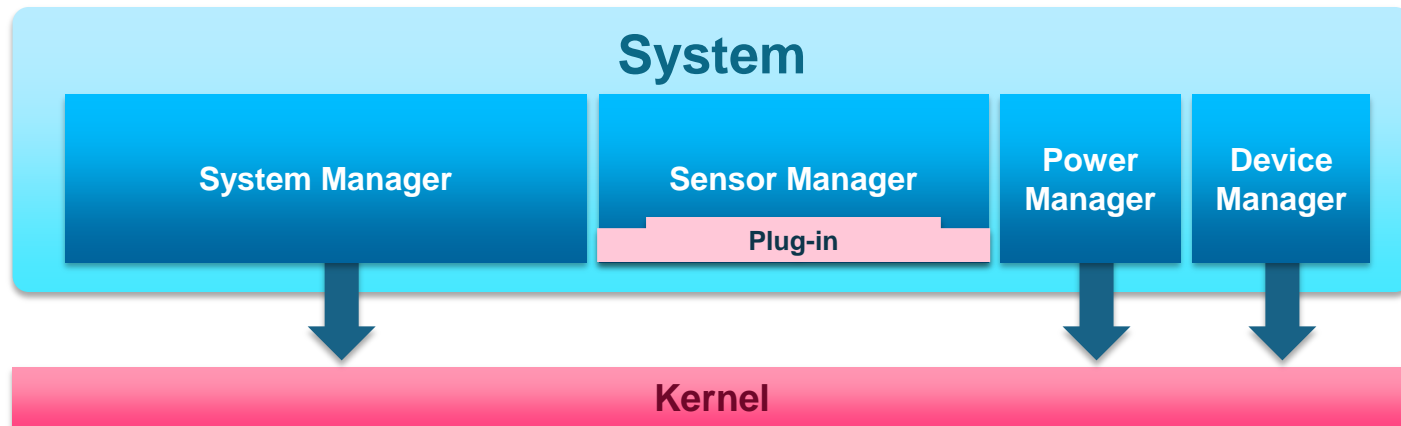
# System

- **Provides:**

- ✓ System monitoring and event handling functionalities

- **Key components:**

- ✓ System Manager
  - Runs as a daemon process
  - Monitors device and system status and handles events from devices (battery, USB, MMC, charger, earjack, etc)
- ✓ Sensor Manager: Handling sensor events from various sensors
- ✓ Device Manager: Setting/getting device values such as brightness
- ✓ Power Manager: Controls LCD display backlight and application sleep





# Connectivity

## ● Cellular and Wi-Fi Connection

- ✓ “Always-on” internet connections based on cellular(e.g.3G) and Wi-Fi .
- ✓ connman manages internet connections
  - Allowing automatic connection for available Wi-Fi access point
- ✓ Managing statistics of data network

## ● Bluetooth

- ✓ Based on Bluez and profiles (OPP, A2DP, RFCOMM, HFP, HDP, etc)
- ✓ Discovering / bonding / exchanging data with remote devices

## ● Tethering

- ✓ Providing three type of tethering : USB, Bluetooth and Wi-Fi

## ● NFC

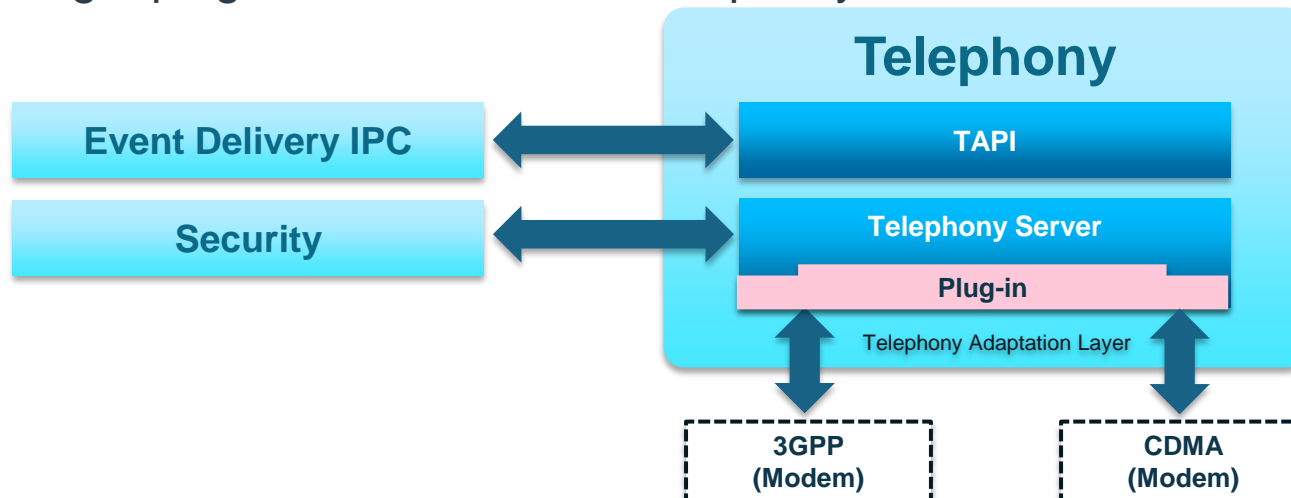
- ✓ Including NFC Manager to handling NFC plug-ins
- ✓ Supporting P2P, Controlling NDEF tag, car emulator

## ● Wi-Fi

- ✓ Scanning and connecting Access Points
- ✓ Connecting hidden Access Points

# Telephony

- Consists of cellular functionalities for communicating with modem:
  - ✓ Managing call/non-call info, packet-related services, network status information, SMS-related services for UMTS and CDMA
  - ✓ Managing SIM Application Toolkit services for UMTS.
  - ✓ Managing SIM files, phone book, and security
- Key Components:
  - ✓ TAPI is available as a library for client
  - ✓ Defining a plug-in architecture for Telephony Server



# PIM

- Provides: **Contact, Calendar, Account, and Sync Services**
- **Key Components:**
  - ✓ Account: Manage accounts to share account information on the device
  - ✓ Contact/Calendar:
    - Account based, Multiple address/calendar books for an account.
    - Enough features to satisfy mobile contact/calendar app requirements.
    - Supporting vCard 3.0 and vCalendar 1.0 respectively
  - ✓ Synchronization (Sync-FW)



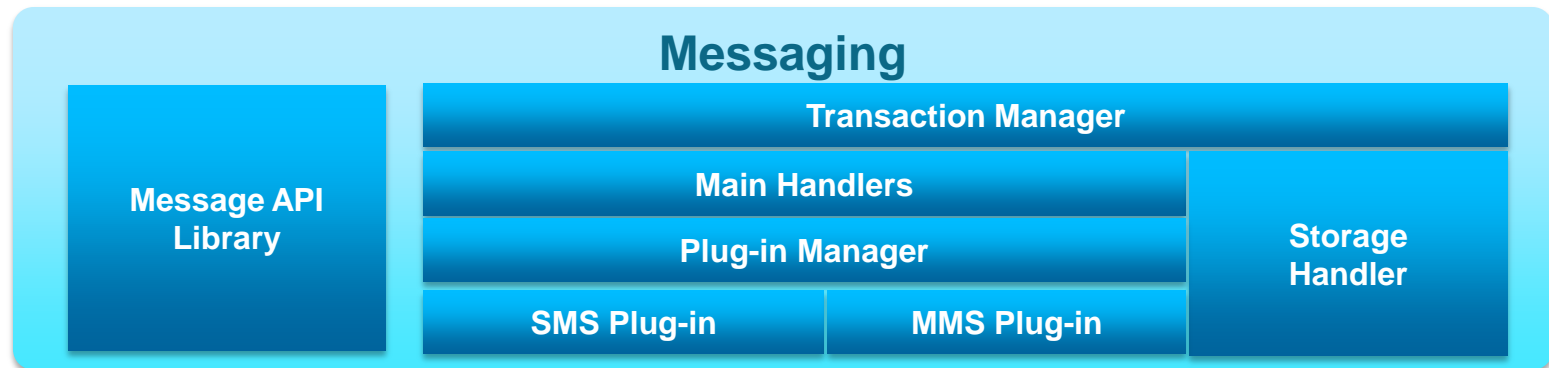
# Messaging

- **Provides: SMS, MMS, Email**

- ✓ SMS, WAP and cell broadcast messages
- ✓ MMS protocols: OMA MMS 1.2.
- ✓ Email protocols: SMTP, IMAP, POP3

- **Key Components**

- ✓ Message Client API
- ✓ Message Server
  - Transaction Manager: Manage IPC between message server and library
  - Main Handlers: Handle message sending/receiving/filtering/setting.
  - Storage Handlers: Save on DB
  - Plug-in Manager: Manage SMS and MMS Plug-ins



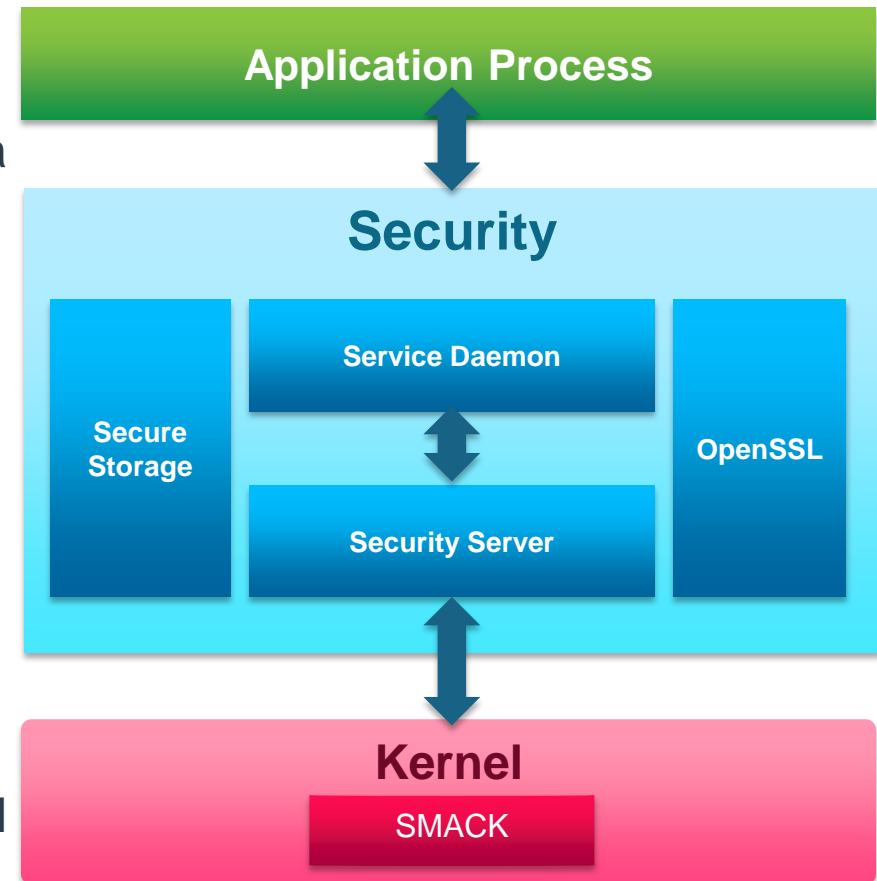
# Security

## ● Provides:

- ✓ Certificate management and verification
- ✓ Secure storage for confidential data
- ✓ User space access control management
- ✓ Cryptography and SSL support
- ✓ Mandatory access control support

## ● Security model:

- ✓ No root applications/No privilege escalation
- ✓ Sandboxed by SMACK
- ✓ Service daemons will make use of SMACK and enforce access control in server side
- ✓ Manifest based permission policy for Apps

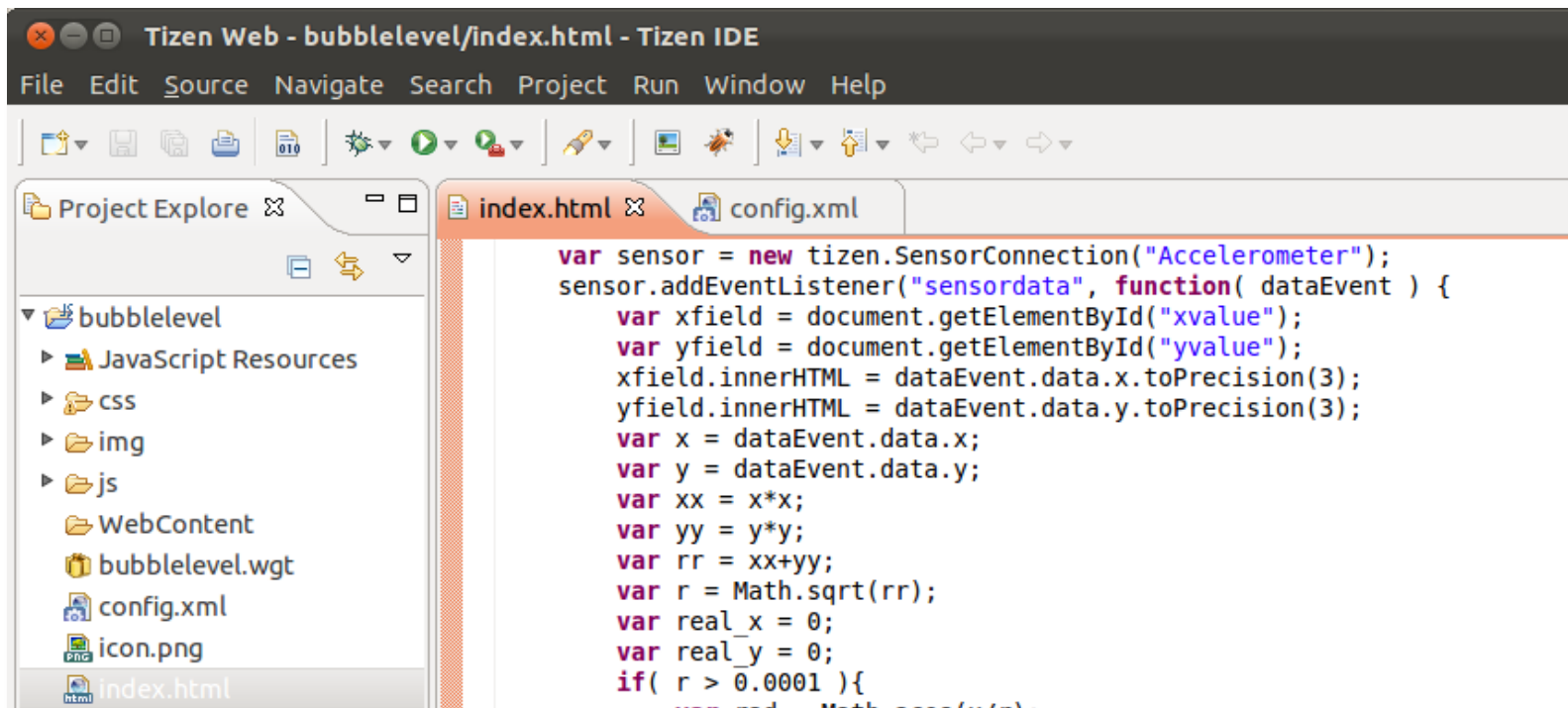


# SDK

# Development Tool: SDK

## ● IDE

- ✓ Competitive editor for HTML, CSS, JavaScript
- ✓ Wizard and various templates: basic, jQuery mobile based, Tizen Web UI FW based, and HTML5 boiler plate
- ✓ Debugging support: JavaScript console, log view, inspectors



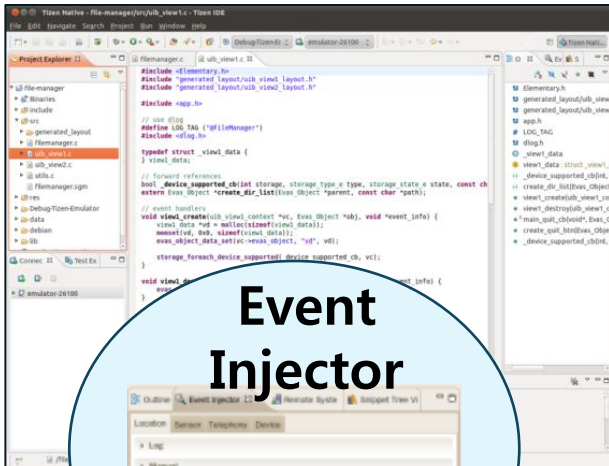
# Development Tool: SDK

## ● Emulator

- ✓ Various Device Emulation based on open source QEMU
- ✓ H/W Acceleration on Host PC (OpenGL ES, EvasGL, WebGL, Etc)
- ✓ Event Injector for Sensors, Call/SMS, LBS, Etc

## Emulator

### IDE



### Event Injector



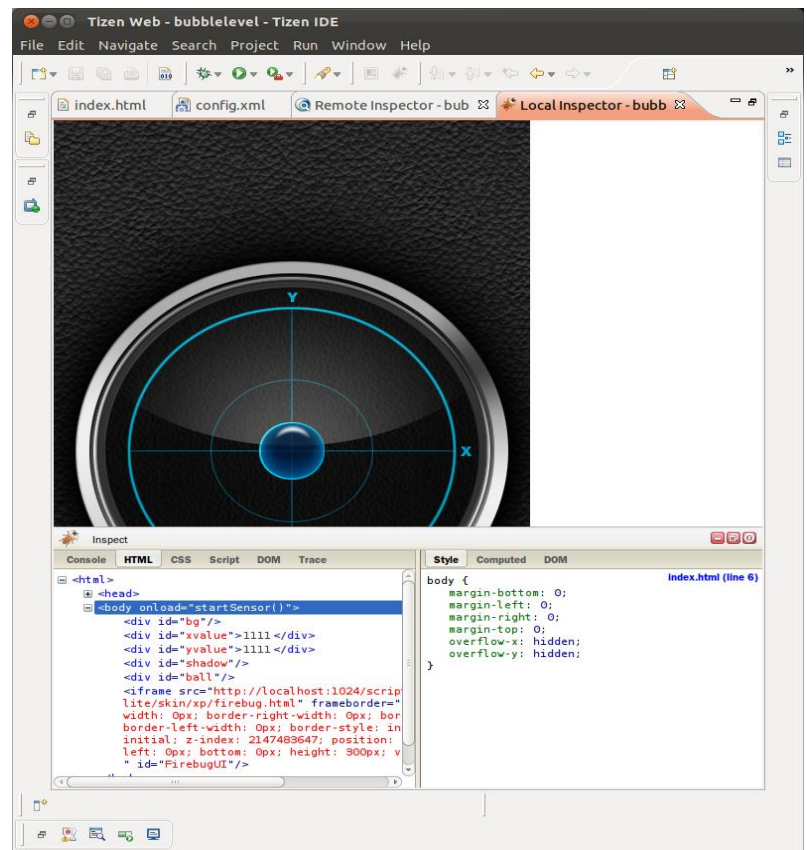
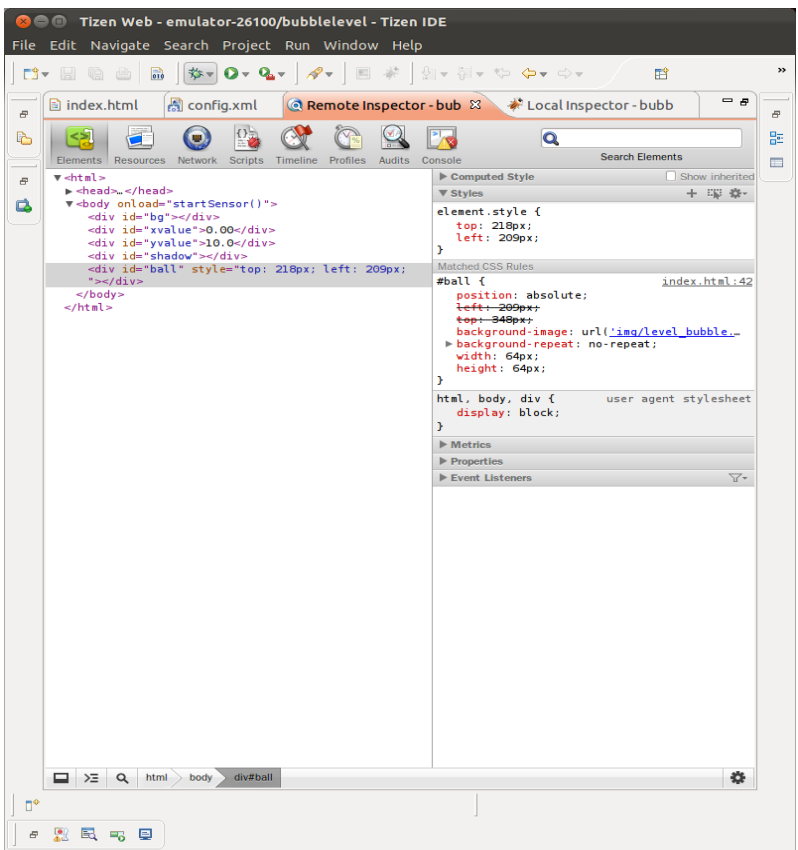
## Emulator Manager





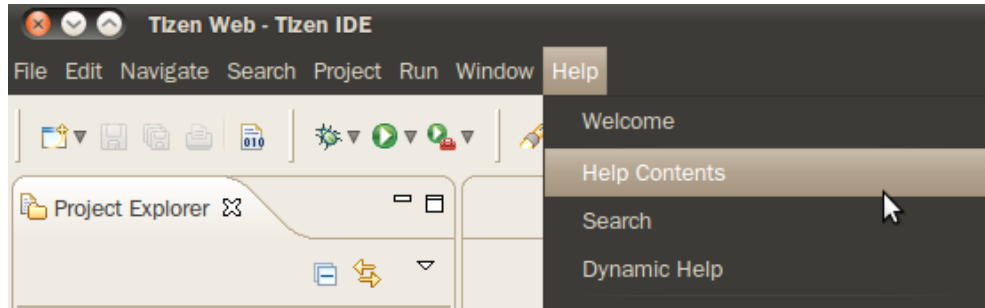
# Development Tool: SDK

- Web Debugging
  - ✓ Remote Inspector (Webkit Inspector)
  - ✓ Local Inspector (Firebug)

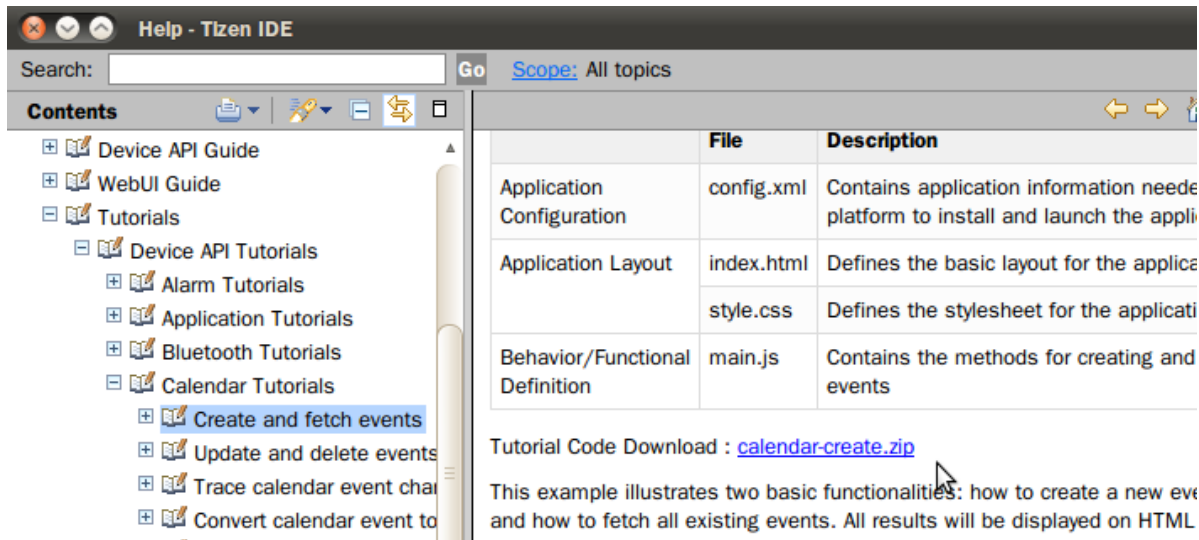


# Development Tool: SDK

- Where to find Documents in SDK
  - ✓ Tizen IDE → Help → Help Contents



- Find Web Device API & Tutorials and We UI FW Guides on the site



# Q&A