Tizen Architecture

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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.

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<thead>
<tr>
<th>Tizen Association Members</th>
<th>Operators</th>
<th>SK telecom</th>
<th>Vodafone</th>
<th>Orange</th>
<th>Telefónica</th>
<th>NTT docomo</th>
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<td>OEMs</td>
<td>Samsung</td>
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<td>Panasonic</td>
<td>NEC</td>
<td>Huawei</td>
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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

- Application
- Web Applications
- Core
- Web API
- Core Service
  - Application Framework
  - Graphics & UI
  - Multimedia
  - Web
  - Messaging
  - Location
  - Security
  - System
  - Base
  - Connectivity
  - Telephony
  - PIM
- Kernel
- Linux Kernel
Features:
- Linux Kernel
- Device Drivers
- Hardware Adaptation Layer
  - Plug-ins
- OpenGL ES/EGL Graphics Driver
  - DRM based graphics stack
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

```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
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

- 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)
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
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, 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
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
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