Introduction to Tizen and Tizen Mobile Architecture

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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.

- MeeGo: Strong developer community
- LiMo: Broad service provider support

NEW

Tizen* is a trademark of the Linux Foundation.
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 |  |
|--------------------------|-----------|
|  | docomo, SK telecom, Vodafone, Orange, Telefónica, Sprint |

|  | OEMs |
|--------------------------|
| Samsung, Intel, Panasonic, NEC, Huawei |
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](https://www.tizen.org/conference)
- The first annual Tizen conference
  - Hyatt in SF, CA, May 7-9th, 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)
- 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.
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 Adaptation

- 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)*

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

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

### Graphics & Input
- **2D** *(EFL, cairo)*
- **3D** *(OpenGL ES/EGL)*
- **Window Mgmt** *(e17)*
- **Window System** *(X11)*
- **Font** *(Fontconfig, freetype2)*
- **ISF, Voice FW** *(isf, ise, STT, TTS, plugin)*

### System
- **IPC** *(D-Bus)*
- **Database** *(SQLite)*
- **Essentials** *(glibc, …)*

### Telephony
- **Cellular** *(telephony-daemon)*

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

### Multimedia
- **Video** *(Gstreamer, plugin)*
- **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** *(libsock, libcurl)*
- **NFC** *(nfc-manager, plugin)*
- **Wi-Fi** *(wpa_supplicant)*

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

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

### App Launch
- **AUL** *(app-service)*

### Runtime
- **WRT**

### ISF, Voice FW
- **ISF**, **Voice FW** *(isf, ise, STT, TTS, plugin)*

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*Note: This diagram illustrates the core services of the Tizen mobile operating system, highlighting the components and dependencies that form the foundation of its architecture.*
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

```javascript
// 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)

**Application Framework**

<table>
<thead>
<tr>
<th>AUL</th>
<th>App-core</th>
<th>App-service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application DB</td>
<td>Launch PAD (AUL Daemon)</td>
<td>VCONF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RUA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>alarm-manager</td>
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<tr>
<td></td>
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<td>AIL</td>
</tr>
</tbody>
</table>

- 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

Overview of Graphics and Input in Tizen
Seokjae Jeong, 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, panorama, 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

Emulator Manager

Event Injector

IDE

Emulator

Event Injector
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