

Building Exciting User Interfaces on new Tizen Platform with EFL/DALi

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TIZEN™
**DEVELOPER
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Tools to realize your App Ideas

Features

Ease of Use

Performance

Light Weight



Key take away from this session

**Basics &
Features**

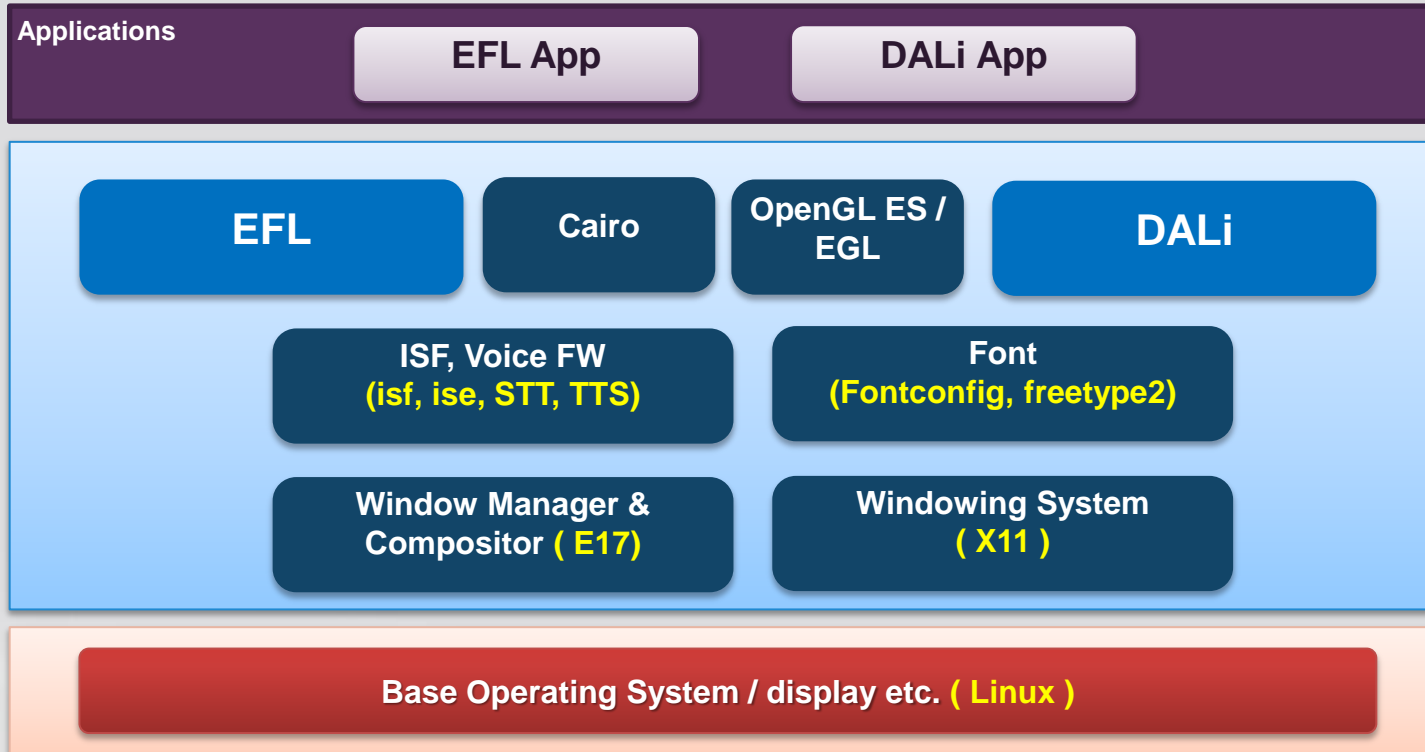
**How to
create UI?**

**What to
Choose?**

Coverage

- ✦ Tizen Native UI Framework Architecture
- ✦ EFL Features & APIs
- ✦ EFL Sample App & Demo
- ✦ DALi Features, Sample App
- ✦ Summary

Tizen Native UI Framework - Subsystems



Tizen Native UI Framework



2D ~ 2.5D UI Framework

- ✿ A collection of libraries supporting 2D ~ 2.5D UI
- ✿ Splits GUI Design & Functionality
- ✿ Enlightenment Open source Project: <http://www.enlightenment.org>

3D Scene Graph UI Rendering Engine

- ✿ Open GL ES 2.0 Shaders, Vertices and Textures based Rendering and Effects
- ✿ 2D world is the Z plane 0 in the 3D world

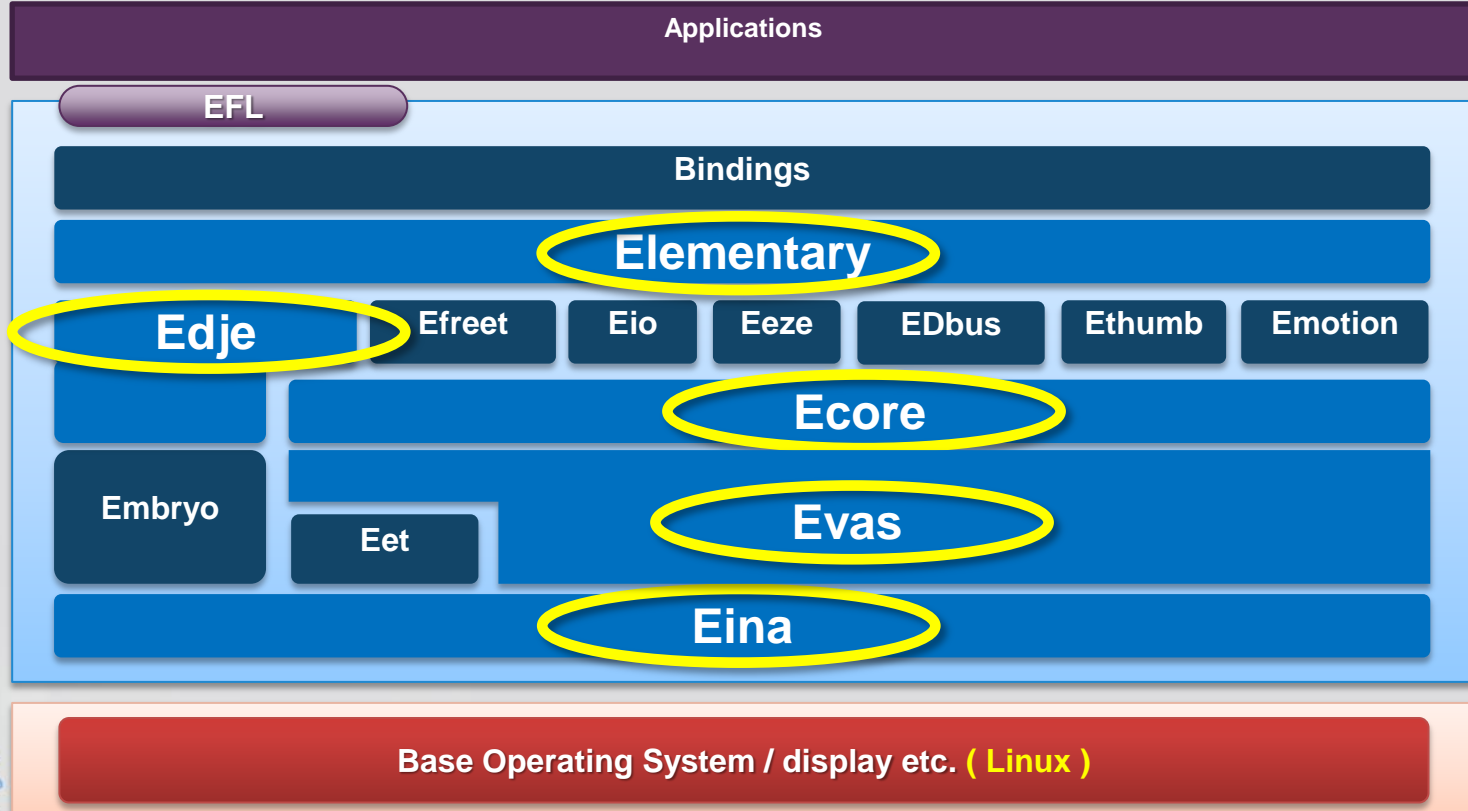




Enlightenment Foundation Libraries (EFL)



EFL Architecture



Evas : (E + CanVAS)

- ✦ Canvas Library
- ✦ Rendering Objects



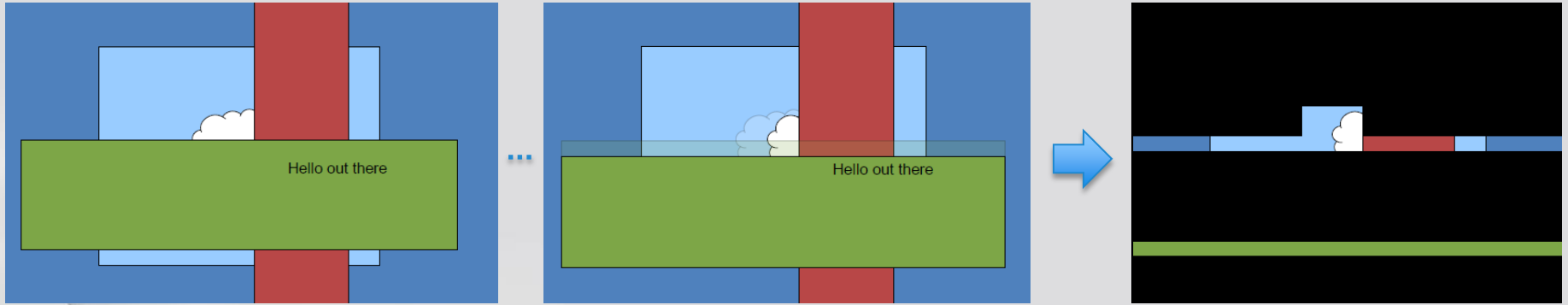
Stencil

Evas Scene Graph

Hierarchy setup with parent and child objects

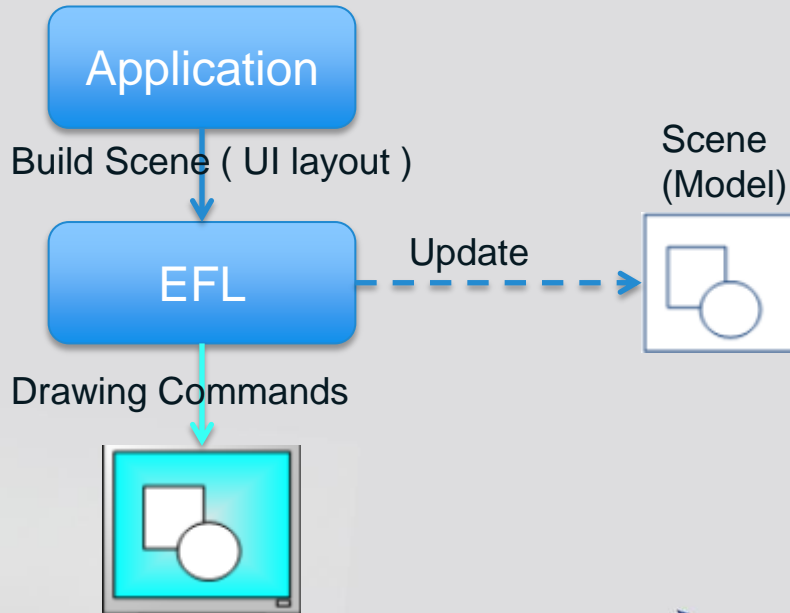
Tracks state of objects

Handles rendering of each object



Retained Rendering Mode

No “rendering” API – Scene Graph



Primitives Object

Rectangle

Line

Polygon

Text

Textblock

Textgrid

Image

Vector Graphic

Smart Object

box

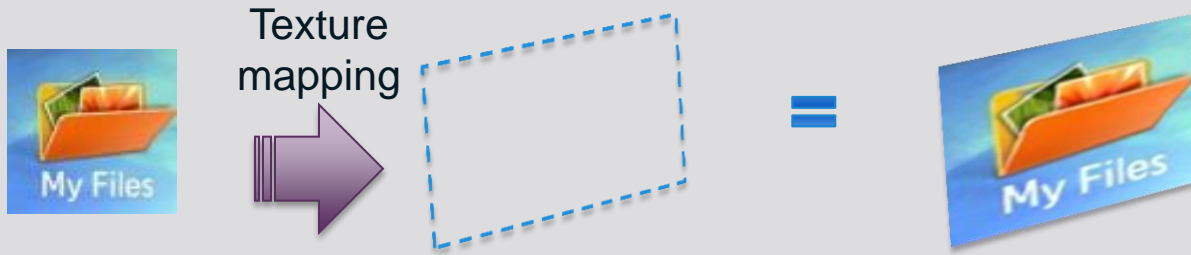
grid

table

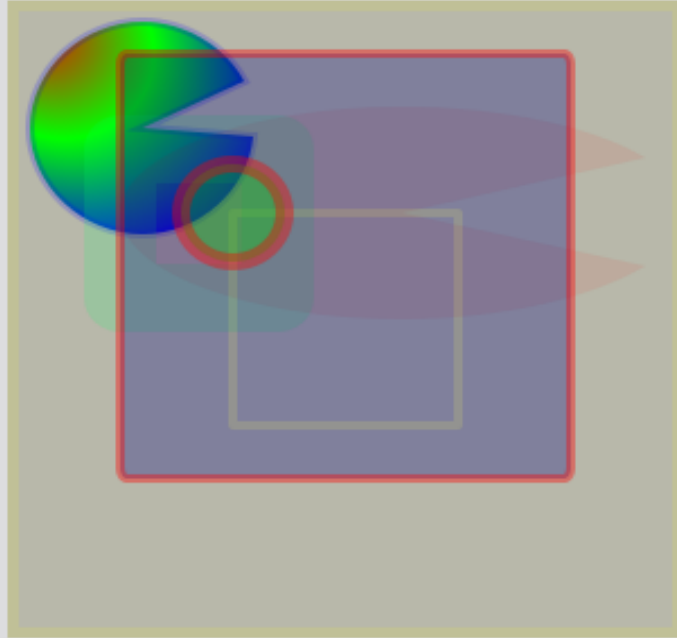
customized smart objects(elm widgets)

Evas Map - 3D Transformation Interface

Transformations : Rotation, Zoom, 3D Perspective



Vector Graphics objects Scene graph



Eina

Eina is a library for data types and some useful tools.

eina_list

eina_file

eina_array

eina_stringshare

eina_rbtrees

eina_benchmark

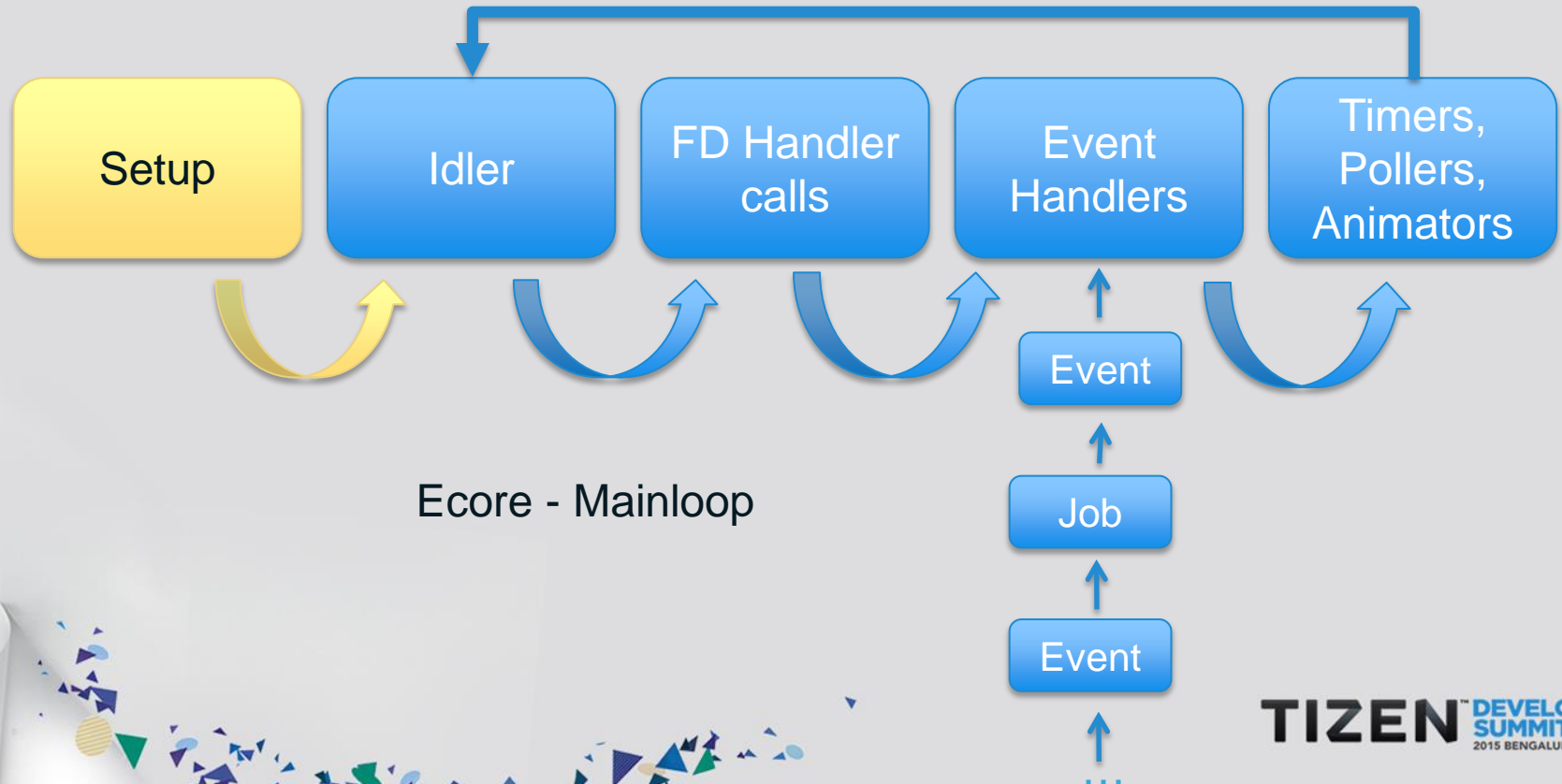
eina_log

eina_mempool

eina_module

Ecore (E + Core)

Clean and tiny event loop library with many convenience modules



Ecore

 Ecore Main loop

 Ecore Thread

 Ecore Pipe

 Ecore Timer

 Ecore Job

 Ecore Idler

 Ecore Animator

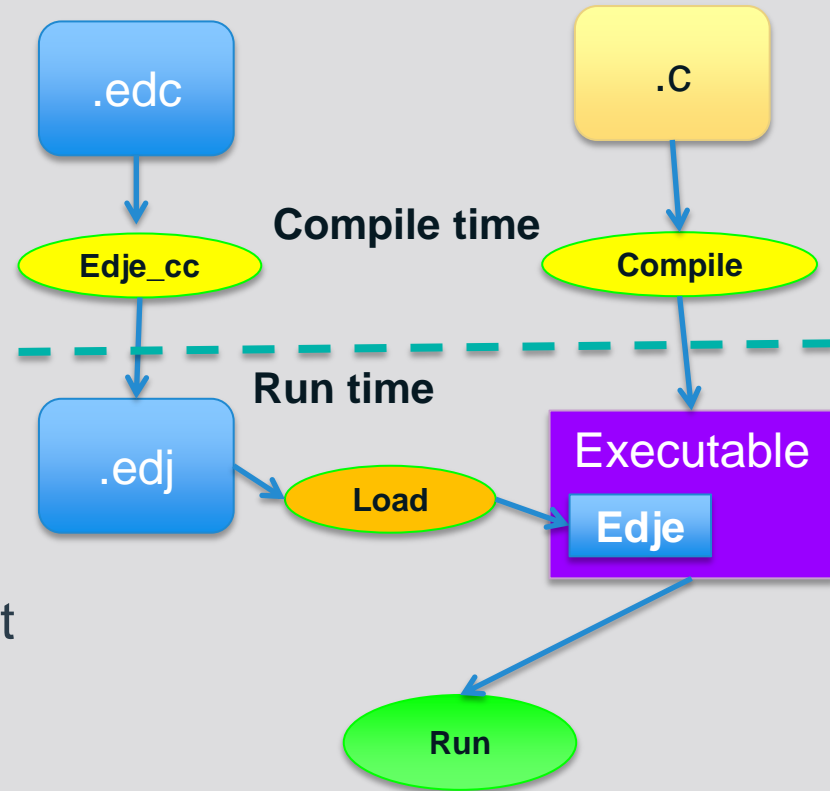
 Ecore Audio

 Ecore IMF

Edje

❁ EFL Application

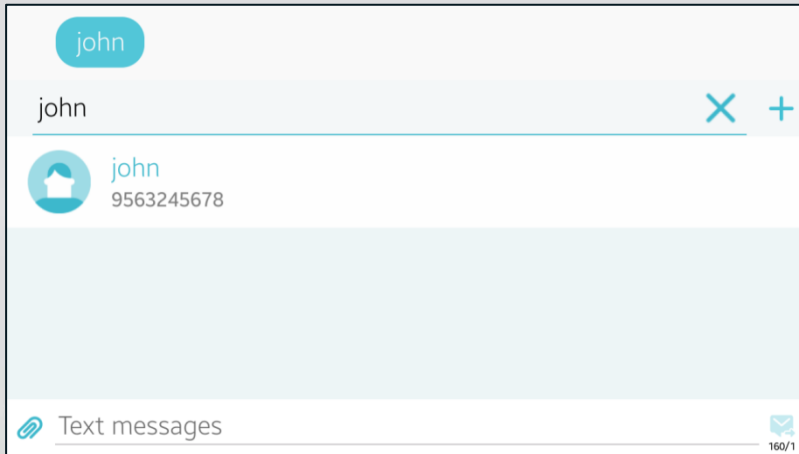
- ❁ Edge text script file (.edc) / GUI Layout binary (.edj)
- ❁ Executable logic binary (C)
- ❁ **Edje** : Graphical design and layout library
- ❁ **Edje Data Collection (EDC)**: Layout Script, Enables UI layout development outside C code



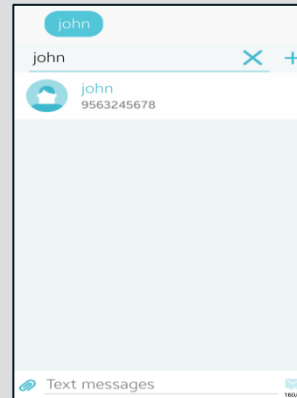
Scalable UI

- ✦ Saleable for multi-size/resolution/aspect-ratio of screens
- ✦ Continuous scaling based on a scale value
- ✦ Screen coordinates are mapped between 0 & 1.

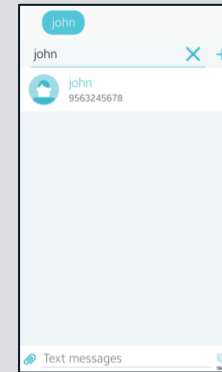
Full HD 60"



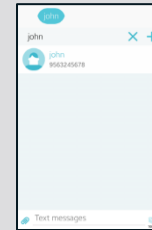
WXGA 10.1"



HD 4.65"



WVGA 3.8"



HVGA 3.27"



Edje Demo

```
collections {
  group {
    name: "demo_group";
    images.image: "ball.png" COMP;
    parts{
      part{
        name: "part_image";
        type: IMAGE;

        description{ state: "default" 0.0;
          rel1.relative: 0.1 0.1;
          rel2.relative: 0.3 0.3;
          image{
            normal: "ball.png";
          }
        }
      }

      description{ state: "bottom" 0.0;
        inherit: "default" 0.0;
        rel1.relative: 0.9 0.9;
        rel2.relative: 1.0 1.0;
      }
    }
  }
}
```

```
program { name: "start";
  signal: "show";
  action: STATE_SET "bottom" 0.0;
  target: "part_image";
  transition: ACCELERATE 0.5;
  after: "bounce";
}

program { name: "bounce";
  action: STATE_SET "default" 0.0;
  target: "part_image";
  transition: DECELERATE 1.0;
  after: "start";
}
```



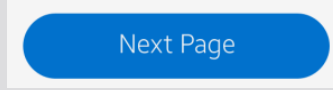
Demo1
Edje_Basic

Elementary : Widget Set Library

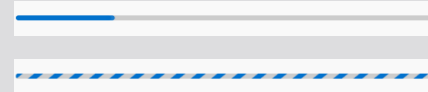
Window & Conformant



Color Selector



Button



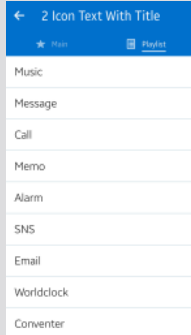
Progress Bar



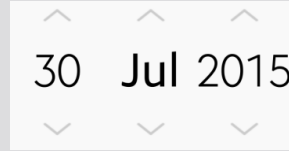
Radio



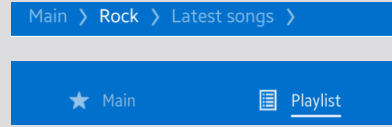
Page Control



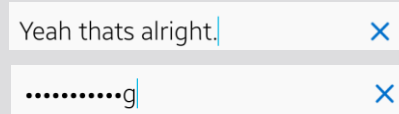
NaviFrame



Date Time



Tool Bar



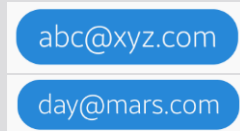
Edit Field



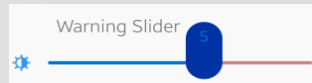
Gengrid



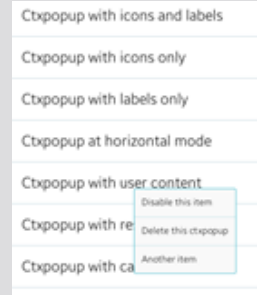
Map



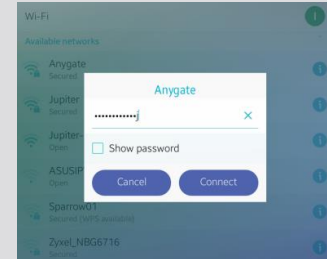
MultiButtonEntry



Slider



Ctx Popup



Popup



Check

Elementary : How to combine an EDC with C?

```
//Create window
```

```
Evas_Object *win = elm_win_add(NULL, "hello",  
ELM_WIN_BASIC);  
elm_win_title_set(win, "Hello");
```

```
//Create a layout object
```

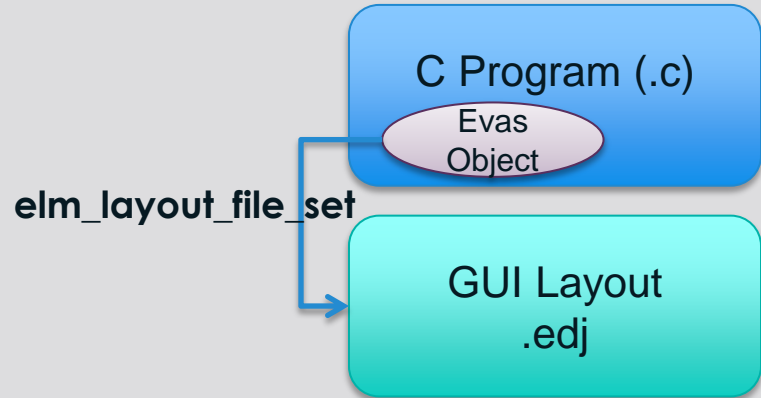
```
Evas_Object* ly = elm_layout_add(win);
```

```
//Load an edj file
```

```
elm_layout_file_set(ly, "sample.edj", "group_name");
```

```
...
```

```
evas_object_show(ly);
```



How to combine an Edge with C?

Send a signal from C to Edge

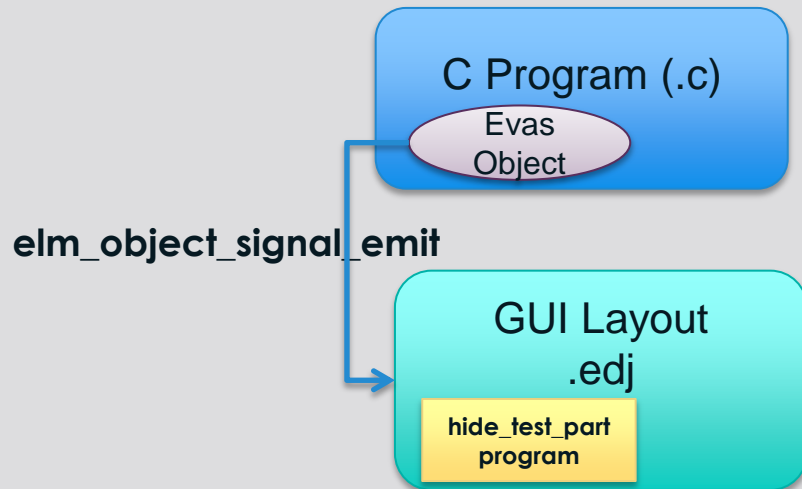
```
...
part {
  name: "test_part";
  //...
  //show state
  description {
    name: "show" 0.0;
    visible: 1;
  }
  //hide state
  description {
    name: "hide" 0.0
    visible: 0;
  }
}

programs {
  program {
    name: "hide_test_part";
    signal: "elm,state,test_part,hidden"; //signal
    source: "elm";
    target: "test_part"; //action target
    action: STATE_SET "hide" 0.0; //action definition
  }
}
...
```

.edc

```
void fn(Evas_Object *parent) {
  Evas_Object *ly = elm_layout_add(parent);
  //...
  elm_object_signal_emit( ly,
                          "elm,state,test_part,hidden", "elm");
}
```

.c



How to combine an Edge with C?

Send a signal from Edge to C

```
//...
parts {
  part {
    name: "test_part";
    //...
  }
  //...
}

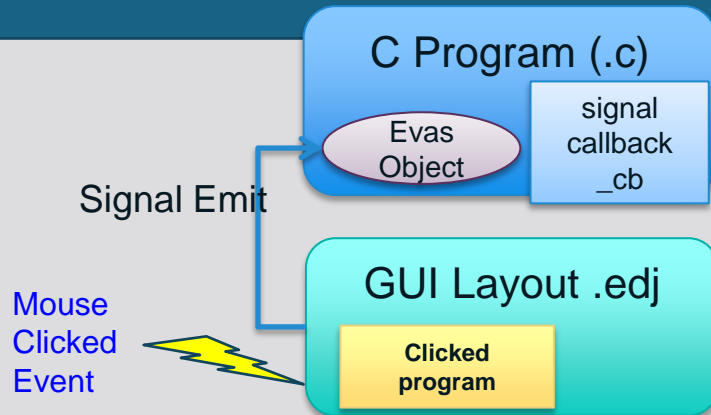
programs {
  program {
    name: "clicked";
    source: "test_part";
    signal: "mouse,clicked,1";
    action: SIGNAL_EMIT "clicked" "***";
  }
  //...
}
//...
```

.edc

```
static void _cb( void *data,
                 Evas_Object *obj,
                 const char *emission,
                 const char *source)
{ //... }

static void fn(Evas_Object *parent) {
  Evas_Object *ly = elm_layout_add(parent);
  //...
  elm_object_signal_callback_add( ly, "clicked", "***", _cb, NULL);
}
```

.c



Elementary Application : Widgets & Layout

```
#include <Elementary.h>

EAPI_MAIN int
elm_main(int argc, char **argv)
{
    Evas_Object *win, *layout, *btn;

    // Create Window
    win = elm_win_util_standard_add("Name", "Win Title");

    // Add Layout
    layout = elm_layout_add(win);
    elm_layout_file_set(layout, "layout.edj", "demo_group");
    elm_win_resize_object_add(win, layout);

    // Create Controls
    btn = elm_button_add(win);
    elm_object_text_set(btn, "Click me!");
    elm_object_part_content_set(layout, "part_swallow", btn);
```

```
//Show the Controls & Window
evas_object_show(layout);
evas_object_show(win);

// Blocking mainloop: process events and callbacks
elm_run();
elm_shutdown();
return 0;
}
ELM_MAIN()
```

Edje Layout : Swallow

```
collections {
  group {
    name: "demo_group";
    parts {
      part {
        name: "bg";
        ...

      part{
name: "part_swallow";
type: SWALLOW;

description{ state: "default" 0.0;
  rel1.relative: 0.1 0.1;
  rel2.relative: 0.2 0.2;
}

description{ state: "bottom" 0.0;
  inherit: "default" 0.0;
  rel1.relative: 0.9 0.9;
  rel2.relative: 1.0 1.0;
}
}
}
```

```
program { name: "start";
  signal: "show";
  action: STATE_SET "bottom" 0.0;
  target: "part_swallow";
  transition: LINEAR 3.0;
  after: "bounce";
}

program { name: "bounce";
  action: STATE_SET "default" 0.0;
  target: "part_swallow";
  transition: LINEAR 3.0;
  after: "start";
}
}
```

```
... part{
name: "part_swallow";
type: SWALLOW;

description{ state: "default" 0.0;
  max: 200 100;
  ...
map {
on: 1;
perspective_on: 1;
rotation {
y: 0;
}
}
}

description{ state: "bottom" 0.0;
  inherit: "default" 0.0;
  ...
map {
rotation {
y: 360;
}
}
}
...
}
```



Demo3
Swallow_Map

Theme

App Code (.c)

Functionality



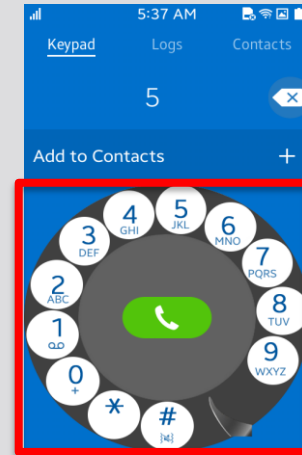
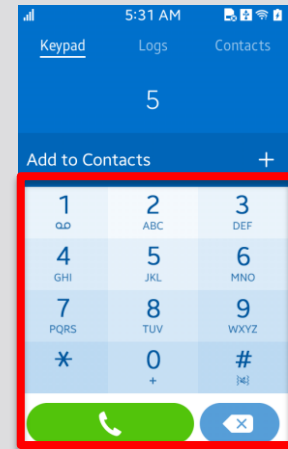
theme1.edc

GUI Layout Style



Theme2.edc

GUI Layout Style



Theme : Priority

❁ System based Theme (Basic Themes)

❁ ELM_THEME = tizen:tizen2:tizen3

❁ Application based Theme

❁ Extension Themes (lower than Basic Themes)

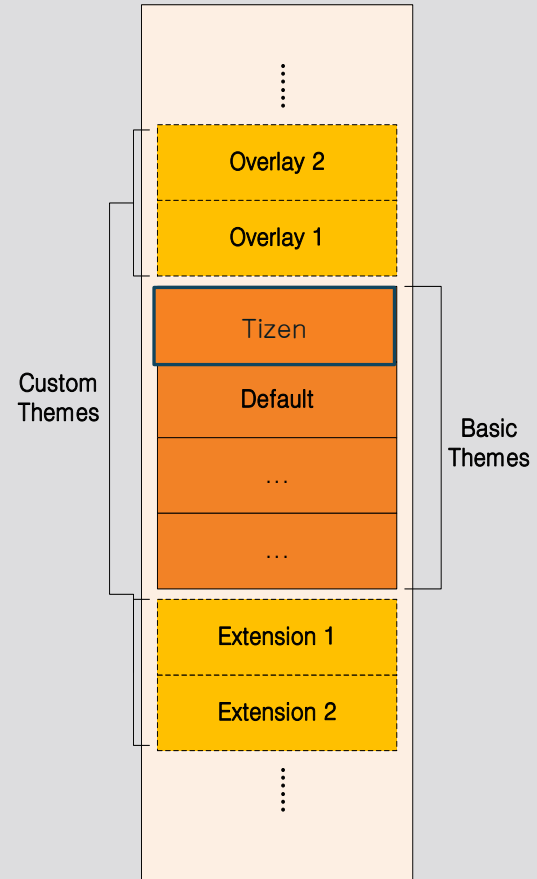
❁ elm_theme_extension_add();

❁ elm_theme_extension_del();

❁ Overlay Themes (higher than Basic Themes)

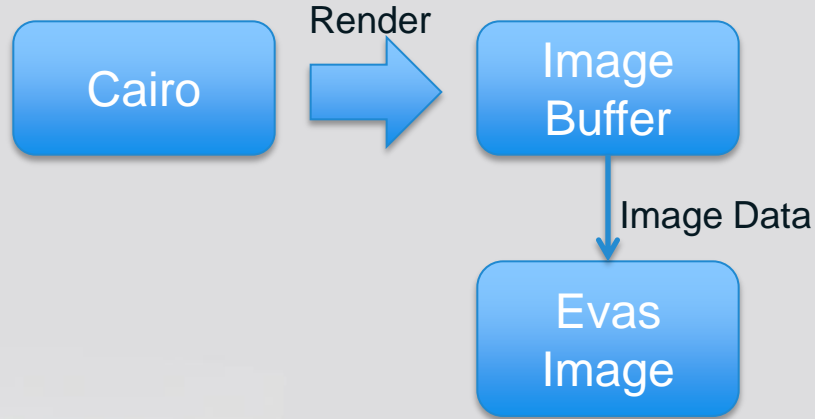
❁ elm_theme_overlay_add();

❁ elm_theme_overlay_del();



Custom 2D/3D Rendering on EFL

- ✦ 2D / Vector Rendering : use Cairo + Evas Image
- ✦ Elm GLView simplifies 3D rendering



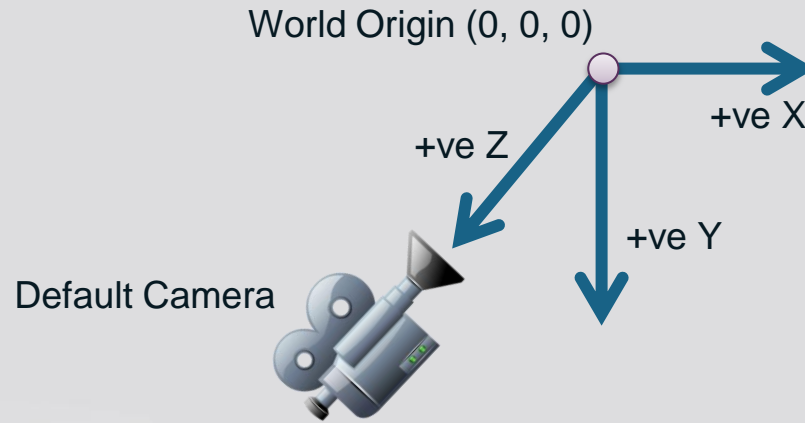


Dynamic Animation Library
(DALi)



DALi

3D Animation/effect based UIFW library

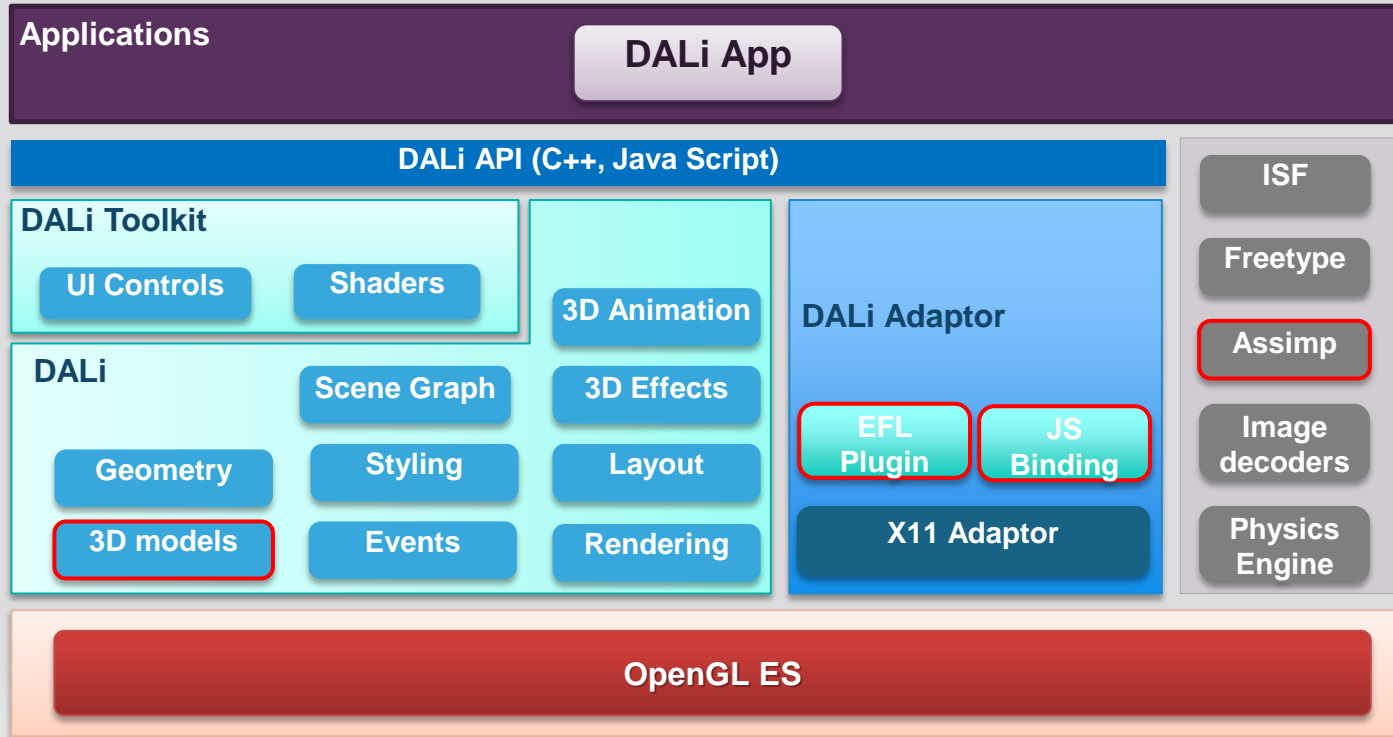



3D Dali World



Demo4
Dali_Features

DALi Architecture



 Future Plan, beyond Tizen 2.4

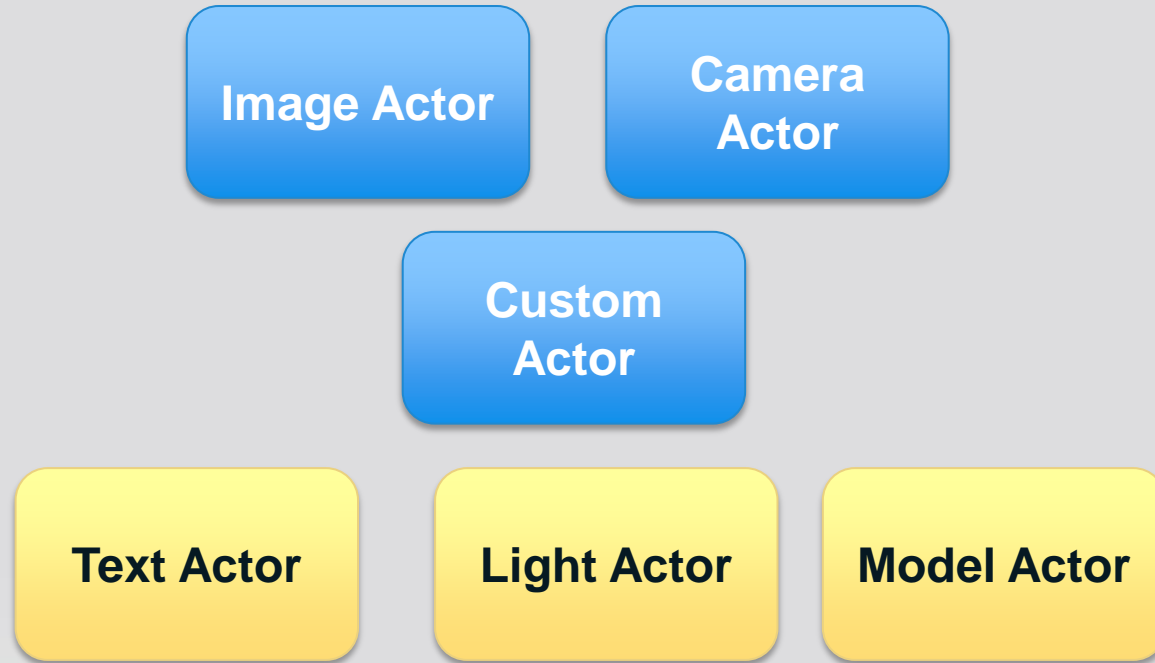
DALi Basics

- ❁ Scene graph based rendering
- ❁ **Stage** defines whole 3D world
- ❁ **Actors** handle input events
- ❁ Effects with **Shaders**
- ❁ 3D Model support#



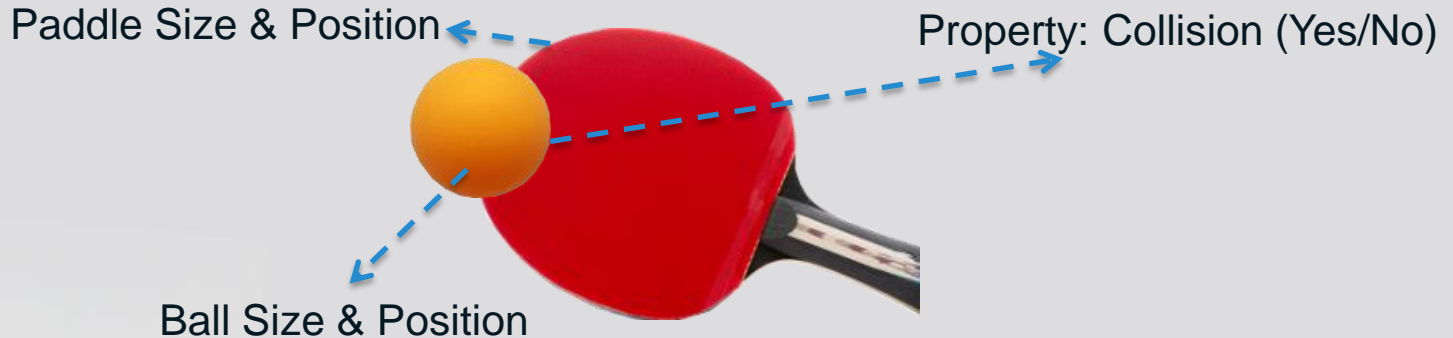
Future Plan,
beyond Tizen 2.4

DALi Actors



Constraints and Property Notifications

- ✿ **Constraint** : Property based on function of other properties
- ✿ **Property notification** : Notified on property reaches or crosses a value



Animation

- ✿ Property animation
- ✿ Vertex & Mesh animation
- ✿ Shader Uniform animation
- ✿ Model / Key frame animation

Effects : Modifies Object Appearance

Actor Default Shader: Override Geometry (vertex) / Pixels (fragment)



3D Models

- ❁ Collada, Maya[®], 3DS Max[®], DALi format, etc...
- ❁ Open Asset Import Library (assimp) Model Importer

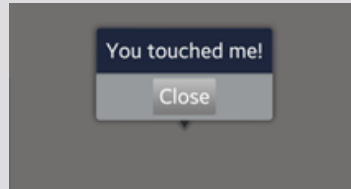


UI Controls

- Basic Building blocks : Image, Text and Mesh Actors
- UI Controls provide additional Layout, Effects, Scrolling



Image View



Button, Pop-up



Item-view



Scroll-view

Italics: 기울임 꼴
Underline: 밑줄
Bold: 두꺼운
Font FreeSerif, green, 12
Shadow: 그림자
Glow: 빛나다
Outline: 윤곽선
Smooth: 부드럽게

Text-field

DALi application

```
using namespace Dali::Toolkit;

#include <dali.h>

class DaliExample
{
public:
    DaliExample(Application& mApplication)
    {
        mApplication.InitSignal().Connect(this,&DaliExample::OnInit);
    }

    virtual ~DaliExample() {}

    void OnInit(Application& app)
    {
        ResourceImage image= ResourceImage::New("Path");
```

```
        ImageView imageView = ImageView::New(image);

        Stage::GetCurrent().Add(imageView);
    }
};

int main(int argc, char** argv)
{
    Application app = Application::New(&argc, &argv);
    DaliExample test(app);
    app.MainLoop();
    return 0;
}
```

EFL or DALi ?

EFL

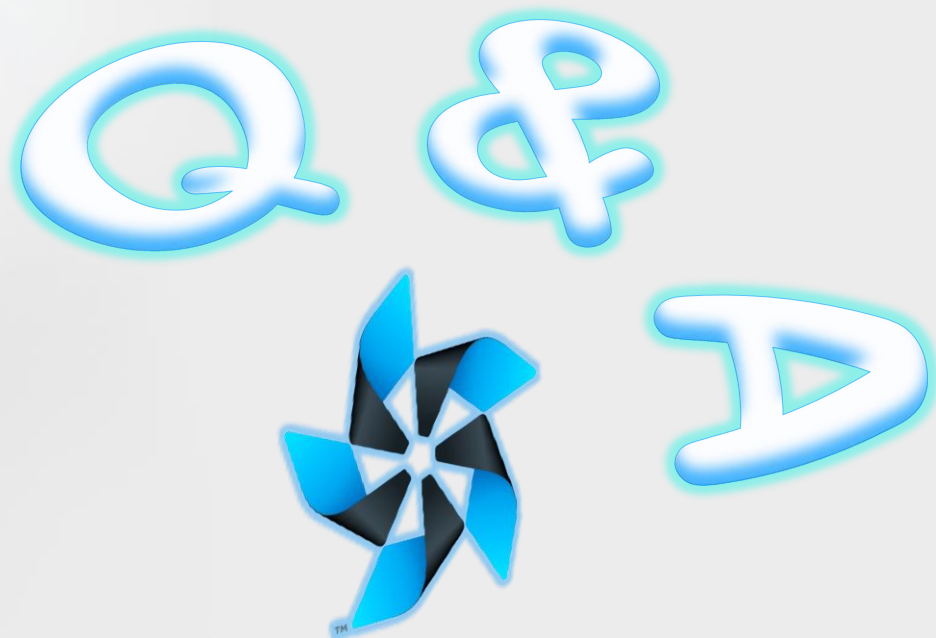
2D ~ 2.5D
Effects

Software
or GPU
based

DALi

Rich 3D
effects /
Physics

3D
Models



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