

TIZEN™ DEVELOPER CONFERENCE MAY 7-9, 2012



Overview **Graphics and Input in Tizen**

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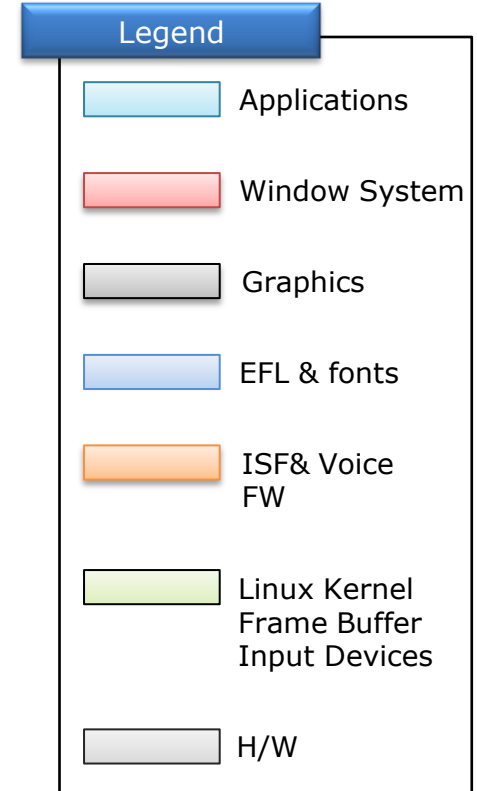
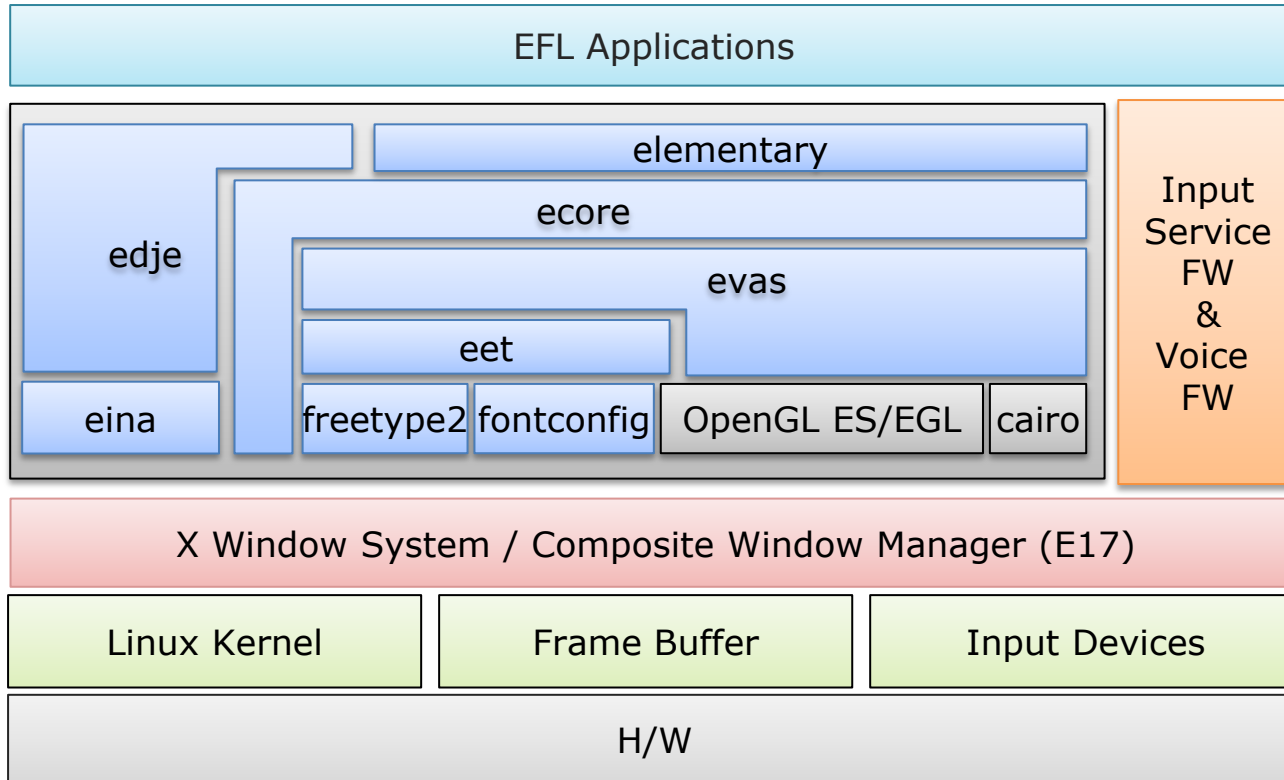
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- Elementary Widgets
- References

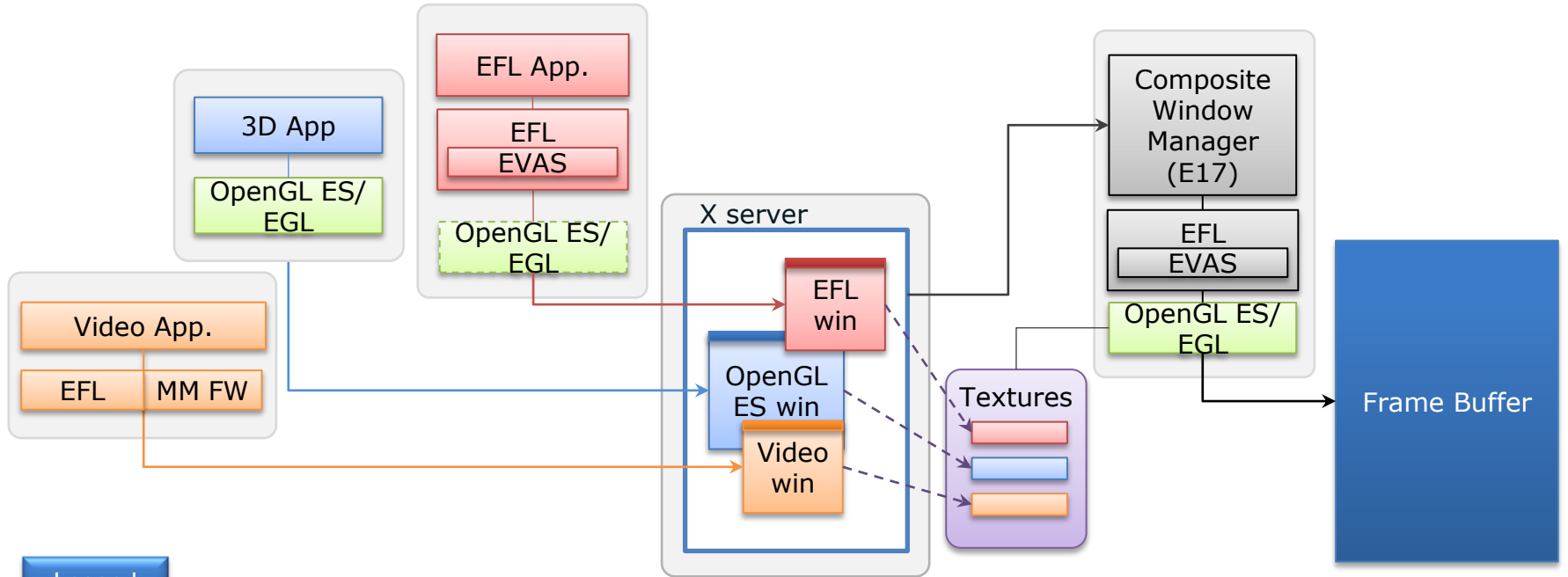
Overall Architecture

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Graphics & Input Architecture



Graphics Rendering Architecture



Legend

 3D App.	 EFL App.	 Multimedia App.	 OpenGL ES/EGL	 Configurable Enable/disable
 Process	 Texture Mem.	\longrightarrow Rendering pipeline path; rendering data flow	\dashrightarrow Texture from Pixmap	

Window System (X11)

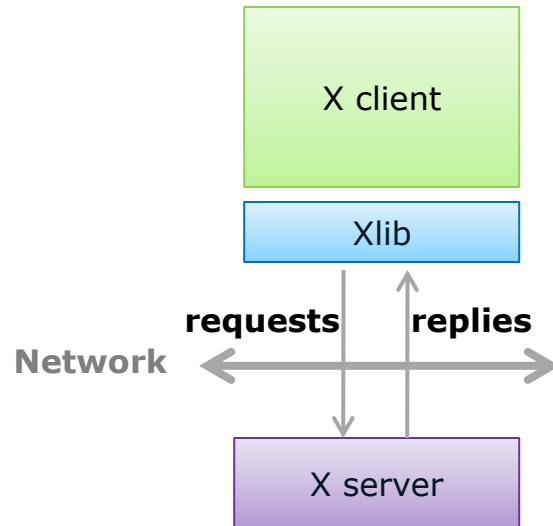
X Window System



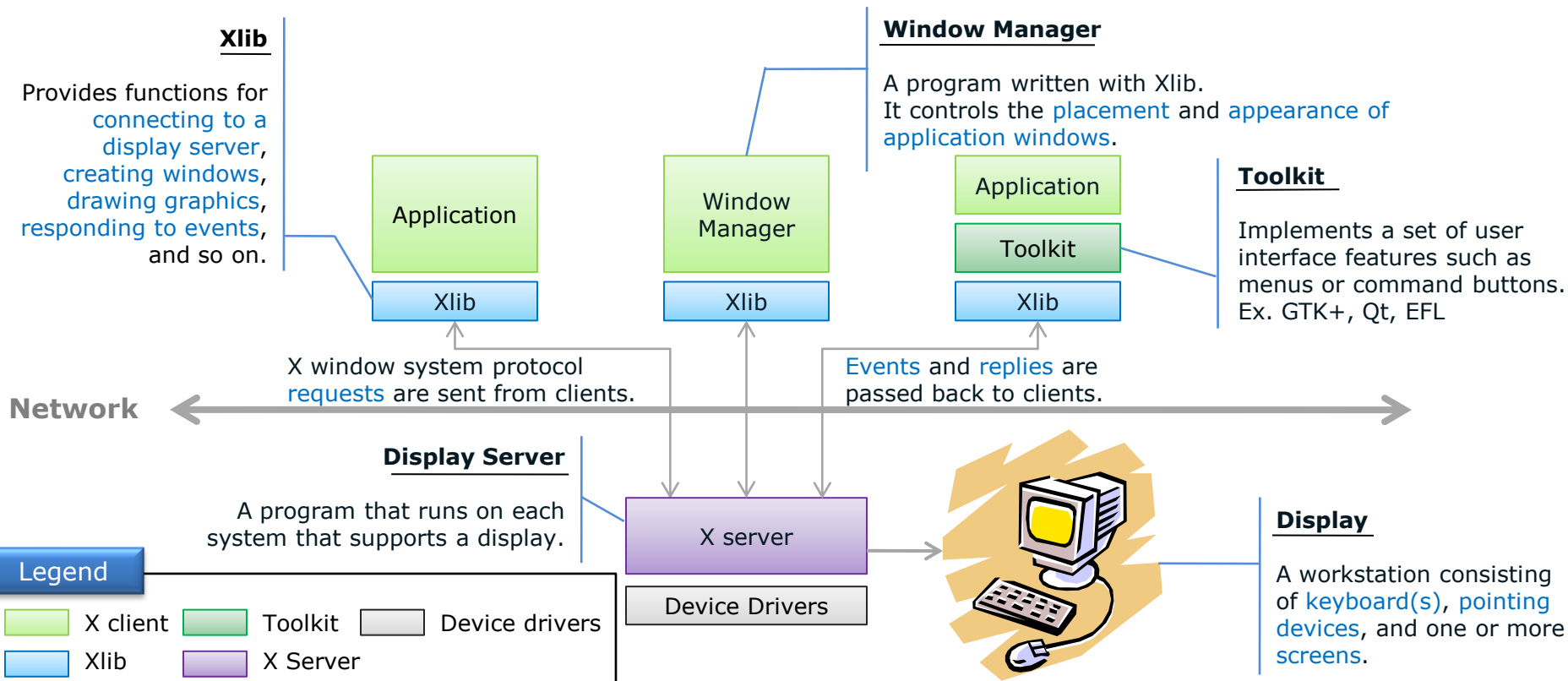
- X Window System History
 - X Window System is commonly called as [X11](#) or [X](#).
 - X originated at MIT in 1984.
 - The current protocol version, X11, appeared September 1987.
 - X was specially designed to be used over network connections rather than on an integral or attached display device.
 - At present, the [X.Org Foundation](#) leads the X project with the current reference implementation which is [X.Org server](#).
- Tizen 1.0 Larkspur includes X.Org R7.6 and xserver 1.9.3.

X Software Architecture (1/2)

- X has the client-server model architecture.
- X logically be thought to be two part, the client linked with Xlib called X client and the server which is generally called X server.
- The X client can communicate with X server through the X protocol translated by Xlib.
- The X client sends graphical request and gets user input.
- The X server accepts request for graphical output (windows) and sends back user input (keyboard, mouse).



X Software Architecture (2/2)



X Server (1/2)

Legend



Xlib



X Window System

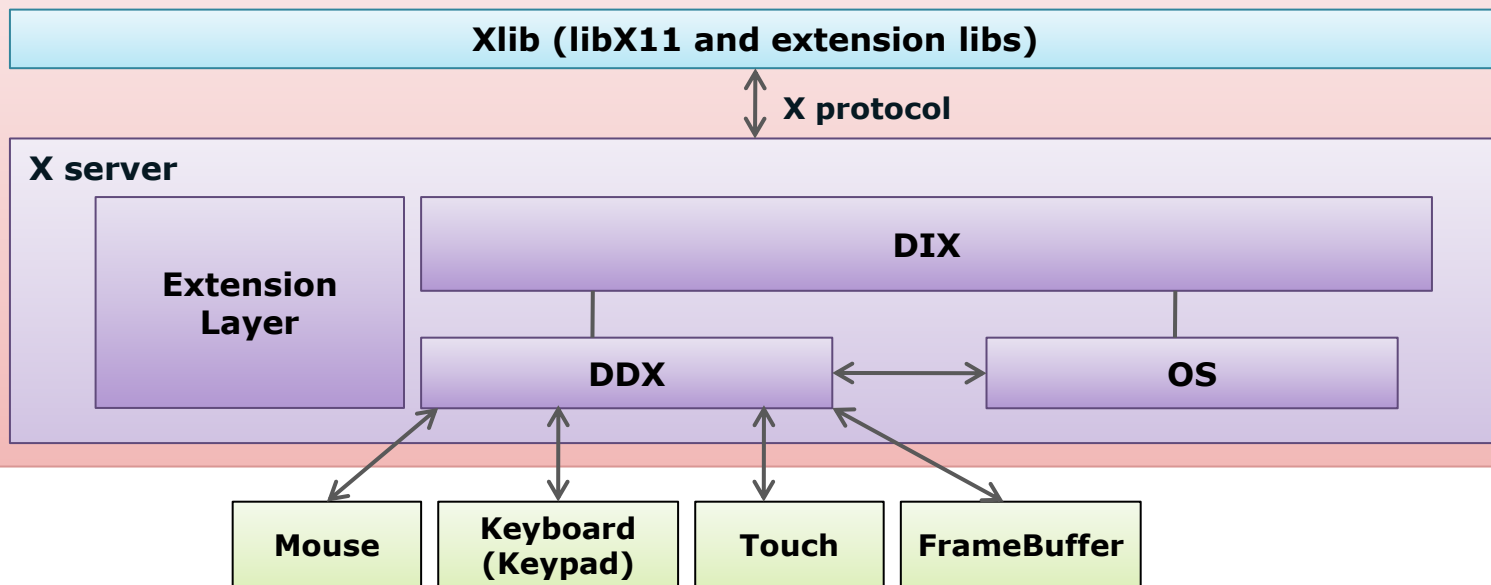


X server



Linux kernel / Frame Buffer / Device Drivers

X window system



X Server (2/2)

- DIX(Device Independent X) layer
 - Is the part of server [dealing with clients](#)
 - Gets requests from clients and sends input events to clients
 - Unpacks request and sends them to [the appropriate DDX or Extensions](#)
 - Enables X server to get [common functionality](#) in respect of X clients where the X server is ported on any device.
- DDX(Device Dependent X) layer
 - Is the part of server [dealing with hardware related in graphics and input](#)
- OS(Operating System) layer
 - Manages client connections
 - Schedules work to be done for clients
 - Provides routines for memory allocation and free
- Extension layer
 - Enables to get additional functionalities for X server

Enlightenment Foundation Libraries & Graphics


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What is EFL? (1/2)

- “Enlightenment” is not just a **window manager for Linux/X11** and others, but also a **whole suite of libraries** to help you create beautiful user interfaces with much less work than doing it the old fashioned way and fighting with traditional toolkits, not to mention a traditional window manager. It covers from small mobile devices like phones all the way to powerful multi-core desktops (which are the primary development environment).

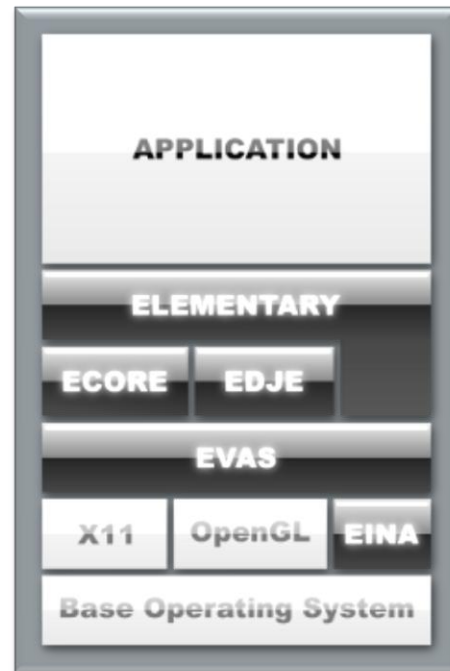


Enlightenment Window Manager

 www.enlightenment.org

What is EFL? (2/2)

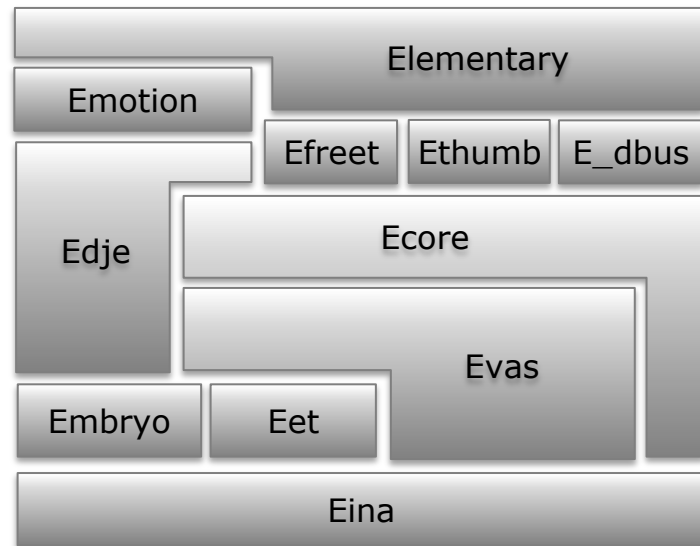
- These provide both a semi-traditional toolkit set in Elementary as well as the object canvas (Evas) and powerful abstracted objects (Edje) that you can combine, mix and match, even layer on top of each other with alpha channels and events in-tact. It has 3D transformations for all objects and more.



A simple overview of the EFL stack

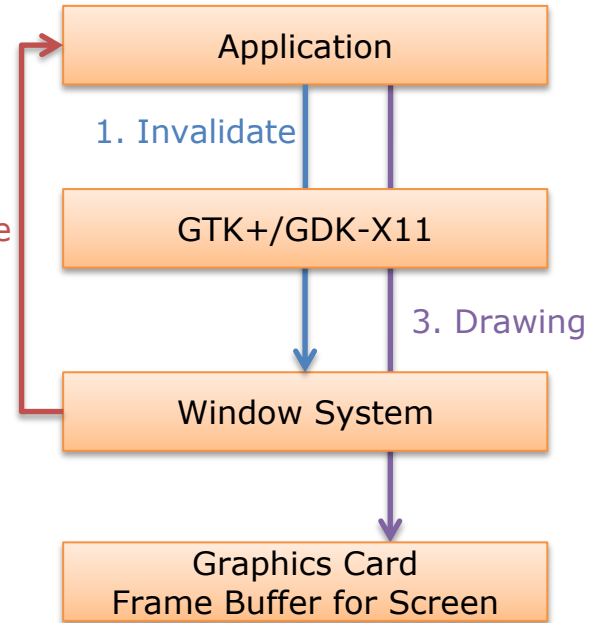
Enlightenment Foundation Libraries

- **Elementary**: widget set library
- **Edje**: complex graphical design & layout library
- **Ecore**: main loop, timing, event, connection, IPC, Jobs, Text encoding, Xlib wrapper...
- **Evas**: a highly optimized canvas and rendering library
- **Eina**: providing data structures (list, array, hash, tree, shared string...)
- **Embryo**: tiny interpreter for small program compiled by embryo_cc
- **Emotion**: a media object lib to play audio/video
- **Ethumb**: thumbnail generation lib.
- **Eet**: data encoding and decoding to and from files or memory
- **E_dbus**: dbus(msg bus system) wrapper
- **Efreet**: helper lib. for Freedesktop.org standards



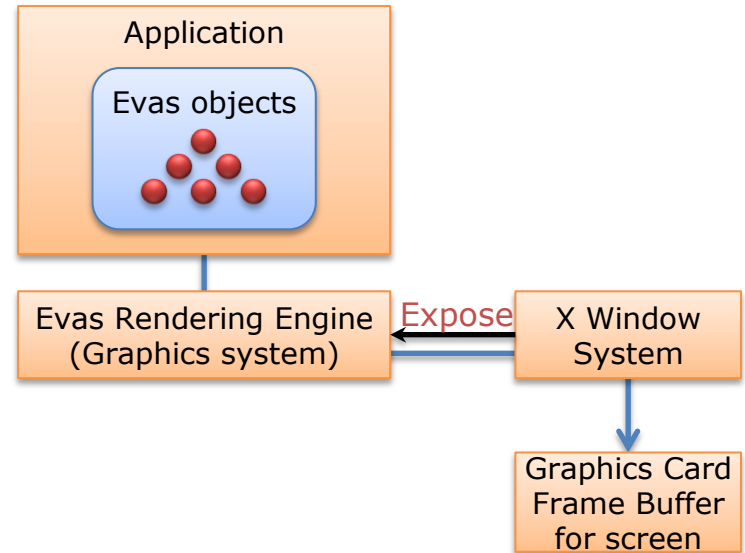
Immediate vs. Retained mode graphics sys. (1/2)

- Immediate mode graphics system (GTK+, GDI, GDI+)
 - Most commonly used drawing mechanism in toolkit library
 - Application is responsible for repainting the portion of the client area that is invalidated
 - Issuing drawing commands and having them processed by the display system immediately; after the draw is done, it appears in the destination

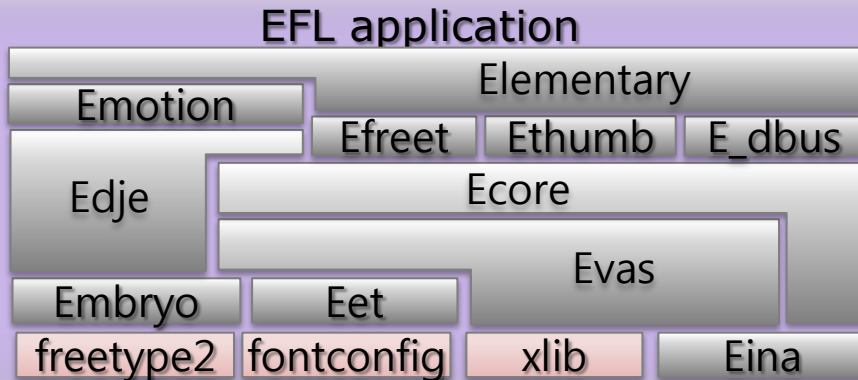


Immediate vs. Retained mode graphics sys. (1/2)

- Retained mode graphics system (Evas, Scene graph)
 - Application defines a set of drawing objects with their properties
 - The graphics system is responsible for responding to all repaint requests for rendering the application objects.
 - Application can modify or create objects at run time.
 - Drawing information is always persisted in a serialized state by the application
 - Rendering responsibility left to the system



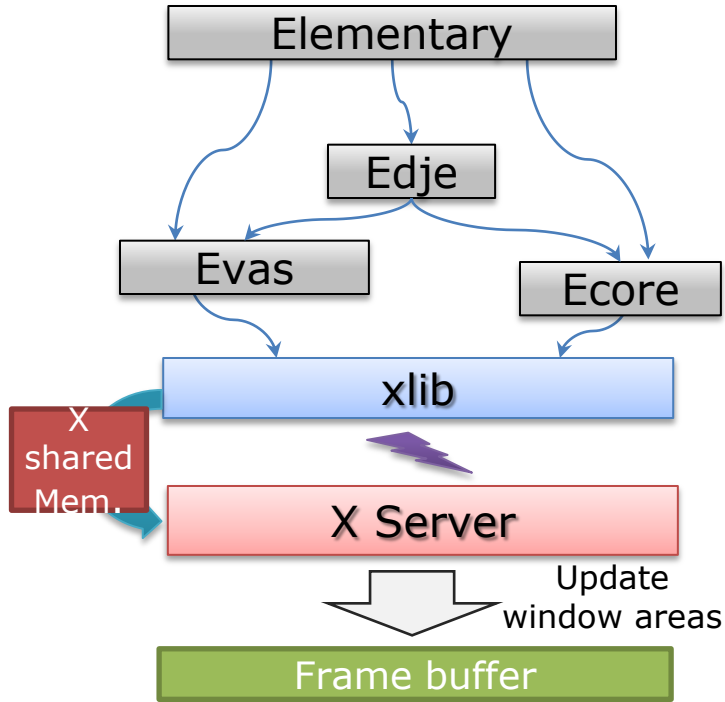
EFL Application on X Window System



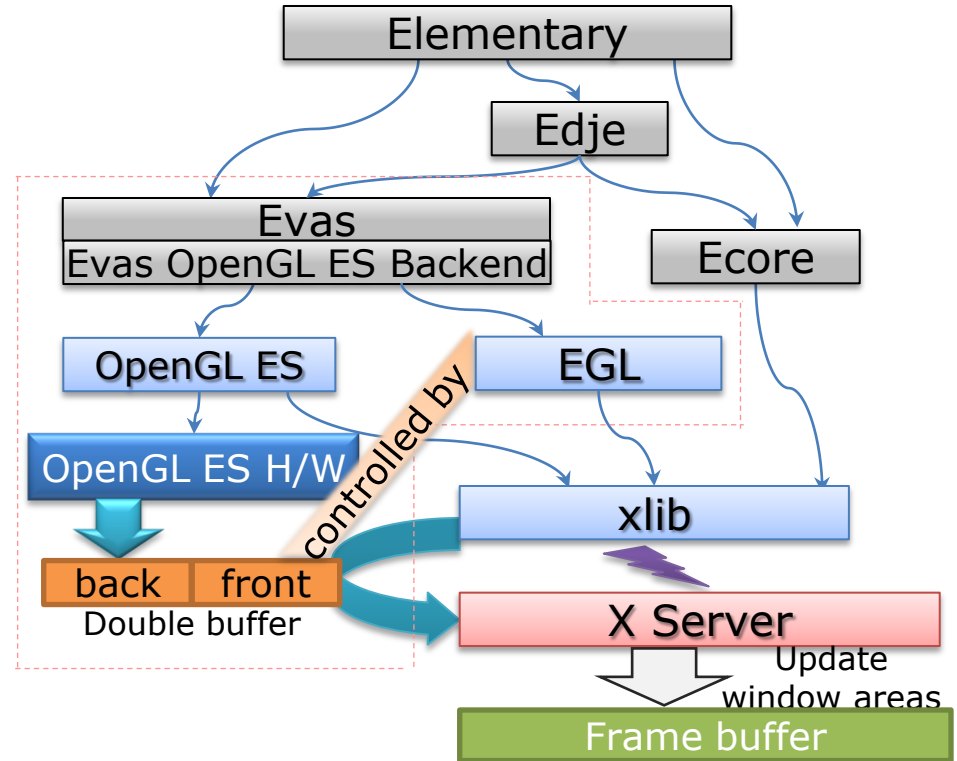
X server



EFL back-ends (SW, OpenGL ES)



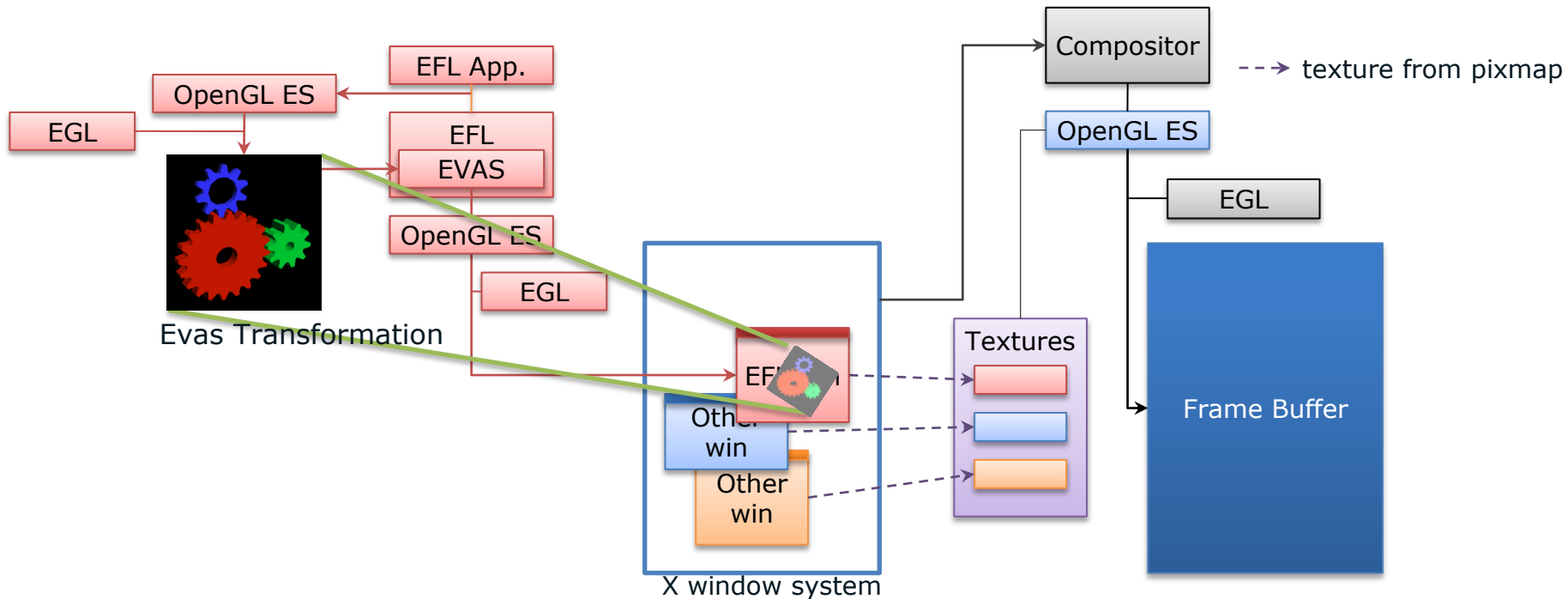
EFL Software Drawing



EFL OpenGL ES Backend Drawing

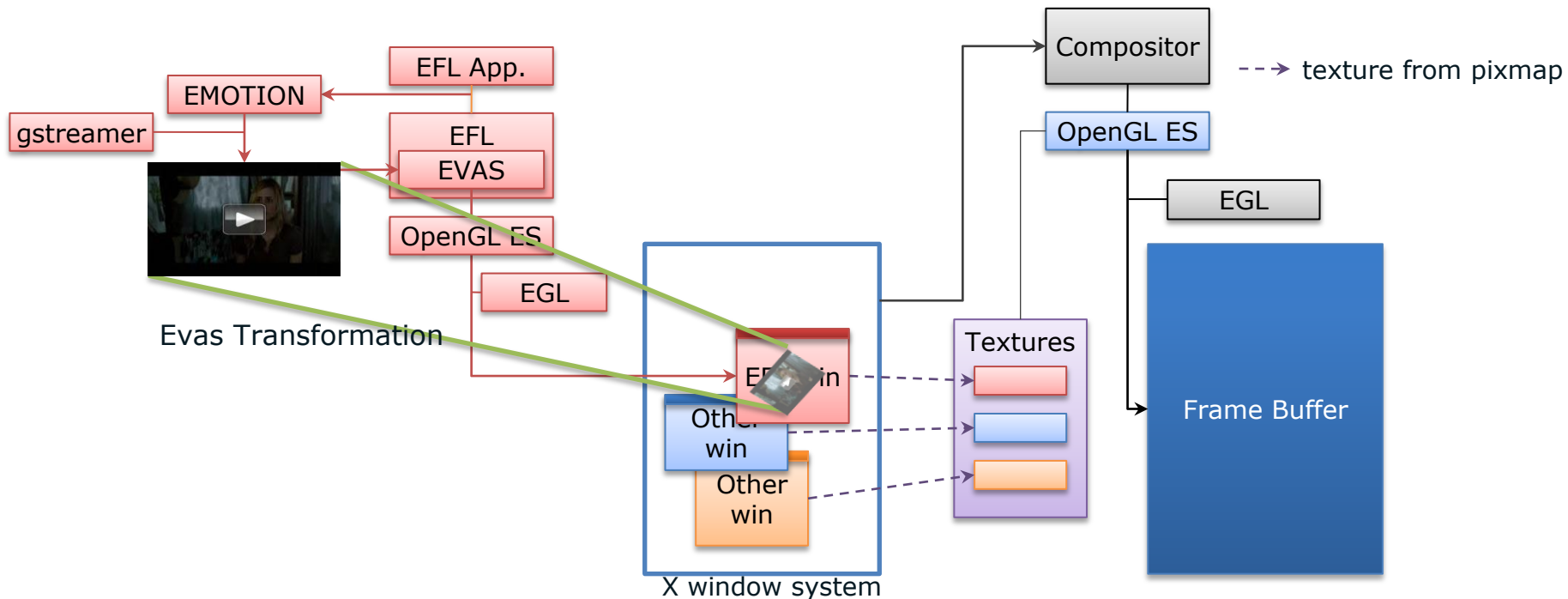
Advanced Features (1/2)

- Graphics rendering path for 3D scene on an Evas object



Advanced Features (2/2)

- Graphics rendering path for Video decoding on an Evas object



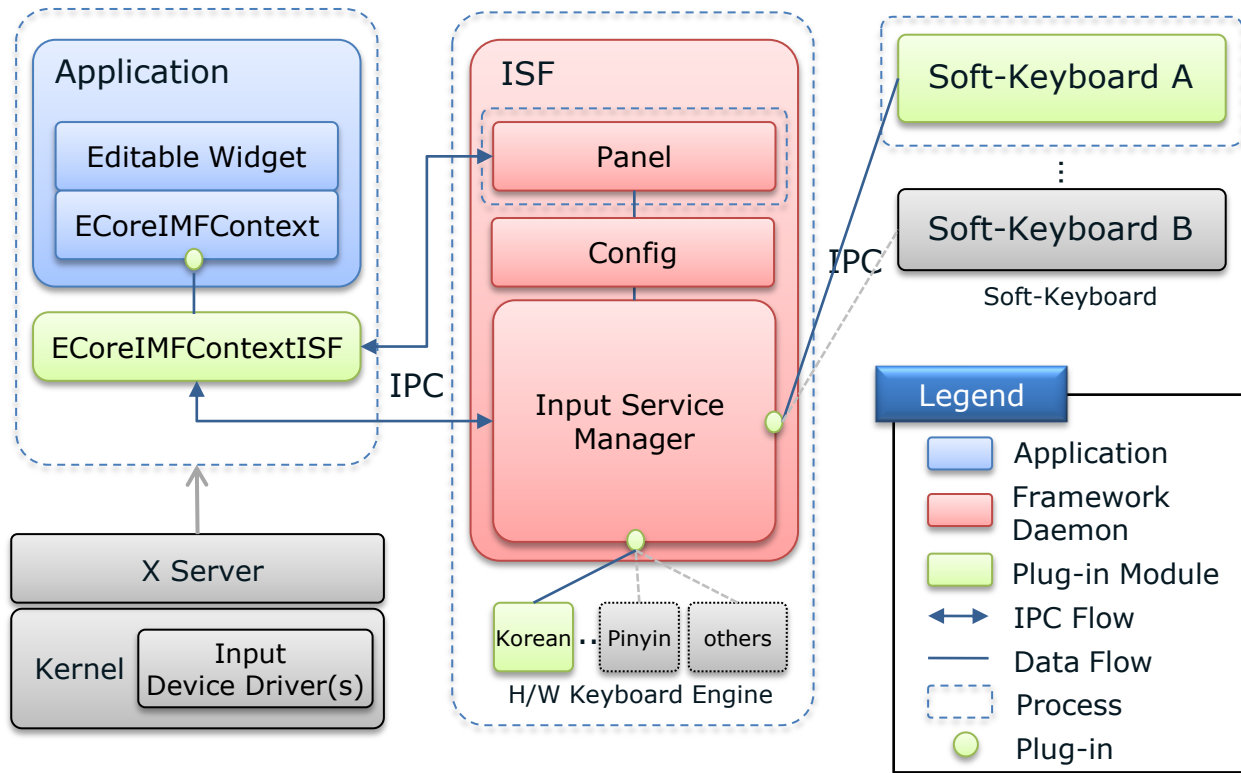
Input Service Framework (ISF)

Input Service Framework

ISF = SCIM v1.4.7 + Mobile Requirements

- Based on SCIM-1.4.7 (Smart Common Input Method)
 - Not enough to satisfy mobile requirements because it was developed for Desktop hardware keyboard.
 - Not support touch-based Soft-keyboard
 - No interactive interfaces between IM engine and Soft-keyboard
 - Insufficient interface between application and Soft-Keyboard (e.g. Changing layout)
- Enhancement
 - Support interfaces between application and Soft-keyboard for mobile environment
 - Optimized for soft-keyboard (e.g. candidate word window)

Input Service Framework (ISF)



Panel

- 1 Adaption layer for various Applications
- 2 Provides the visual feedback to the user, such as candidates, pre-edit word, etc.

Input Service Manager

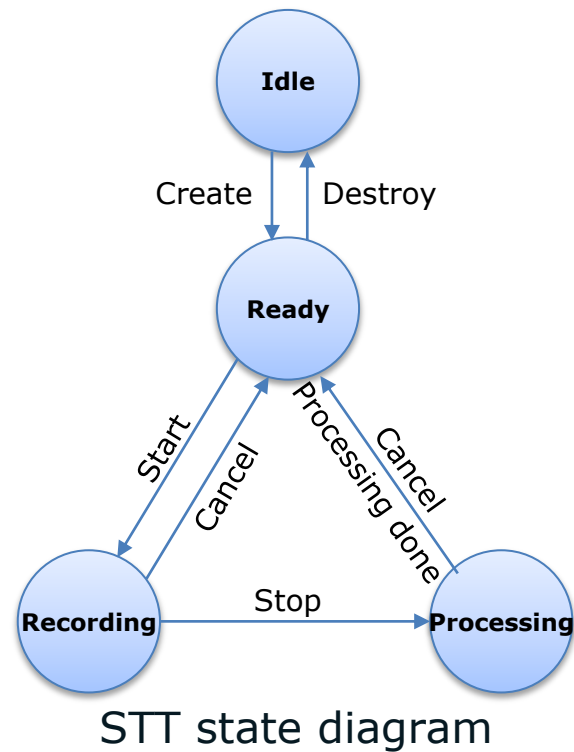
- 1 Registration/Load/Unload/Running/Pause/Resume mutually exclusive for ISEs
- 2 Interfaces among Applications/ ISE
- 3 Offer specific interface with highly modular for each ISE can be plugged in

Voice Framework

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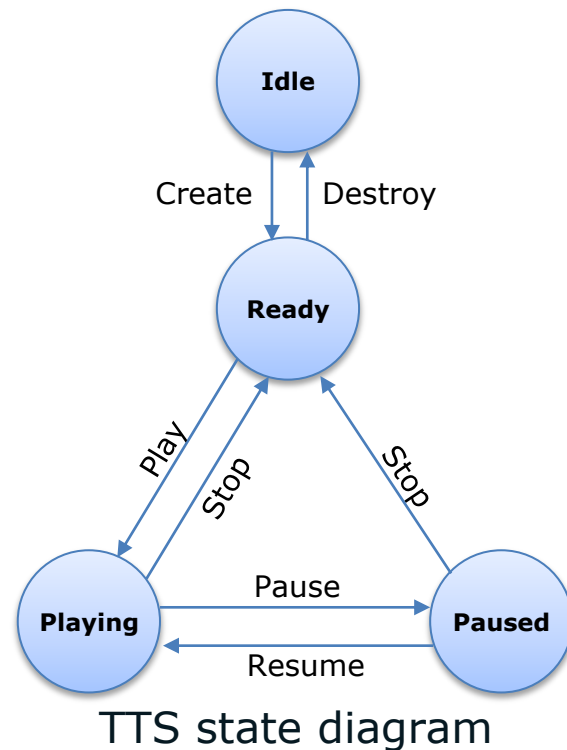
Speech-to-Text (STT)

- Client/Server model
- Components
 - STT Daemon
 - Running in background for STT service
 - Recording sound (voice)
 - Recognizing the speech with STT engine
 - Returning the text recognized to the client
 - STT Client lib
 - Providing STT APIs to application
 - Requesting STT service to the STT Daemon
 - Returning the text to the application



Text-to-Speech(TTS)

- Client/Server Model
- Components
 - TTS Daemon
 - Running in background for TTS service
 - Playing the input text from the client
 - TTS Client lib
 - Providing TTS APIs to application
 - Requesting TTS service to the TTS Daemon with text input from the application



Elementary Widgets

Elementary Widgets

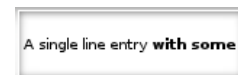
- Elementary is a simple widget toolkit set
 - Fast, Finger friendly, Scalable, Theme changeable, ...
- Widgets
 - Containers - Box, Conformant, Grid, Layout, Panes, Scroller, Table, ...
 - Non-Containers - Bg, Button, Check, Entry, Label, List, Icon, Win, ...



naviframe



genlist



entry



button



icon, image

Elementary Widgets (desktop looks)



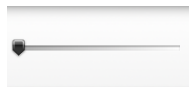
clock



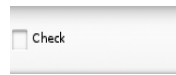
segment control



flipselector



slider



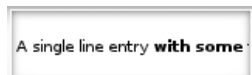
check



actionslider



panes



entry



frame



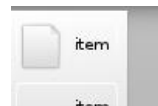
notify



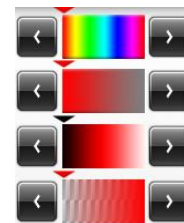
radio



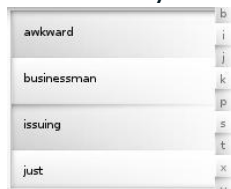
photo, photocal



menu



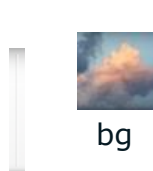
colorselector



index



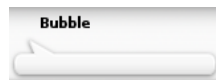
map



separator



Label



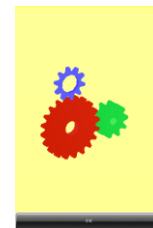
bubble



diskselector



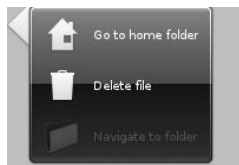
fileselector



glview



thumb



ctxpopup



calendar



toggle



multibuttonentry



toolbar



panel

References

- Tizen Community
 - <https://www.tizen.org/community>
 - IRC
 - Primary Channel
#tizen at irc.freenode.net: 24/7 open discussion.
 - #tizen IRC Logs
<https://www.tizen.org/irclogs/>
 - Mailing Lists
 - **General**: general@lists.tizen.org: General questions about the project, the community, or events.
 - **Application-dev**: application-dev@lists.tizen.org: Questions and feedback related to application development.
 - **Product-dev**: product-dev@lists.tizen.org: Development of the Tizen distribution itself.
 - **IVI**: ivi@lists.tizen.org: Discussions and questions about the In-Vehicle Infotainment (IVI) project for Tizen.
 - **Announce**: announce@lists.tizen.org: This is a low volume list containing only announcements about the Tizen project.
- Enlightenment Community (EFL)
 - <http://www.enlightenment.org>
 - Mailing list: <http://www.enlightenment.org/p.php?p=contact&l=en>
 - IRC: #e at irc.freenode.net: 6667

Thank You.

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