DirectFB and Khronos APIs

OpenGL(ES) / EGL / DirectFB Systems

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Overview

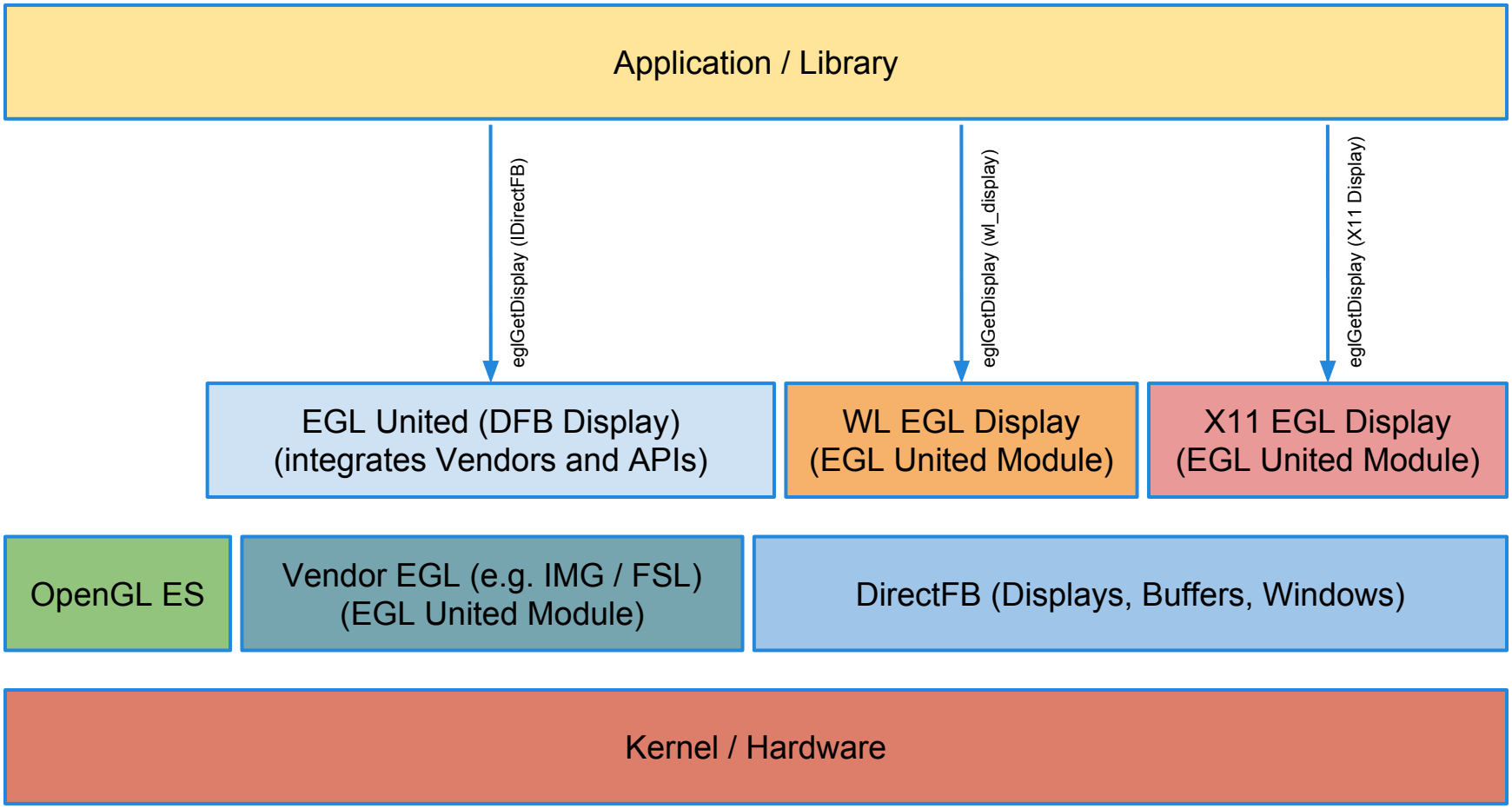
This document is at a very early stage and shall give an introduction to DirectFB's EGL United and related work.

EGL United is an EGL Core implementation that integrates various modules on different levels, e.g. generic display extensions or multiple vendor implementations of APIs with transition of images etc...

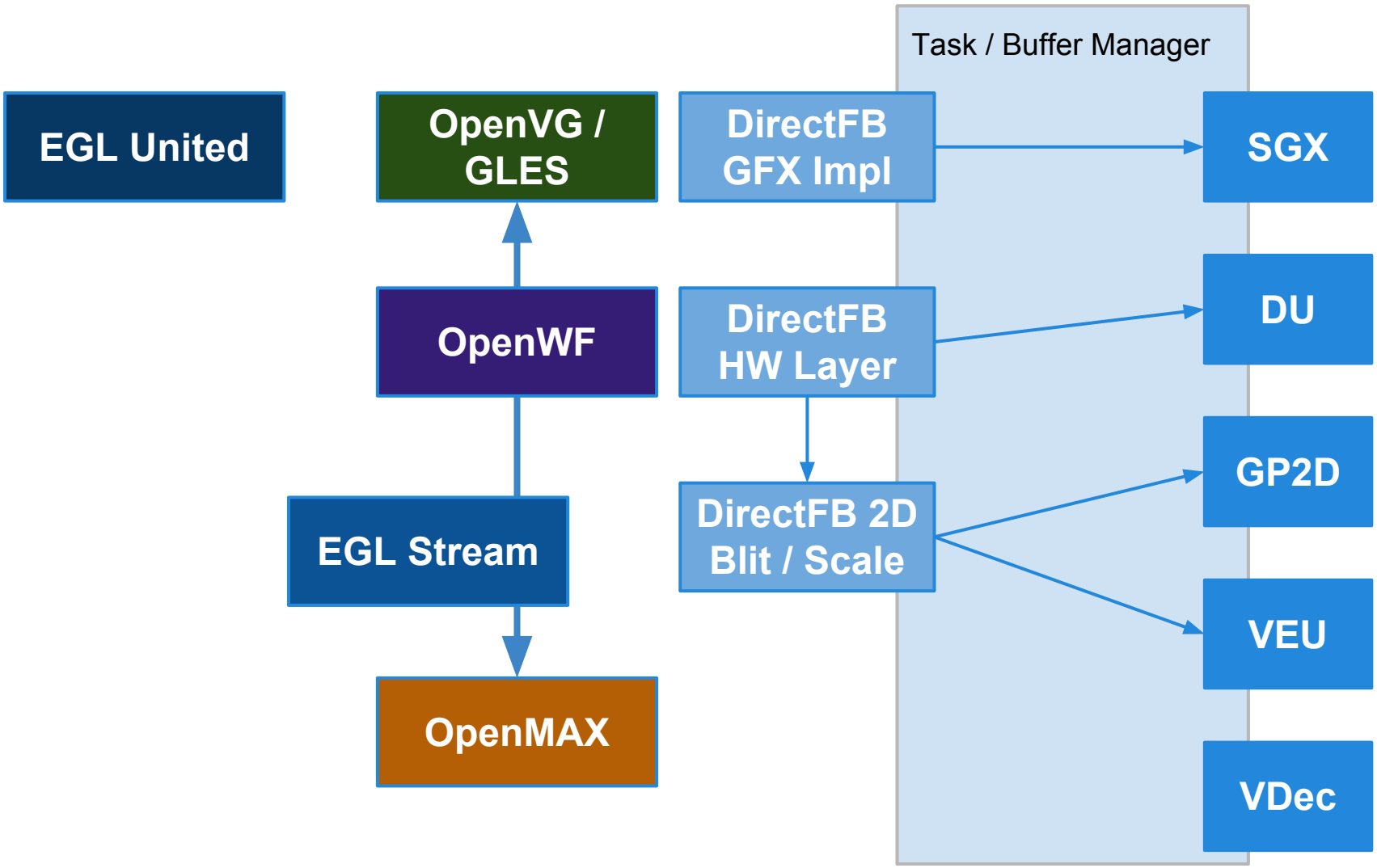
Systems

- Implementations
  - EGL
    - EGL United (DirectFB integrated media)
    - SGX WSegl (Renesas)
    - V3D (Broadcom)
    - X11 (Mesa)
    - DRM Intel/AMD/nVidia (Mesa)
  - GLX
    - X11 (nVidia / AMD)
- Clients
  - DirectFB (IDirectFB/Surface)
  - X11 (Display/Pixmap)
  - Wayland (wl_display/surface)

EGL United - Modules



Khronos / DirectFB System (R-Car)



EGL United - Image

IDirectFBSurfaceAllocation based targets

eglCreateImageKHR targets

- IDirectFBSurface
  - calling GetBuffer()
- IDirectFBSurfaceBuffer
- any native / vendor handle
  - calling Allocate() for wrapping

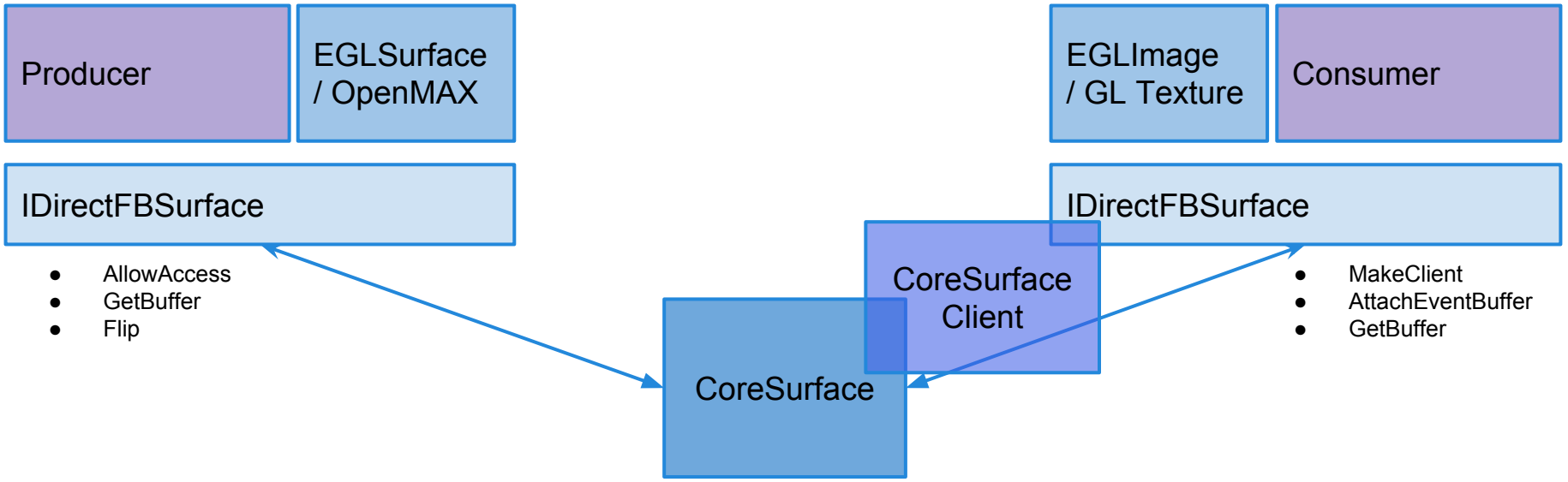
- GetAllocation (from Surface)
- GetHandle

Handles

- DRM Buffer Object / FD
- X11 Pixmap / Window
- ...

EGL United - Stream

IDirectFBSurface based producer / consumer endpoints



Producer API

- EGLSurface
- ALDataLocator
- ...

Consumer API

- OpenGL Texture
- OpenWF Port
- ...

Interfaces

Context / Control

- EGL
- IDirectFBGL2
- IDirectFBGraphics (planning)

Drawing

- OpenGLES, OpenVG
- Renderer (Engines)
  - GLES2, VG
  - Genefx, DFBfx
  - M2MC, GP2D, GC200, ...

Graphics Core Modules

DRM

- DRI2 based Contexts and Buffers
- Surface Peer
  - Access buffers using BO/DRM key

Renesas

- IMGegl using IDirectFBSurface (WSEGL for DirectFB)
- Surface Peer
  - Access buffers via Lock/Unlock as usual

Broadcom

- BCMegl using Nexus Surface
- Surface Peer
  - Access buffers using Surface/Nexus key

X11 / EGL

- X11egl using Pixmaps and Windows
- Surface Peer
  - Access buffers using Window/X11 key

EGL Core Modules

DirectFB

- eglGetDisplay(IDirectFB)
  - Default implementation with EGL::Display is used
    - See NATIVE_PIXMAP as IDirectFBSurface (for EGLImage)
- eglCreatePixmapSurface(IDirectFBSurface)
  - <- IDirectFB::CreateSurface()
  - <- IDirectFB::GetSurface()
  - (see below)
- eglCreateWindowSurface(IDirectFBWindow / IDirectFBSurface)
  - <- IDirectFBDisplayLayer::CreateWindow()
  - Create simple EGL::Surface wrapping IDirectFBSurface
  - Let implementation create a peer for the IDirectFBSurface
- eglSwapBuffers(EGLSurface)
  - Call Flip() at implementation's peer

EGL Core Modules

Wayland (Weston/DFB)

- eglGetDisplay(wl_display)
  - Create special DisplayWL overriding some of the EGL::Display methods
    - See NATIVE_PIXMAP as wl_egl_window (for EGLImage)
- eglCreateWindowSurface(wl_egl_window)
  - <- wl_egl_window_create(wl_surface)
    - Create IDirectFBSurface with wl's surface_id as resource_id
  - Create special SurfaceWL overriding some of the EGL::Surface methods
    - Get IDirectFBSurface from wl_egl_window structure (special dfb version)
  - Let implementation create a peer for the IDirectFBSurface
- eglSwapBuffers(EGLSurface)
  - Call Flip() at implementation's peer

EGL Core Modules

XDirectFB

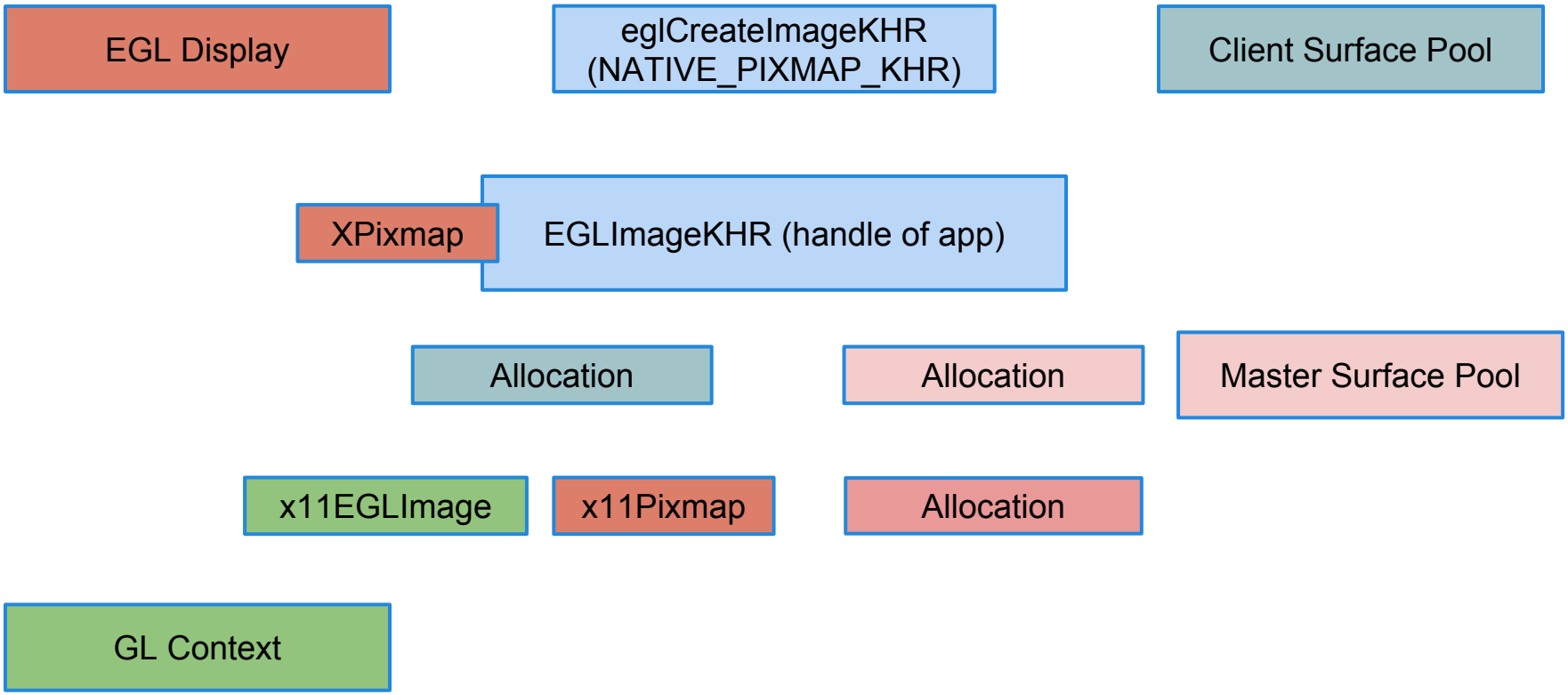
- eglGetDisplay(Display)
  - Create special DisplayXDFB overriding some of the EGL::Display methods
    - See NATIVE_PIXMAP as XID (for EGLImage)
- eglCreateWindowSurface(Window)
    - <- XCreateWindow
  - Create special SurfaceXDFB overriding some of the EGL::Surface methods
    - Query DFBSurfaceID via Window property
    - Get IDirectFBSurface from IDirectFB::GetSurface
  - Let implementation create a peer for the IDirectFBSurface
- eglSwapBuffers(EGLSurface)
  - Call Flip() at implementation's peer

EGL Core Modules

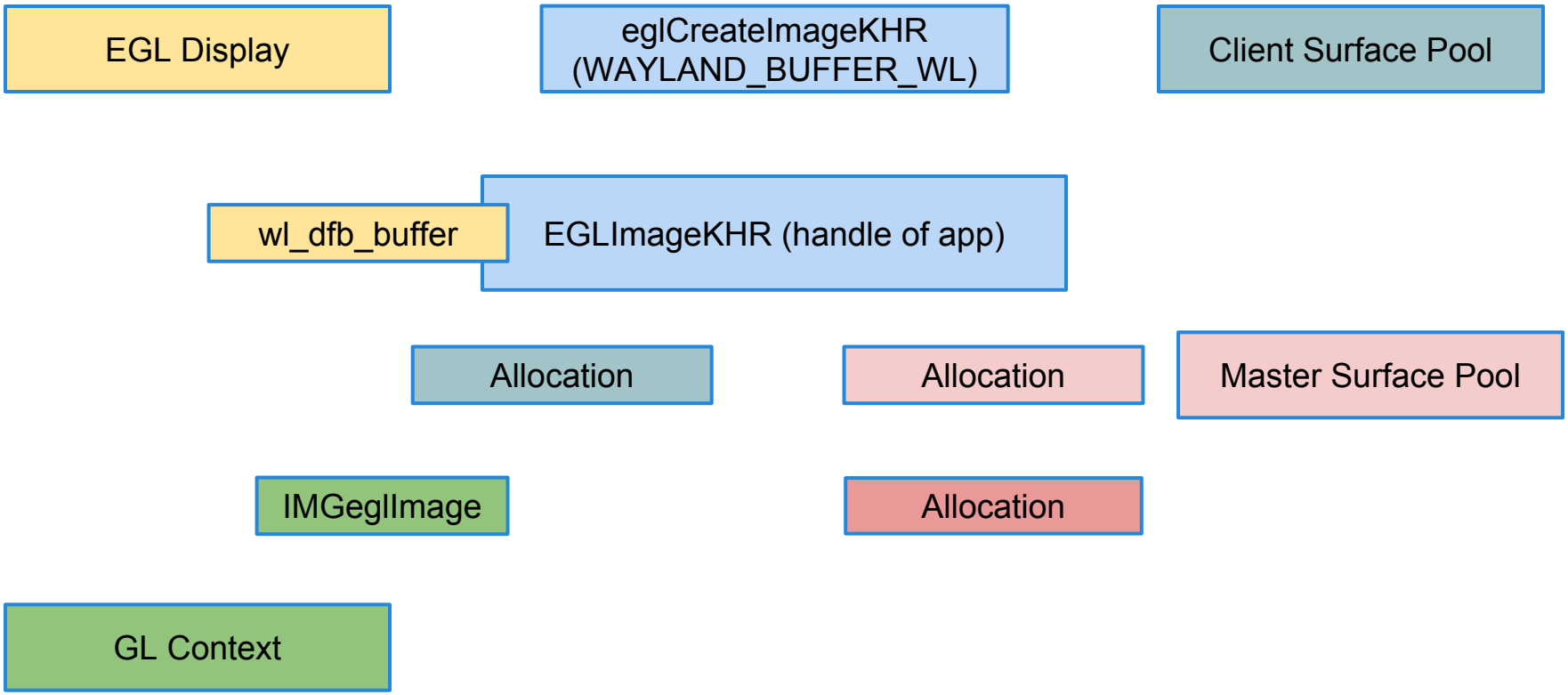
Xorg

- eglGetDisplay(Display)
  - Create special DisplayX11 overriding some of the EGL::Display methods
    - See NATIVE_PIXMAP as XID (for EGLImage)
- eglCreateWindowSurface(Window)
    - <- XCreateWindow
  - Create special SurfaceX11 overriding some of the EGL::Surface methods
    - Create IDirectFBSurface with Window attributes
    - Allocate buffers using Window/X11 key
    - Unmap window?
  - Let implementation create a peer for the IDirectFBSurface
- eglSwapBuffers(EGLSurface)
  - Call Flip() at implementation's peer

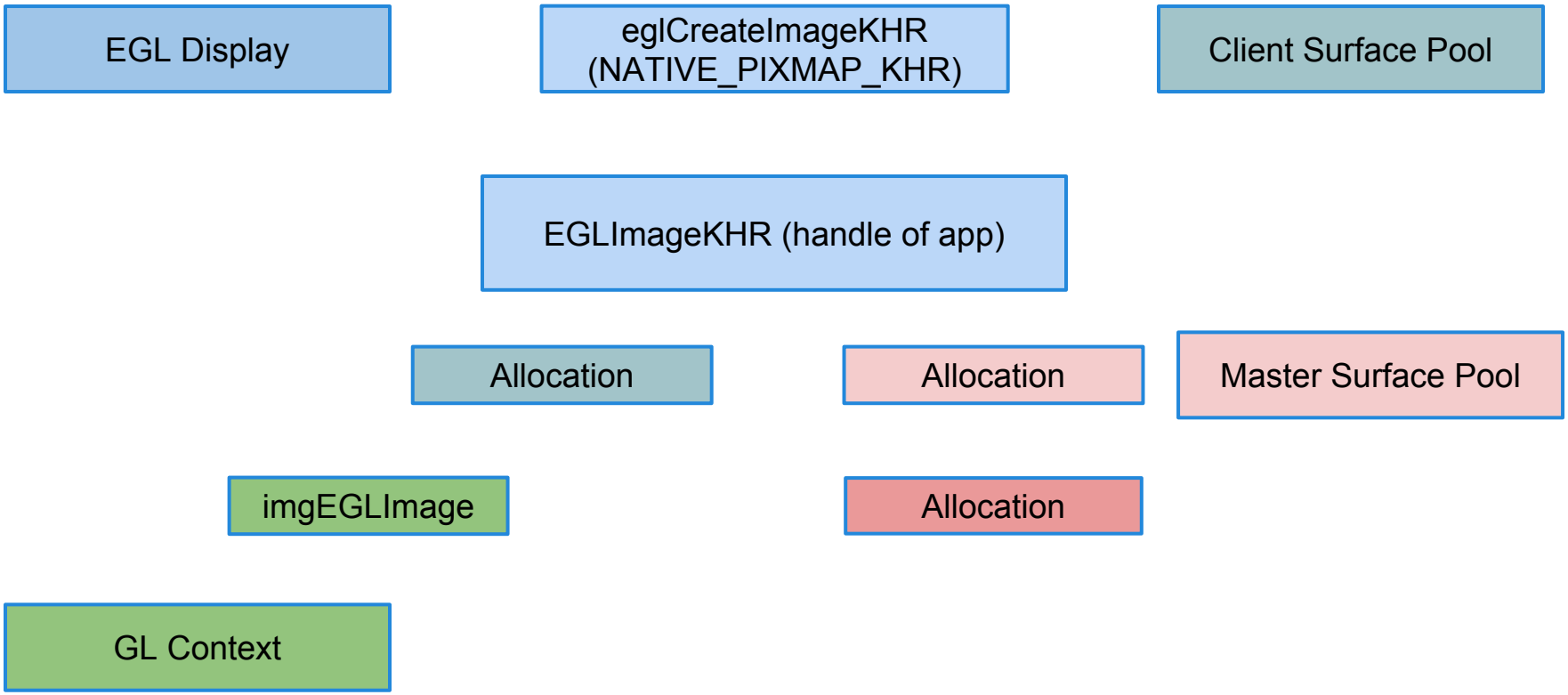
EGL Image


EGL Display
eglCreateImageKHR
(NATIVE_PIXMAP_KHR)
Client Surface Pool
XPixmap
EGLImageKHR (handle of app)
Allocation
Allocation
Master Surface Pool
x11EGLImage
x11Pixmap
Allocation
GL Context

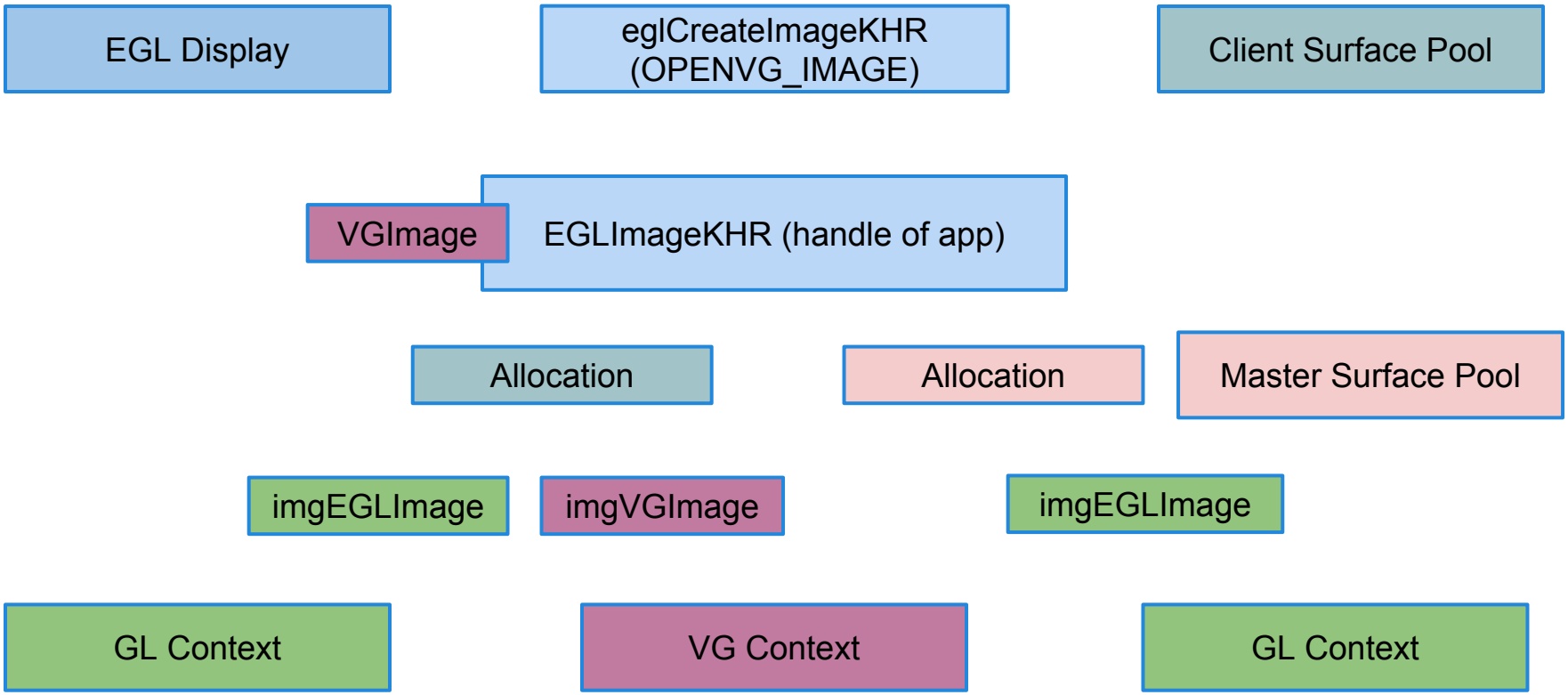
EGL Image


EGL Display
eglCreateImageKHR
(WAYLAND_BUFFER_WL)
Client Surface Pool
wl_dfb_buffer
EGLImageKHR (handle of app)
Allocation
Allocation
Master Surface Pool
IMGeglImage
Allocation
GL Context

EGL Image


EGL Display
eglCreateImageKHR
(NATIVE_PIXMAP_KHR)
Client Surface Pool
EGLImageKHR (handle of app)
Allocation
Allocation
Master Surface Pool
imgEGLImage
Allocation
GL Context

EGL Image


EGL Display
eglCreateImageKHR
(OPENVG_IMAGE)
Client Surface Pool
VGImage
EGLImageKHR (handle of app)
Allocation
Allocation
Master Surface Pool
imgEGLImage
imgVGImage
imgEGLImage
GL Context
VG Context
GL Context