Tizen Architecture

Łukasz Stelmach
Samsung R&D Institute Poland

SmartDevCon²
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Outline

Introduction to Tizen

Inside Tizen

Tizen and others

Q&A

Outline
Introduction to Tizen
Inside Tizen
Tizen and others
Q&A

T-43
Good morning everyone, my name is Łukasz Stelmach, I work for Samsung R&D Institute Poland and I am going to talk about Tizen, some of its internals and externals.
Those of you who have followed Tizen development know probably more than I will tell today. I hope, however, that the rest would find my presentation interesting and educating.
Questions? Ask!

Introduction to Tizen

2013-09-12

Tizen Architecture
└Introduction to Tizen

Tizen isn't the most popular operating system yet, so I suppose a brief introduciton will be helpful.

Tizen

- **Open source**
  - GNU/Linux
  - WebKit
  - EFL
- **Standards-based**
  - POSIX
  - HTML5
- **Smart-embedded**
  - Phones
  - Tablets
  - IVI
  - TV

TIZEN

Tizen
- **Open source**
  - GNU/Linux
  - WebKit
  - EFL
- **Standards-based**
  - POSIX
  - HTML5
- **Smart-embedded**
  - Phones
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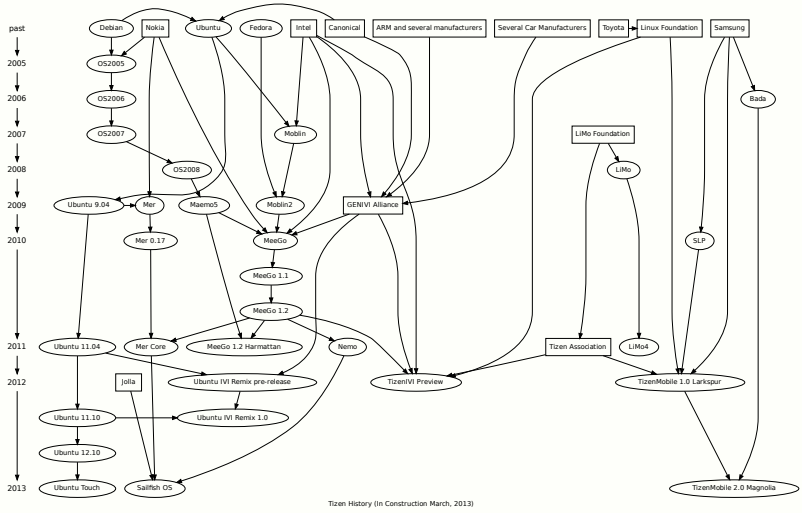
  - TV

T-40

- **It has GNU/Linux basic userland**
- **POSIX + HTML5**
- **Smart-embedded devices**

Family tree (https://github.com/kumadasu/tizen-history)



Tizen History (In Construction March, 2013)

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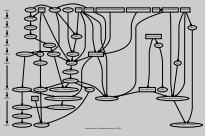

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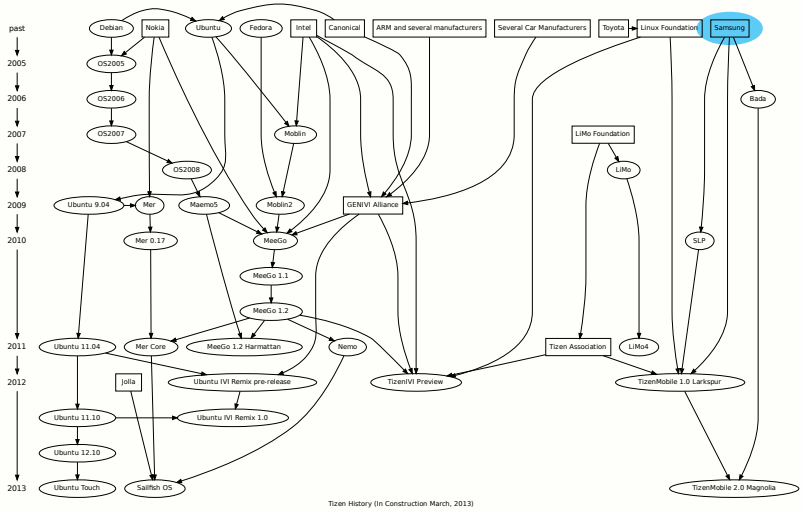

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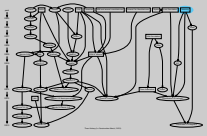

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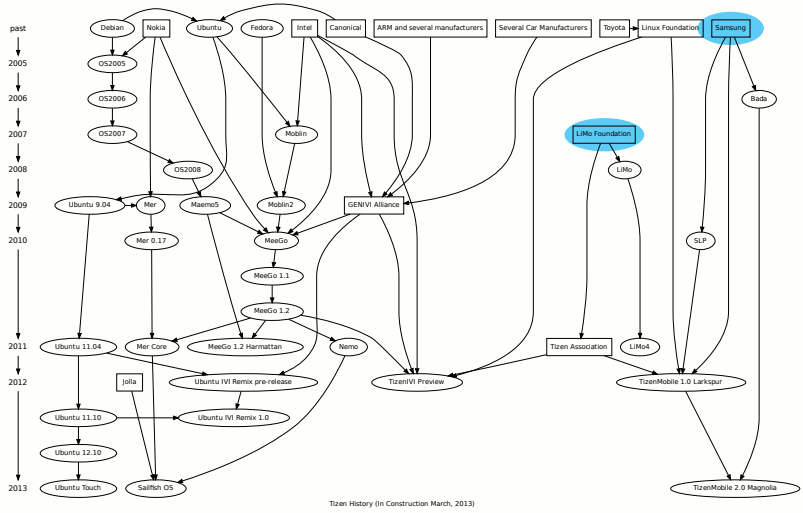

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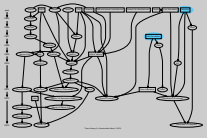

In 2007, Samsung together with other manufacturers established LiMo Foundation. Its mission was to create an open, Linux-based software platform for mobile devices. http://www.theregister.co.uk/2007/01/26/limo_founded/

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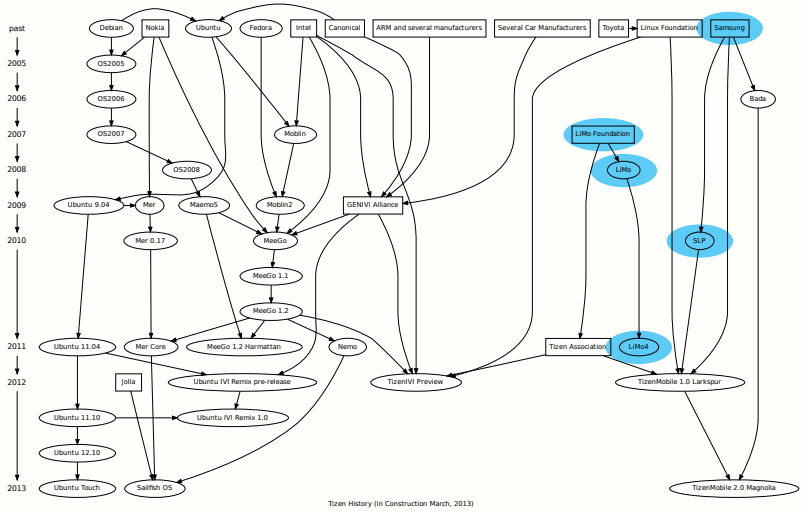

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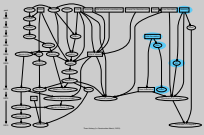

The foundation released two version of the platform with significant contribution ported from Samsung's SLP.

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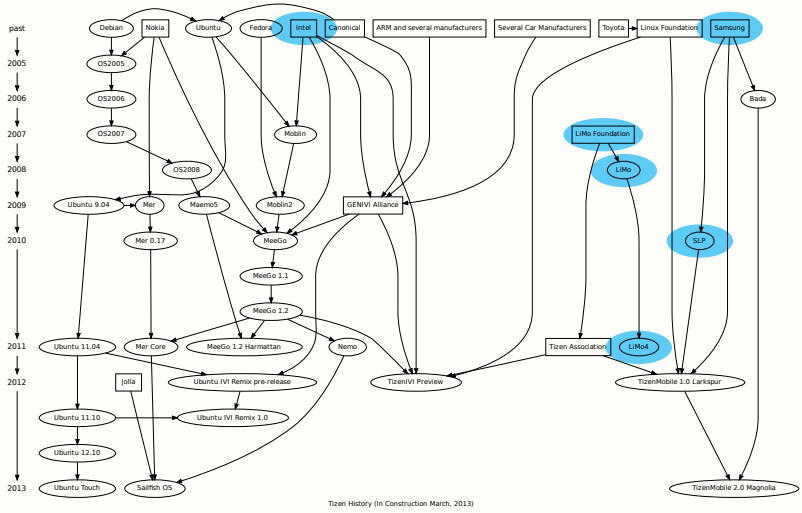

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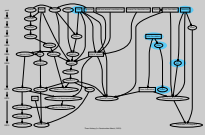

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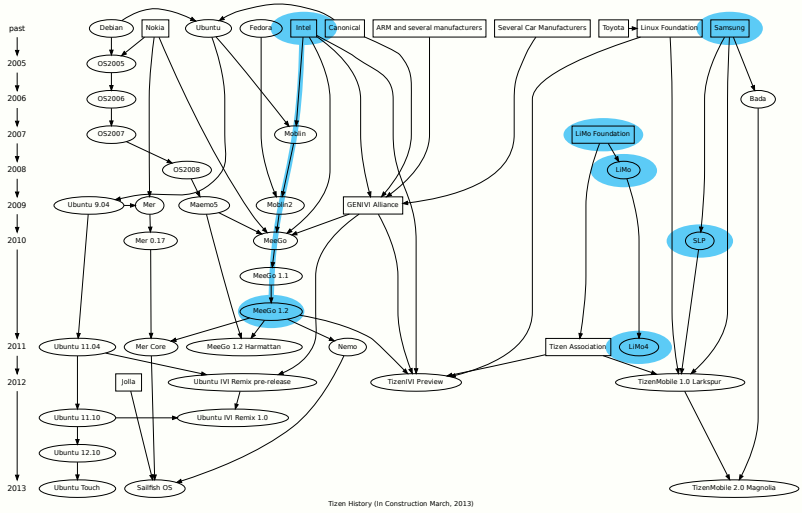

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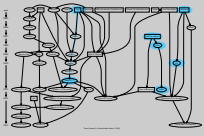

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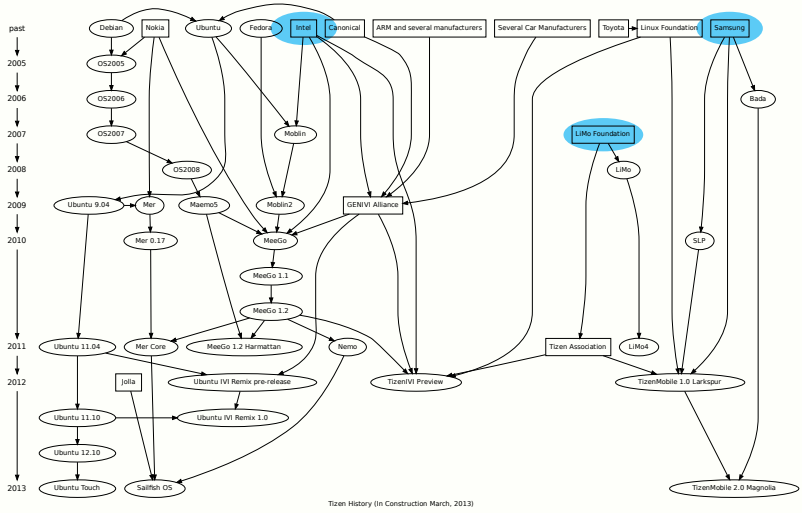

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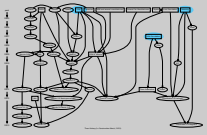

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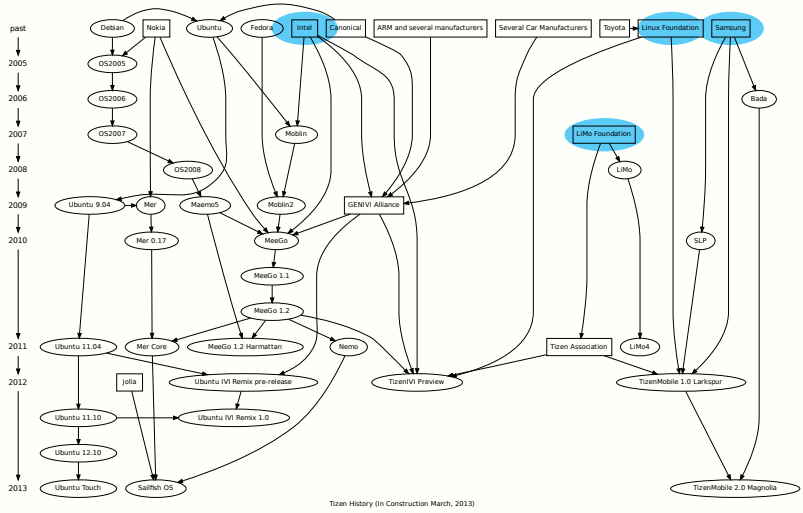

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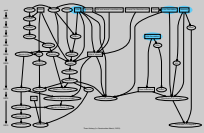

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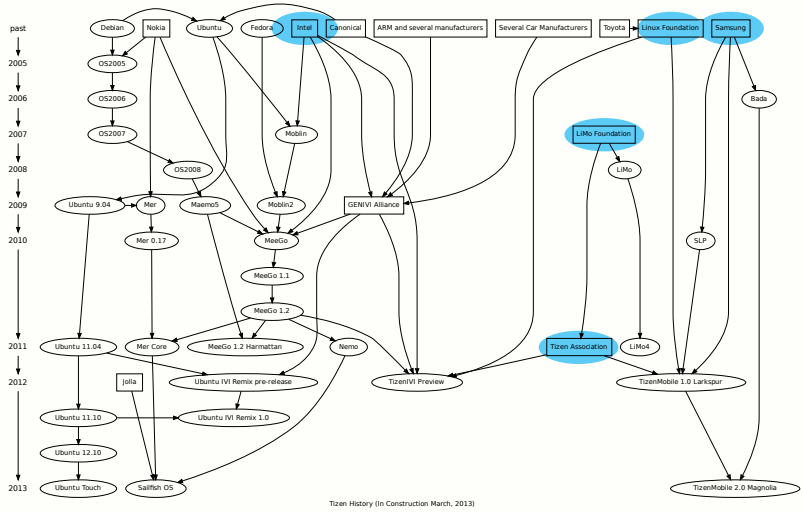

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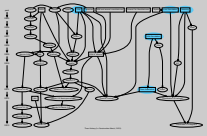

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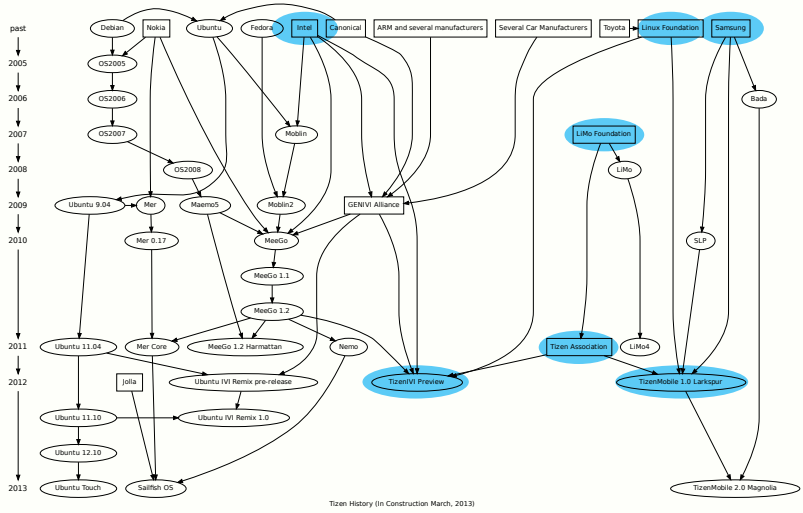

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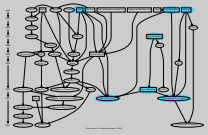

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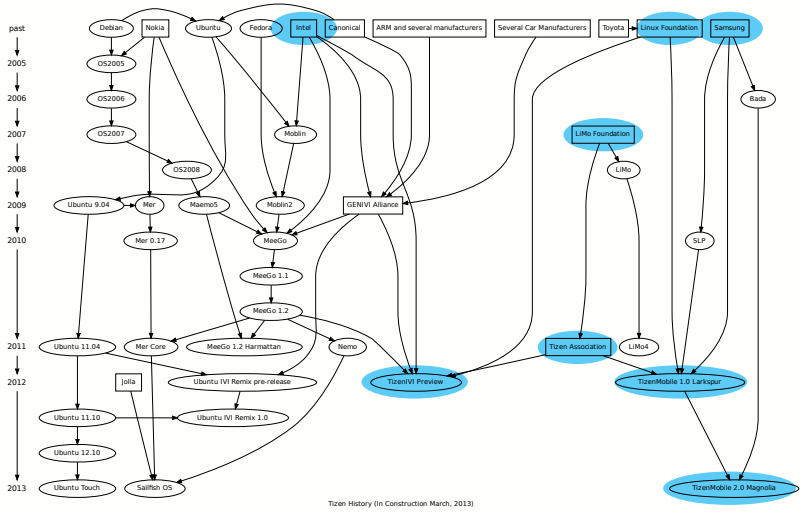

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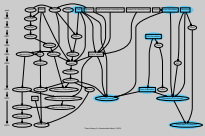

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Tizen's origins, things to remember

- **LiMo $\rightarrow$ Tizen Association**
- **Samsung + Intel**
- **Tizen $\neq$ MeeGo**
- **Tizen has got few bits from MeeGo**
  - Connman
  - oFono
  - BlueZ
  - RPM
  - staff
- **I assure you we are open.** http://www.tizen.org

Tizen's origins, things to remember

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T-33
The things I would like you to remember are:

- **Tizen Association continues efforts of LiMo foundation**
- **Samsung and Intel are the main contributors to Tizen**
- **Tizen is not MeeGo although Intel brought some useful bits from it.**

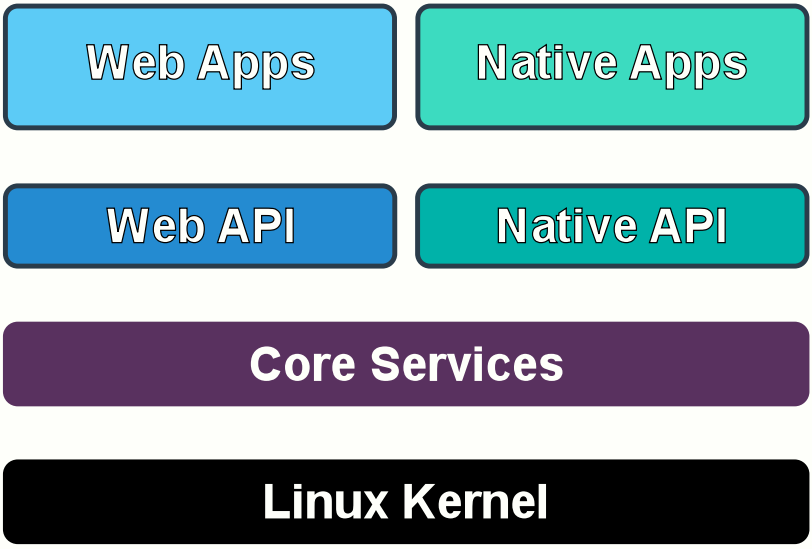
The first releases have been developed in a closed environment and released afterwards. The development process of the 3.0 is fully transparent. http://www.tizen.org

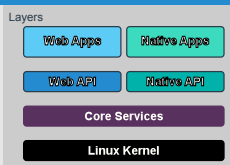
Inside Tizen

2013-09-12

Tizen Architecture
└Inside Tizen

Layers





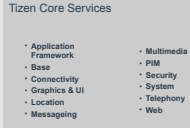
T-32
Layers… we like them don't we. The picture is pretty simple while still being true, unbelivable.

- **Kernel (*mainline*)**
- **Core (GNU + Tizen)**
- **APIs (Bada + WebRuntime)**
- **Applications (C++ + HTML)**

In my team we develop one of many parts of the Core layer. This is what I know best and it isn't exposed directly to developers so I would like to talk about it a little.

Tizen Core Services

- **Application Framework**
- **Base**
- **Connectivity**
- **Graphics & UI**
- **Location**
- **Messageing**
- **Multimedia**
- **PIM**
- **Security**
- **System**
- **Telephony**
- **Web**



Application Framework, Base, Connectivity, Graphics & UI, Location, Messageing, Multimedia, PIM, Security, System, Telephony, Web

Base

- **A basic self-contained GNU/Linux userland**
- **Boots to console with a login prompt**
- **Toolchain**
- **Support libraries**
  - database access
  - i18n
  - XML and others

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Base

- A basic self-contained GNU/Linux userland
- Boots to console with a login prompt
- Toolchain
- Support libraries
  - database access
  - i18n
  - XML and others

T-30
Although this part is completely invisible to the end-user and even developers aren't supposed to be exposed to it to much it is crucial that it works flawlessly. To make sure it does we put here as much free software as possible.

- **gnu/linux userland**
- **systemd as init**
- **gcc toolchain**
- **libraries, pretty much the same you find on a desktop linux.**

Application Framework

- **Application state management**
- **Pre-defined services**
- **Notifications**
- **Package management**
- **Alarm/time management**

Application Framework
- Application state management
- Pre-defined services
- Notifications
- Package management
- Alarm/time management

- **Pre-defined like dialer**
- **Notifications about system events: batteries, orientation (sensors)**

Network & Connectivity

- **TCP/IP connection**
- **Bluetooth**
- **HTTP**
- **NFC**
- **Wi-Fi**

Network & Connectivity

- TCP/IP connection
- Bluetooth
- HTTP
- NFC
- Wi-Fi

- **connectivity ConnMan**
- **Bluetooth (BlueZ)**
- **HTTP: libsoup, curl**
- **NFC**
- **Wi-Fi: direct**

Graphics & UI

- **X11**
- **OpenGL**
- **Enlightenment Foundation Libraries (EFL)**
- **Input methods**

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Graphics & UI

- X11
- OpenGL
- Enlightenment Foundation Libraries (EFL)
- Input methods

- **Tizen graphics stack is based on X11, we are experimenting with Wayland**
- **OpenGL**
- **EFL present, several applications use it but not an official API**
- **Input Methods**

Location

- **GeoClue**
  - GPS
  - WiFi
  - 3G
  - GeoIP
  - Geocoding

Location

- **GeoClue**
  - GPS
  - WiFi
  - 3G
  - GeoIP
  - Geocoding

Location services are based on GeoClue. Currently the following we've got plugins to do the following tasks. GPS, WiFi, 3G/Network, GeoIP, Geocoding

Messaging

- **SMS, MMS**
- **Email**
- **Push**

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Messaging
- SMS, MMS
- Email
- Push

Samsung is going to provide application developers with a cloud-part of the push. You need to register your application and you can use Samsung's cloud to forward messages for it.

Multimedia

- **Video**
- **Audio**
- **Camera**
- **Audio Policy**
- **3D Audio**

Multimedia

- Video
- Audio
- Camera
- Audio Policy
- 3D Audio

Multimedia framework is ready to support hardware codecs for Video. There are ongoing works to support audio.
Audio policy, scenarios provided by PulseAudio.

PIM

- **Contacts**
- **Calendar**
- **Accounts**
- **Synchronisation**

PIM

- Contacts
- Calendar
- Accounts
- Synchronisation

Security

- **Access control**
- **Certificates**
- **Secure storage**
- **Cryptography**
- **DRM**

Security

- Access control
- Certificates
- Secure storage
- Cryptography
- DRM

- **Tizen is the first commercial-grade system to use SMACK**
  Certificats, Secure storage, Cryptography, DRM

System

- **Sensors**
- **Power management**
- **System settings**

System

- Sensors
- Power management
- System settings

Telephony

- **Telephony services**
- **Network communication**
- **SIM management**

Telephony

- Telephony services
- Network communication
- SIM management

Web

- **WebKit: layout + rendering**
- **WebRuntime**

Web

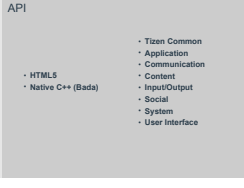
- WebKit: layout + rendering
- WebRuntime

- **You can find my colleagues' contribution at WebKit.org**
- **Saturday, 2013-09-14 09:00 — *Webruntime in Tizen*, Janusz Majnert (T2)**

API

- **HTML5**
- **Native C++ (Bada)**

- **Tizen Common**
- **Application**
- **Communication**
- **Content**
- **Input/Output**
- **Social**
- **System**
- **User Interface**



T-20
Those services are available through proper APIs to both native and HTML5 applications.
Thre are two official sets of APIs: HTML5 and C++. The former based on WebRuntime the latter is a Linux port of Samsung's OSP Bada framework. The former is cross platform the latter is not. If you want to know more about HTML5 runtime we will meet at Janusz Majnert's talk on Saturday.
You may ask what about: EFL, Qt? The former, although present, is not a part of the official API. The latter isn't there, officially. Qt has been ported to Tizen and Jarosław Staniek will tell you more about it on Saturday too.

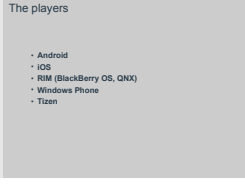
Tizen and others

Tizen and others

No numbers. I don't want to speak about numbers on the following slides. The numbers are different everytime you look at them. Besiedes, most of you porbably, know them better than I do. I'd like to show a qualitive comparison between the most common mobile operatiing systems… and Tizen.
This is my own view and I am not an application developer. My conclusions may not apply to you if you are one. If it happens so, I will be glad to discuss it during Q&A part.

The players

- **Android**
- **iOS**
- **RIM (BlackBerry OS, QNX)**
- **Windows Phone**
- **Tizen**



T-18

- **Android: Aparently Google wants too much leaving little for: manufacturers, operators (developers?).**
- **iOS: to me it seems like it too much depend on fashion/trend.**
- **Windows Phone: that's becoming quite interesting**
- **Tizen: new kid on the block. The first mobile devices are going to be released by the end of this year.**

Areas of applications

- **Android: pretty much anything**
- **iOS: iStuff**
- **RIM: Blackberry phones and tablets**
- **Windows Phone: Nokia (mostly)**
- **Tizen: pretty much anything**

Areas of applications

- Android: pretty much anything
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Software development

- **Android: Java**
- **iOS: ObjectiveC**
- **RIM: Native (C/C++), HTML5, Adobe AIR, Android (BB10)**
- **Windows Phone: .NET, C++**
- **Tizen: Native (C++), HTML5, (Android via ACL)**

Software development

- Android: Java
- iOS: ObjectiveC
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- Windows Phone: .NET, C++
- Tizen: Native (C++), HTML5, (Android via ACL)

T-14

- **iOS Developer license to run a code on a device**
- **RIM: most versatile**
- **ACL: Andoroid APK to Tizen TPK with a little help from OpenMobile**

Platform development

- **Android: open (?)**
- **iOS: closed**
- **RIM: closed**
- **Windows Phone: closed**
- **Tizen: open (!)**

TIZEN

Platform development

- Android: open (?)
- iOS: closed
- RIM: closed
- Windows Phone: closed
- Tizen: open (!)

T-12
Android dev. model is technicaly open. There are community driven distributions like CyanogenMod. However, Android does not run on the mainline Linux kernel. Google, driven by NIH syndrome, wrote a lot of code just to make sure they don't have any GPL code in userland.
Tizen: Is becoming an opensource project. Tizen is going to run on mainline kernel because we push our changes upstream. As I mentioned before there we've got GPL userland and it's not a problem for us. If some piece software needs modification to meet our needs we work with its developers to push changes upstream and get them back with the latest version.

Software distribution

- **Android: Play Store**
- **iOS: App Store**
- **RIM: BlackBerry World**
- **Windows Phone: Windows Phone Store**
- **Tizen: Tizen Store (?)**

Software distribution
- Android: Play Store
- iOS: App Store
- RIM: BlackBerry World
- Windows Phone: Windows Phone Store
- Tizen: Tizen Store (?)

T-10

- **Android: Play or not, no problem.**
- **iOS: I do not follow the news and I remember that in the beginning application development was quite risky as one could find one day that Apple didn't like an app that took three months of full time development and was supposed to be the beginning of a start-up.**
- **Tizen store is open for developers. How it is going to work? TBD**

Q&A

2013-09-12

Tizen Architecture
└Q&A

Thank you

Łukasz Stelmach <l.stelmach@samsung.com>

More About Tizen

- **Friday, 2013-09-13**
  - 15:15 — *Creating a Tizen Application*, Kamil Grondys (T1)
  - 17:30 — *HTML5* Features, Wojciech Bielawski (T2)
- **Saturday, 2013-09-14**
  - 09:00 — *Webruntime in Tizen*, Janusz Majnert (T2)
  - 11:15 — *Porting Qt to a new Smarthone for Fun and Fame*, Jarosław Staniek (T1)
  - 11:15 — Solution for Tizen/, Michał Knapiński and Michal Pawluk (T2)

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