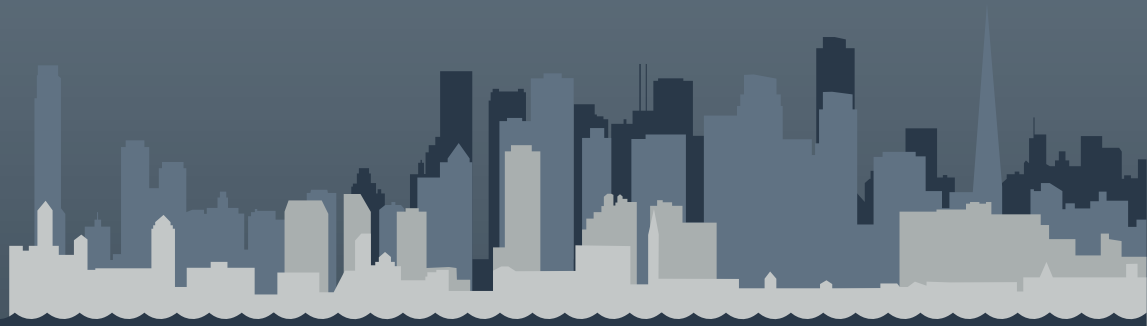
TIZEN™ DEVELOPER CONFERENCE
MAY 7-9, 2012



Tizen Architecture

Sunil Saxena, Intel
Hobum (Vincent) Kwon, Samsung

Agenda

- What is Tizen™?
- Tizen Architecture Overview
- Tizen Core Services

What is Tizen™?

- Tizen is a cross-architecture, open source software platform based on a comprehensive standards-based HTML5 implementation that spans across multiple device segments, including smartphone, tablet, IPTV, netbook and in-vehicle infotainment system.

- Tizen Association, an industry consortium consisting of key service providers, device manufacturers and Intel, has been formed to drive industry awareness and adoption of Tizen software platform.

Tizen Association Members	Operators	SK telecom	vodafone	orange	Telefónica	NTT docomo
	OEMs	SAMSUNG	intel	Panasonic	NEC	HUAWEI

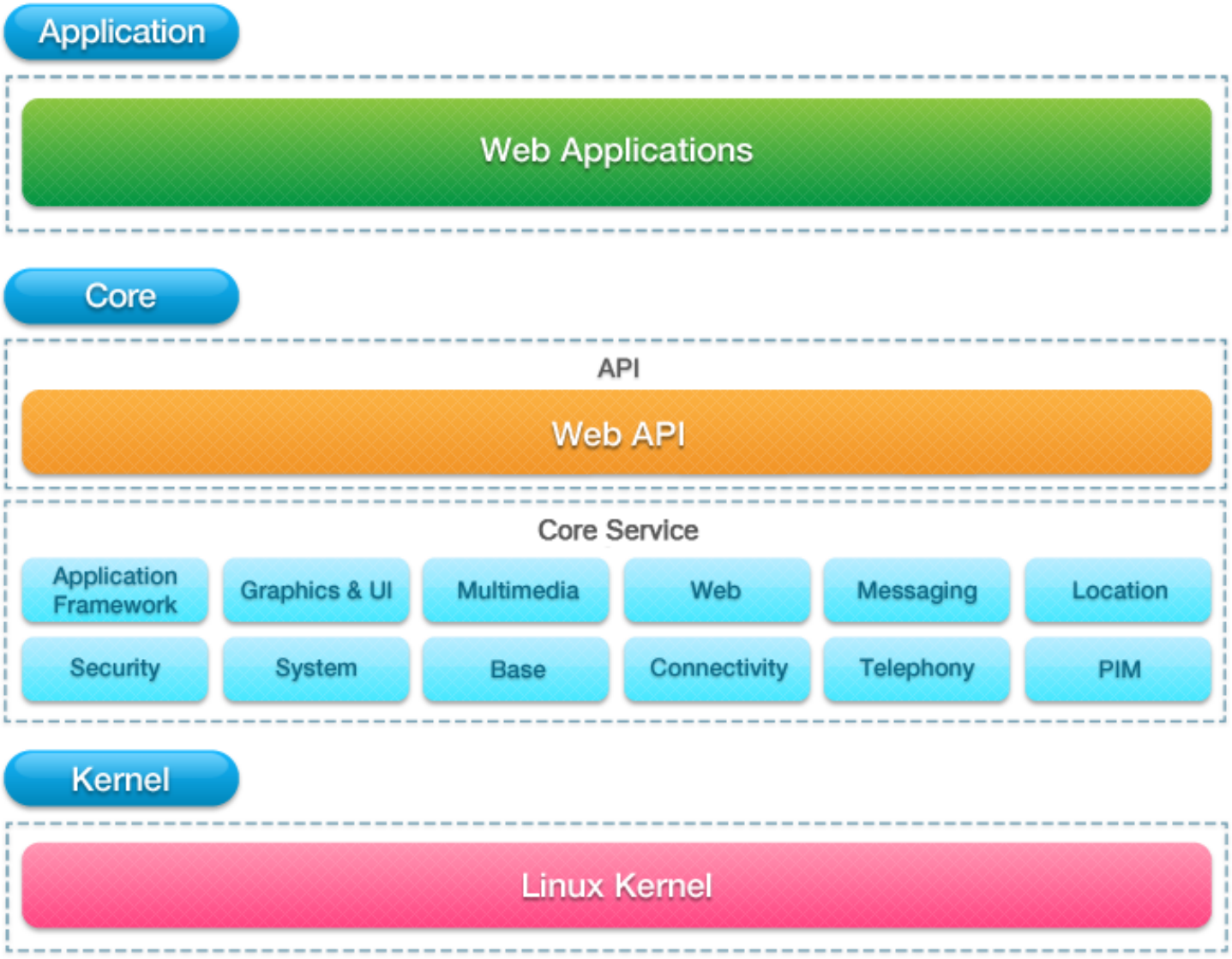
Tizen Open Source Information

- **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

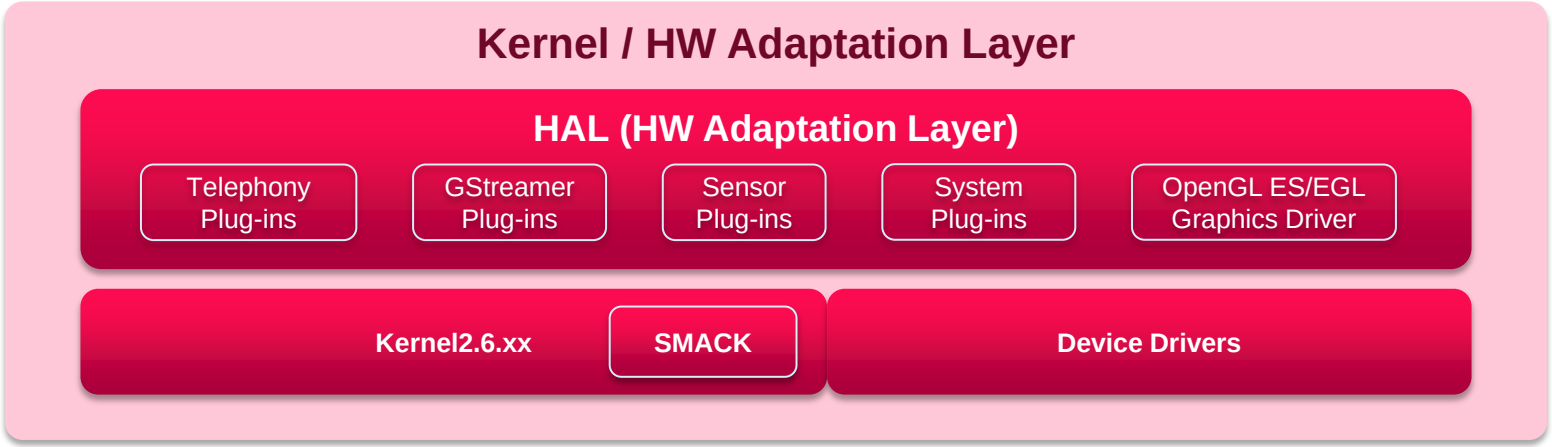
Tizen Architecture Overview

Tizen Architecture



Kernel and H/W Abstraction

- **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

App FW
- AppLife Cycle Mgmt (app-core)
- App Launch (AUL, app-service)
- Package Mgmt (slp-pkgmgr)

System
- System (system-server)
- Sensor (sensor-fw, plugin)
- Power Mgmt (libslp-pm)

Messaging
- SMS (msg-service)
- MMS (msg-service)
- Email (email-service)

PIM
- Contacts (contacts-serrvice)
- Calendar (slp-calendar)
- Account (accounts-svc)
- Synchronization (sync-fw, plugin)

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

Base
- IPC (D-Bus)
- Database (SQLite)
- Essentials (glibc, …)

Graphics & Input
- 2D (Enlightenment)
- 3D (OpenGL ES)
- Window Mgmt (Enlightenment)
- Window System (X11)
- Font Mgmt (Fontconfig, Pango)

Telephony
- Cellular (telephony-daemon)

Multimedia
- Video (GStreamer)
- Audio (GStreamer, PulseAudio)
- Camera (GStreamer)
- Audio Policy (audio-session-manager)
- 3D Audio (OpenAL)

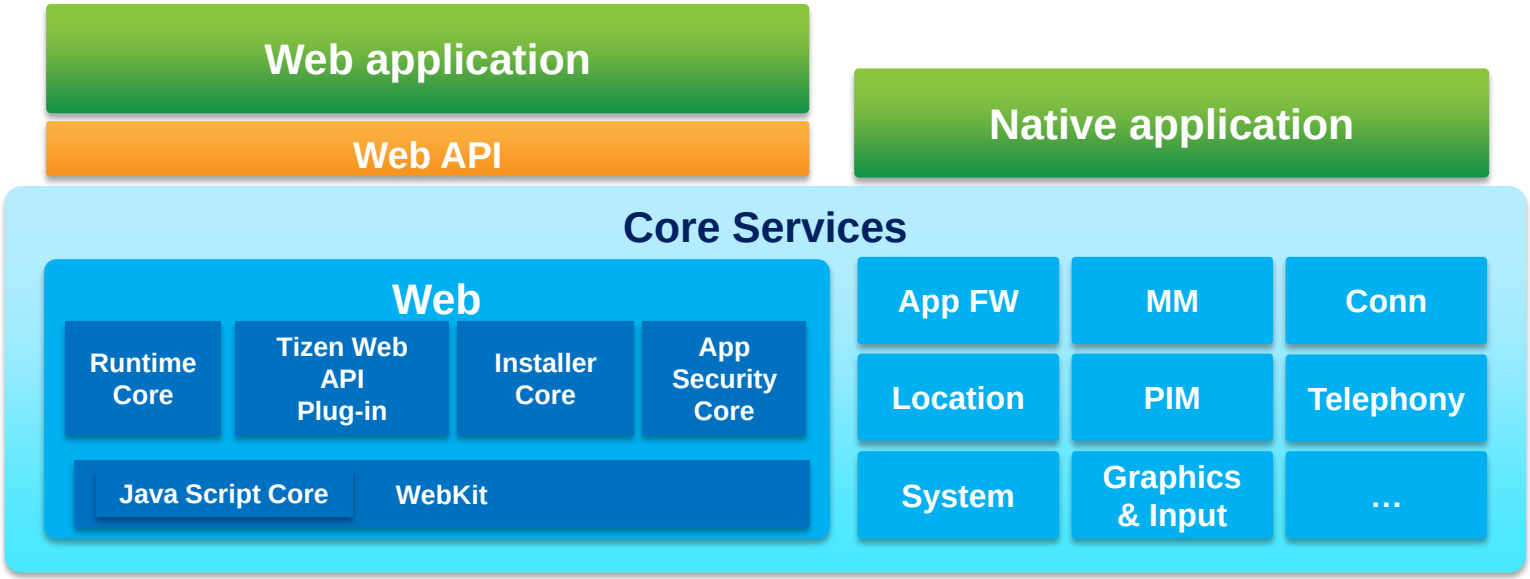
Location
- Geolocation (Geoclue, plugin)
- Geocoding (Geoclue, plugin)
- MAP (Geoclue, plugin)
- Route (Geoclue, plugin)
- POI (Geoclue, plugin)

Connectivity
- Connection (ConnMan)
- Bluetooth (Bluez)
- HTTP (libsoup,libcurl)
- NFC (nfc-manager, plugin)
- Wi-Fi (wpa_supplicant)

Web
- Layout & Rendering (WebKit)
- JS Engine (JavaScriptCore)
- Runtime (WRT)

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 through platform APIs in Core Service



Tizen Web Application

- **Web Application Fundamental**
  - ✓ W3C/HTML5 Base
  - ✓ Device integrated API support
  - ✓ jQueryMobile base UI Widgets
- **Device API**
  - ✓ Access to the platform capabilities
  - ✓ Support Features: App Management/System Info./BT/NFC etc.
  - ✓ Additional APIs will be added in the future e.g. Accounts, Automotive

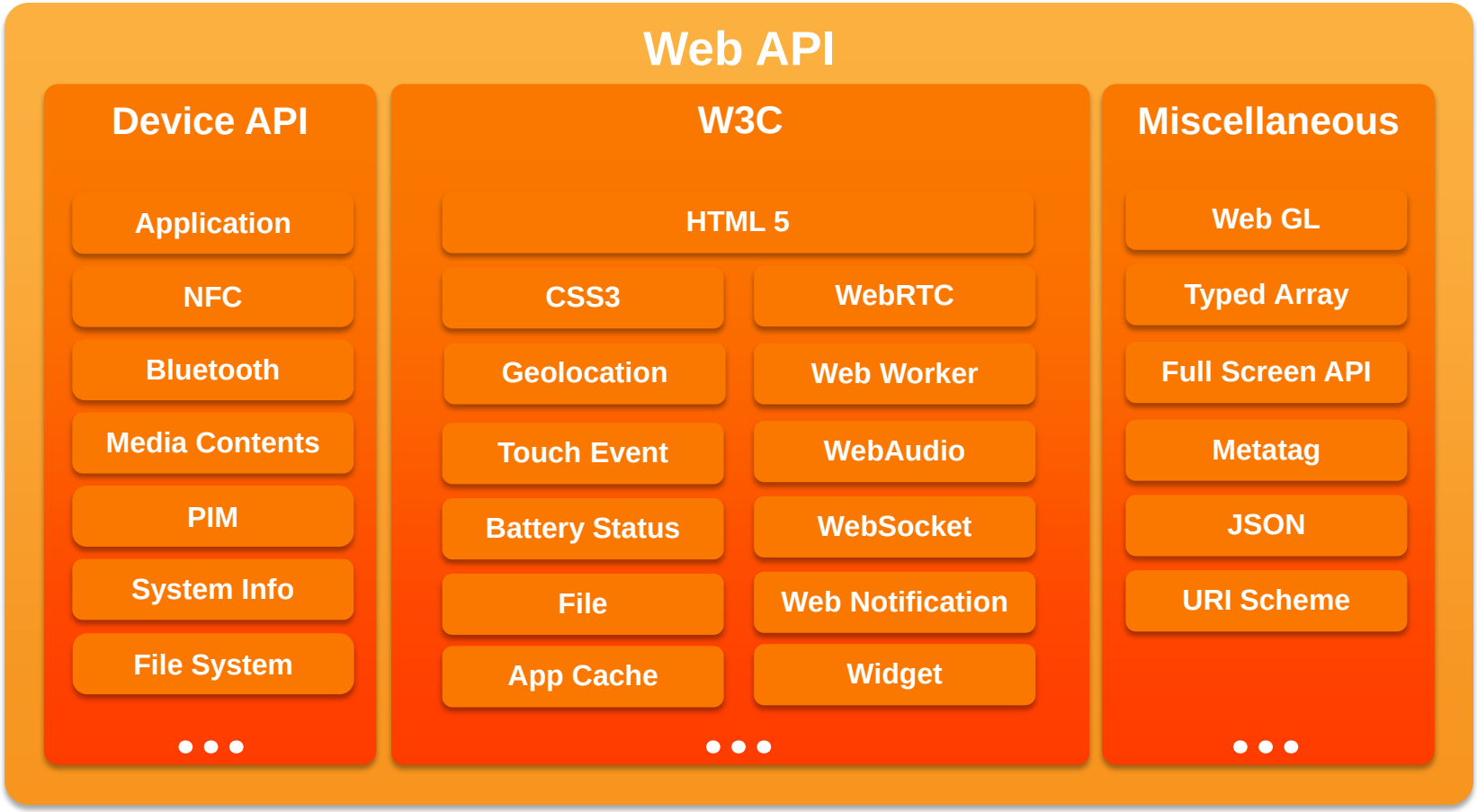
```
// Define success callback
function successCallback(contacts) {
  console.log(contacts.length + " contacts found.");
}

// 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

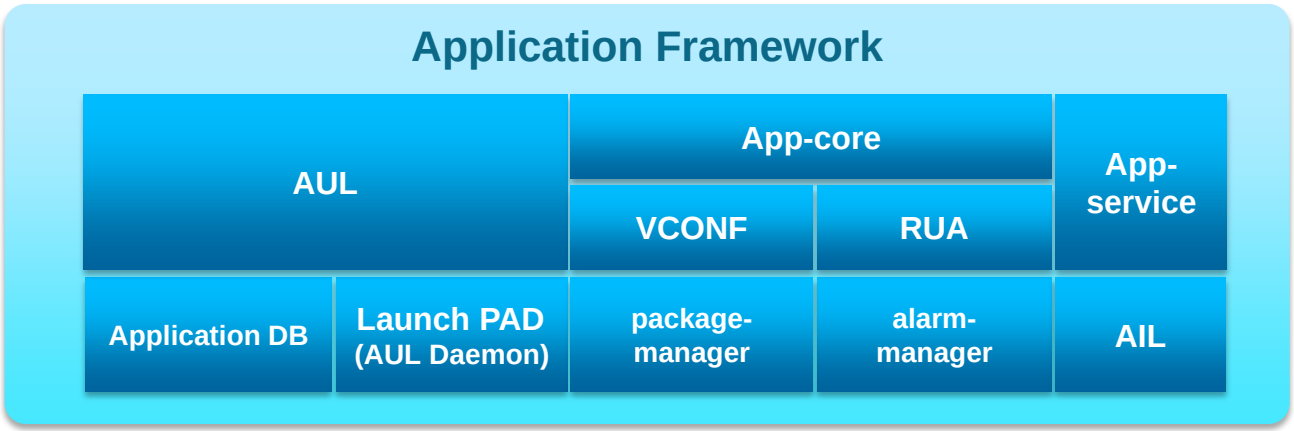


Tizen Core Services

Application Framework

- **Provides**
  - ✓ Launching a new 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 launch history (librua)
  - ✓ Setting an alarm to launch at specific time (alarm-manager)

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

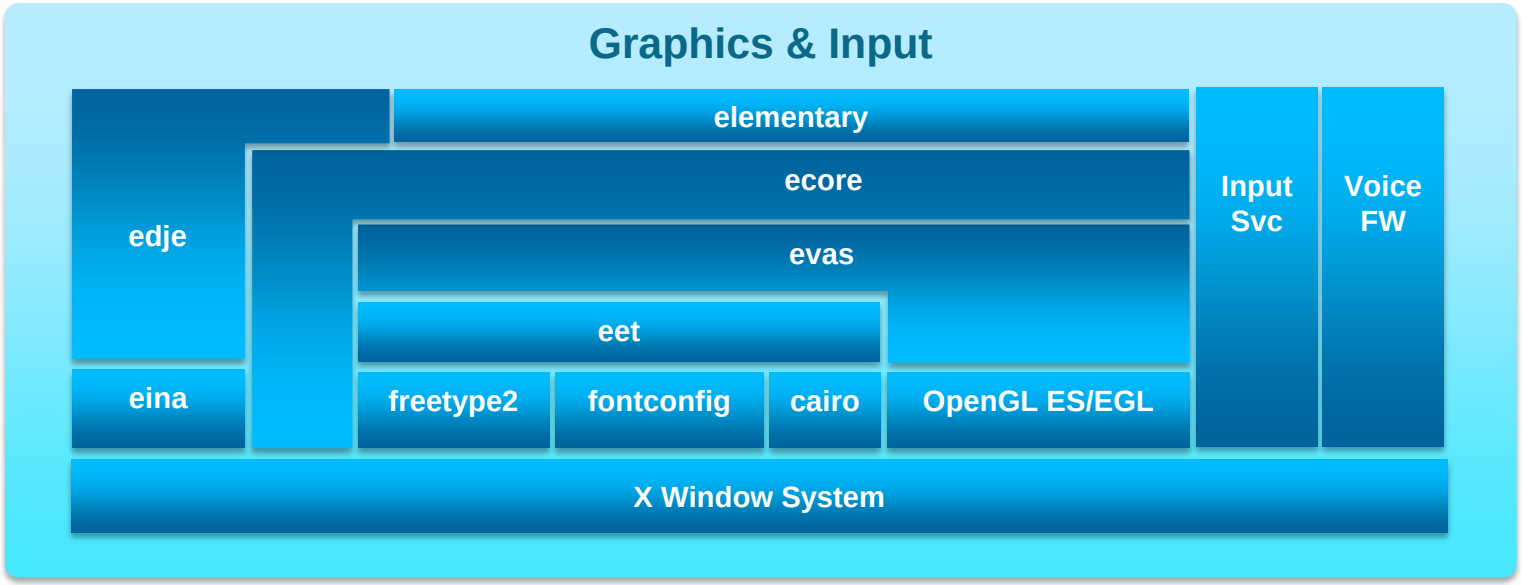


Graphics & Input

11:00–11:40	**Overview of Graphics and Input in Tizen** Seokjae Jeong, Samsung

- **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),

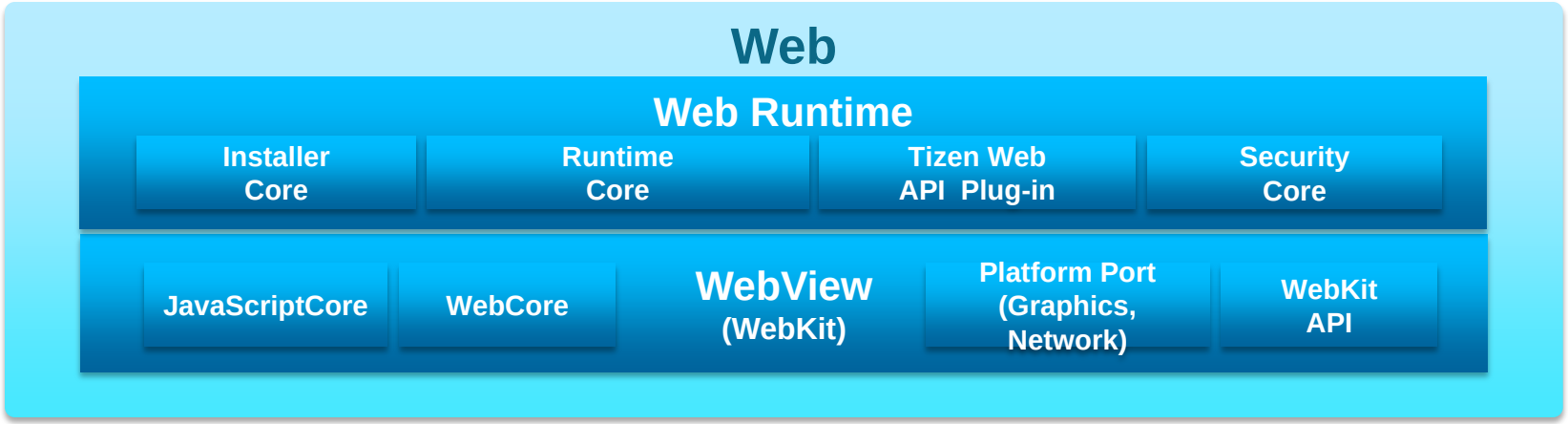
13:30–14:10	**Tizen Graphics Core—The Scenegraph (Evas)** Carsten Haitzler, Samsung



15:15-15:55	**Tizen Web Runtime** MingJin, 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:**
  - ✓ WebVeiw (WebKit /EFL): JavaScriptCore, WebCore(HTML5/W3C API implementation), WebKit API
  - ✓ Web Runtime: Execution environment for packaged Web Apps

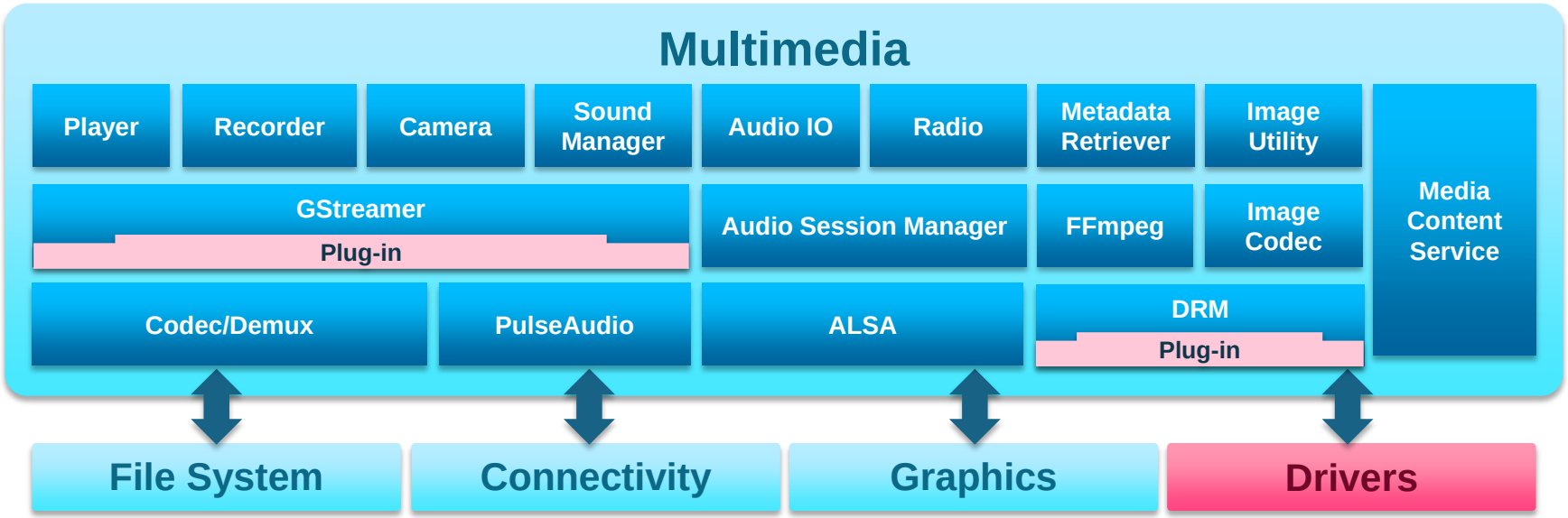


Multimedia (1/2)

- **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)

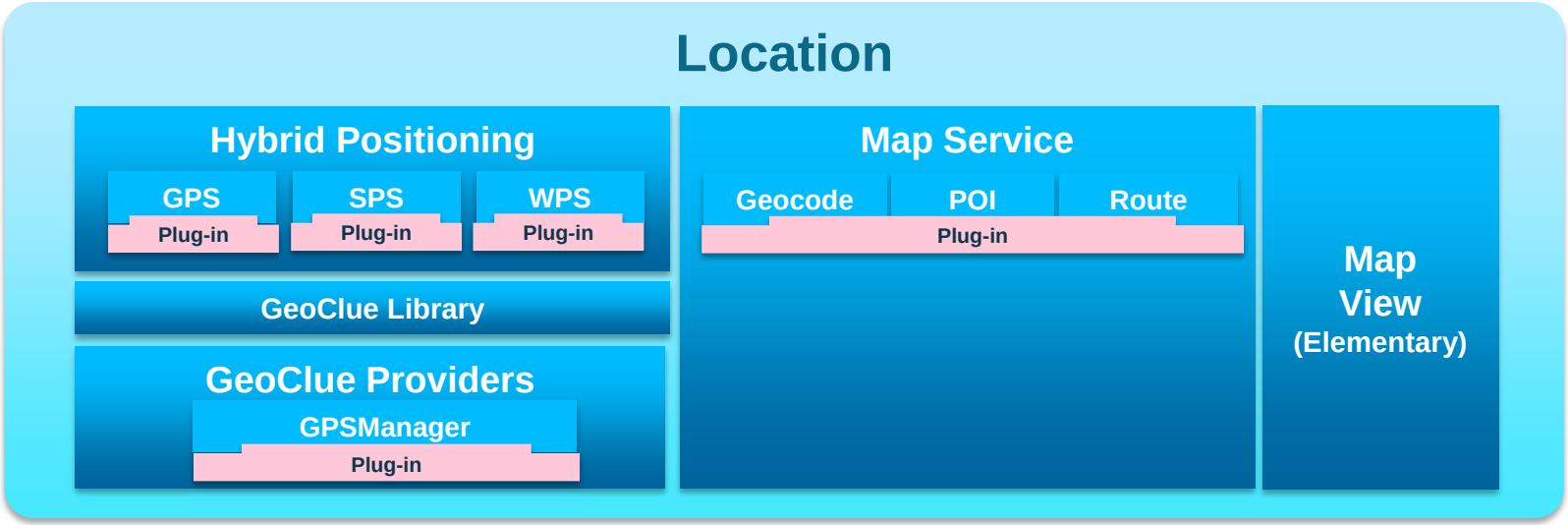
- **Key Components:**
  - ✓ GStreamer: Audio, Video, Recording, Streaming, Editing, Etc
  - ✓ Audio Session Manager: Sound Policy Management
  - ✓ PulseAudio: Software mixing multiple audio streams
  - ✓ Multiple-Format Codec: Various support of codec
  - ✓ Media Content Service: Content management for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



11:45-12:25	**Overview of Tizen Location** Young-Ae Kang, Samsung

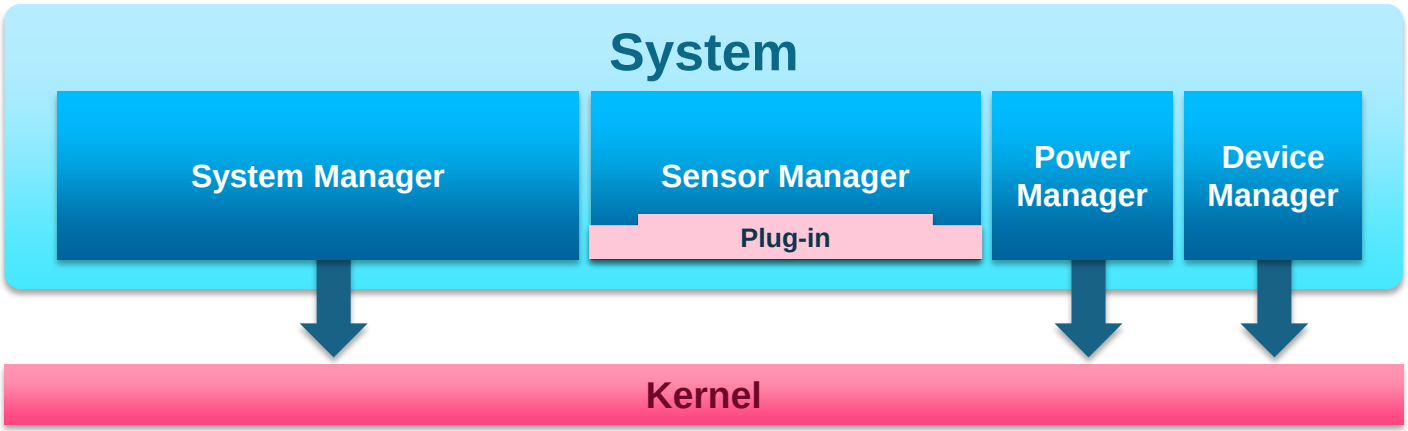
Location

- **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

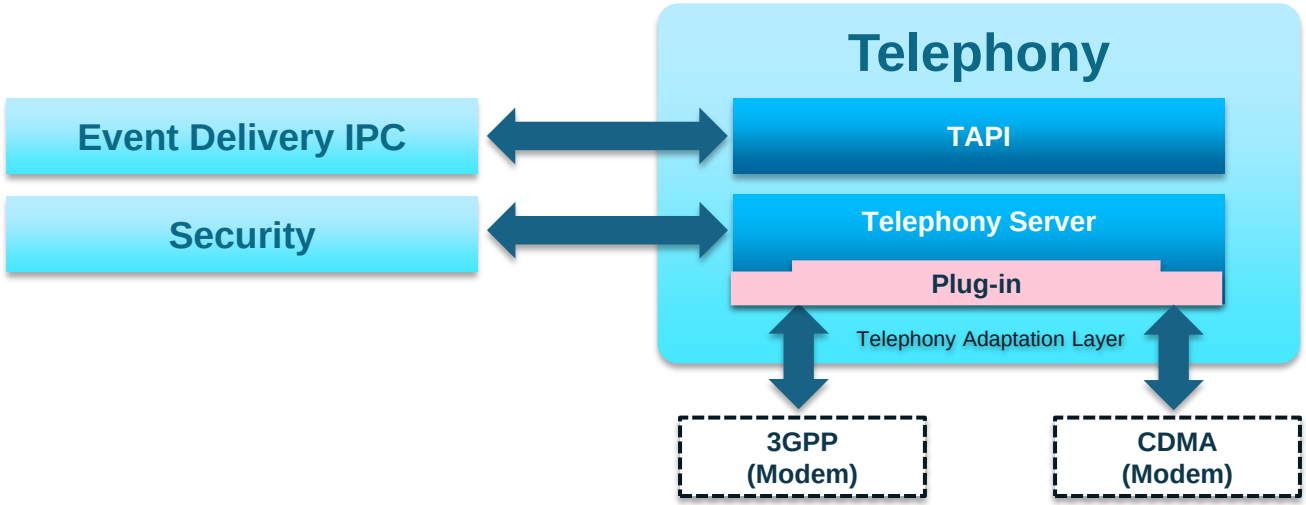


Connectivity

- **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 g, car emulator

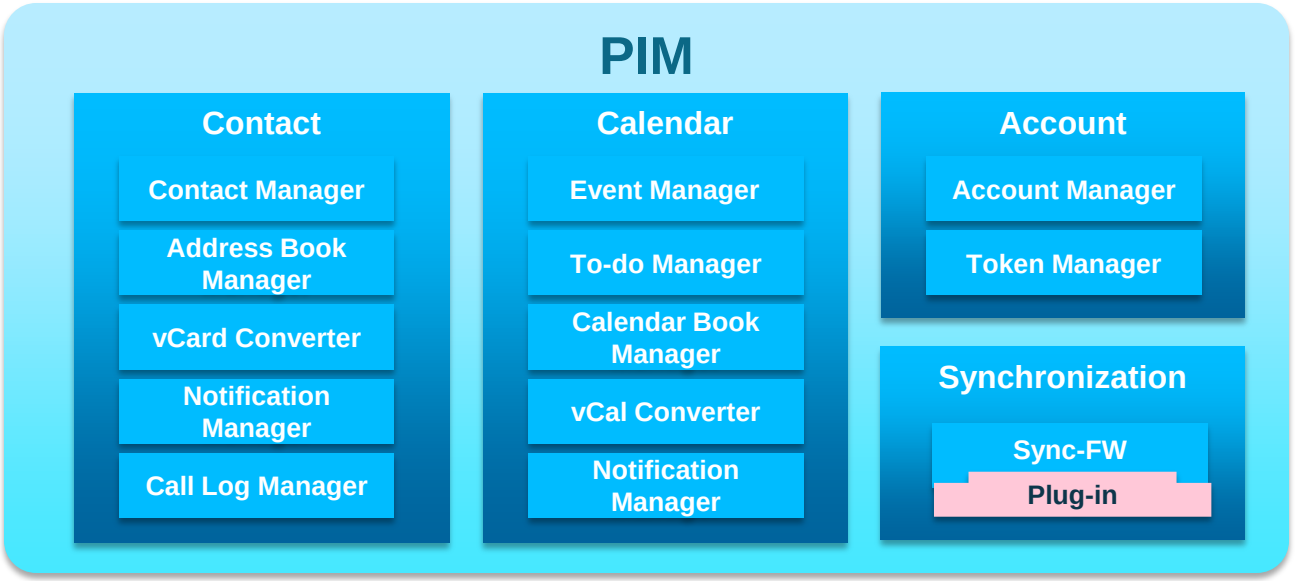
Telephony

- **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



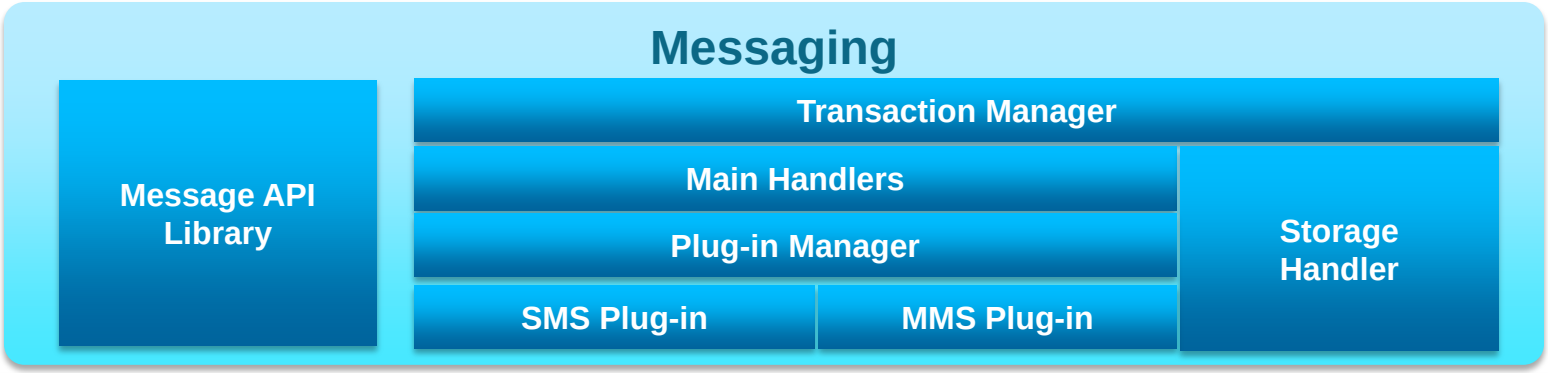
PIM

- **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)



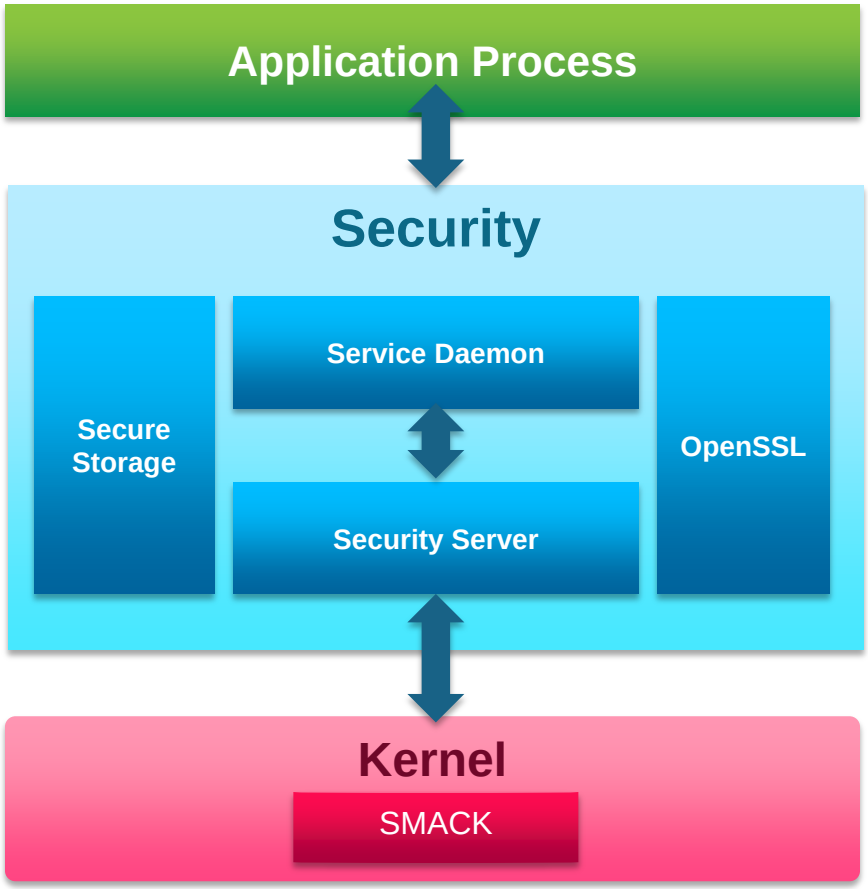
Messaging

- **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

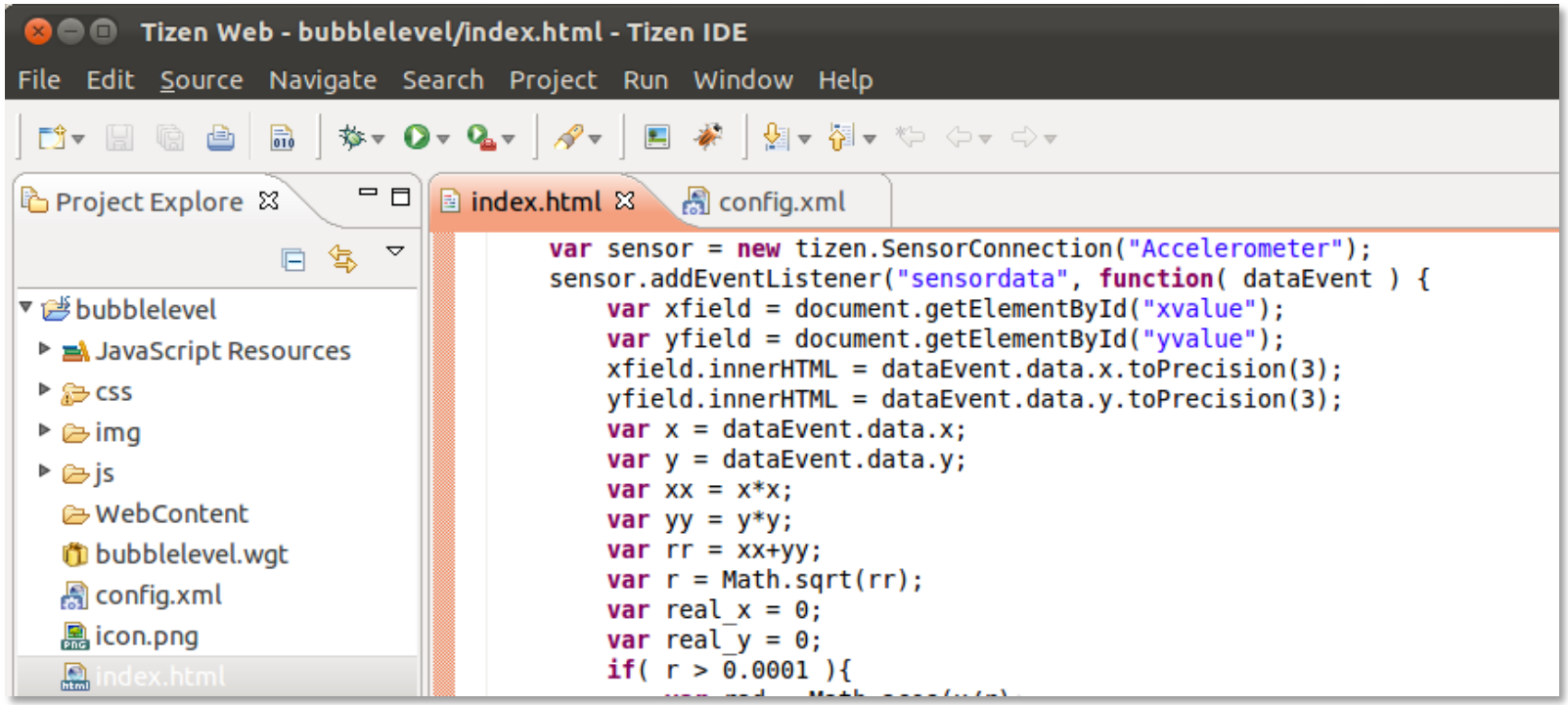


SDK

15:15-17:15	**HANDS-ON LAB**—GRAND BALLROOM

Development Tool: SDK

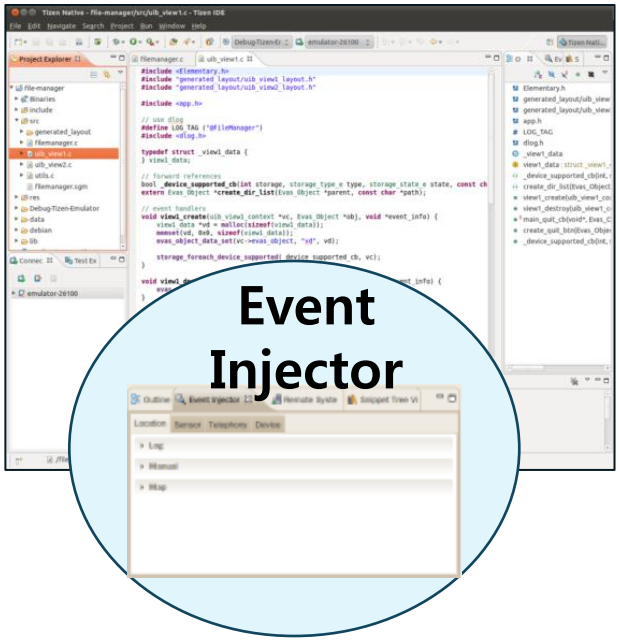
- IDE
  - ✓ Competitive editor for HTML, CSS, JavaScript
  - ✓ Wizard and various templates: basic, jQuery mobile based, Tizen Web UI FW based, and HTML5 boiler plate
  - ✓ Debugging support: JavaScript console, log view, inspectors



Development Tool: SDK

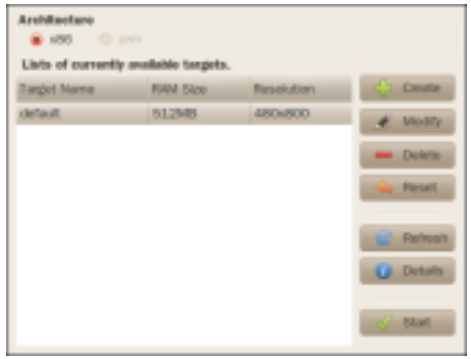
- **Emulator**
  - ✓ Various Device Emulation based on open source QEMU
  - ✓ H/W Acceleration on Host PC (OpenGL ES, EvasGL, WebGL, Etc)
  - ✓ Event Injector for Sensors, Call/SMS, LBS, Etc

IDE



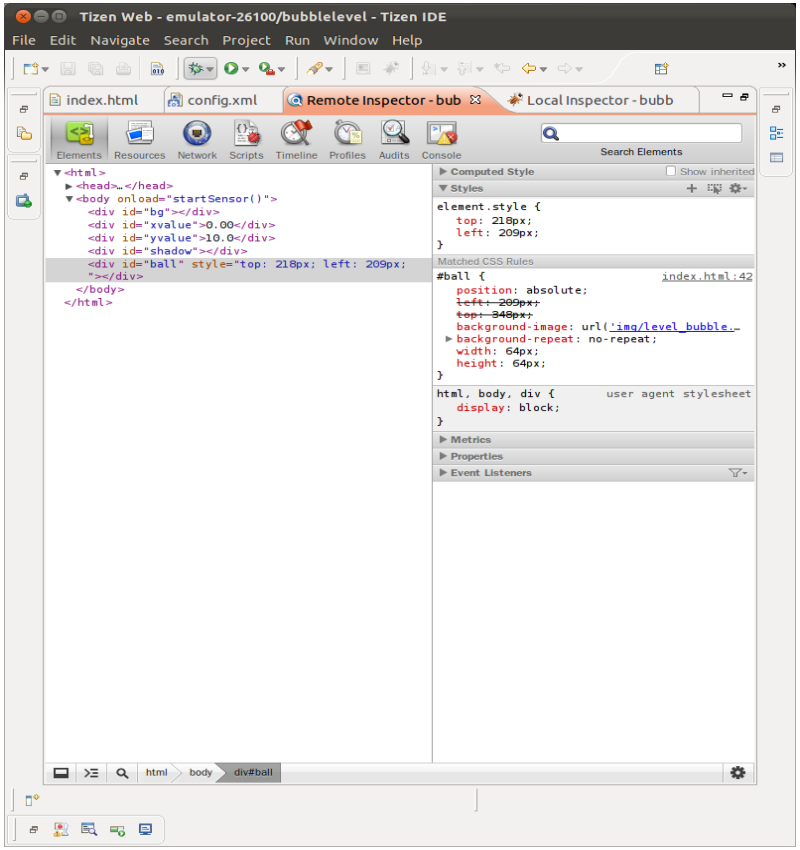
Emulator

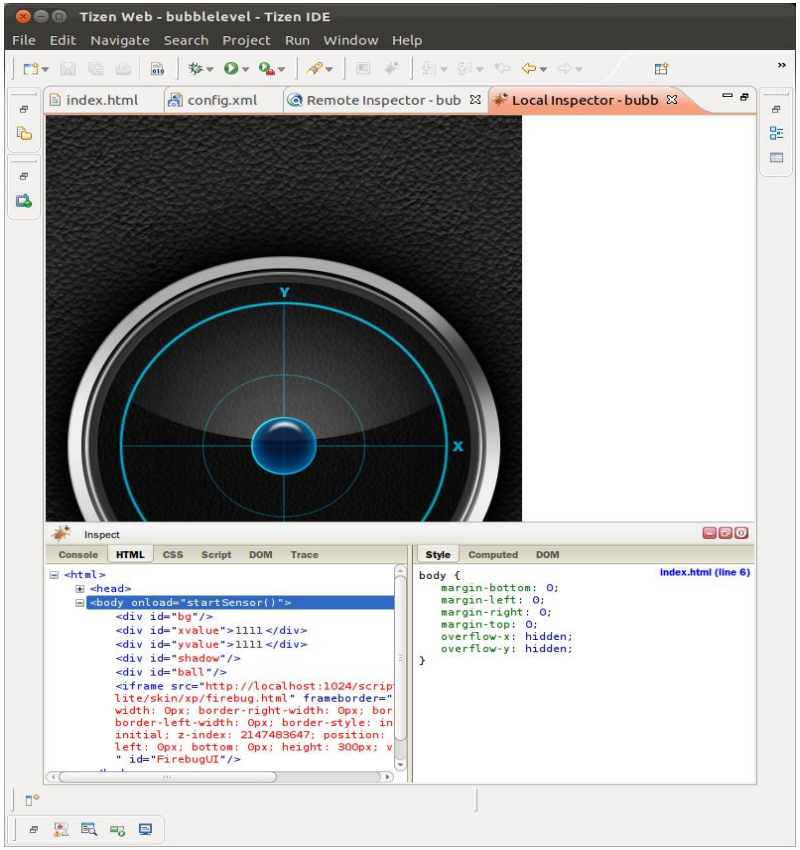
Emulator Manager



Development Tool: SDK

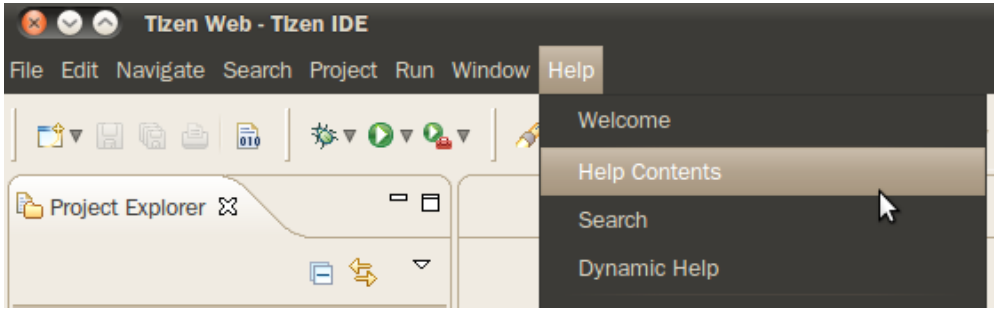
- **Web Debugging**
  - ✓ Remote Inspector (Webkit Inspector)
  - ✓ Local Inspector (Firebug)



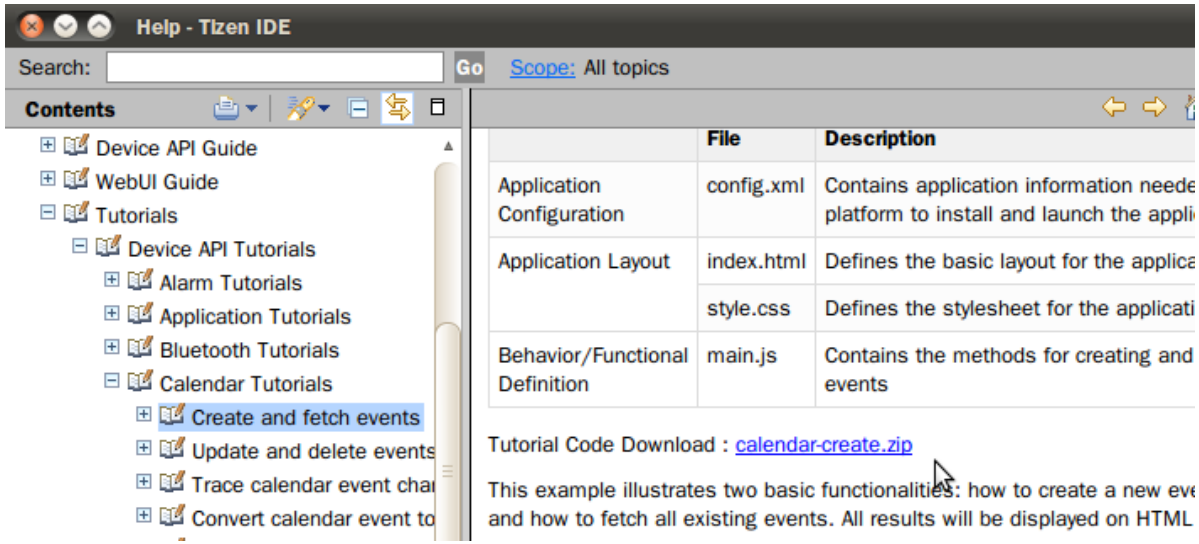


Development Tool: SDK

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



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



Q&A