VIVID Runtime®

VIVID Runtime and Secured Content Delivery System on Tizen

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Company Profile

Corporate Name: Acrodea Inc. (acro+idea=Acrodea)

Established: July 2004

Consolidated Sales: 2,961 M Yen ($30M) FY2012

Employees: 167

Group Companies: AMS,Inc. Acrodea Korea Inc.

Main business:

- Smartphone Solutions Device DRM
- Contents Services Social game development
- Middleware Solutions VIVID Runtime/VIVID UI

Presentation summary

✓Native application executables can be treated as data by utilizing VIVID Runtime.

✓By encrypting data with our ARG, even if the data is extracted, it will not execute on an unauthorized terminal.

✓For this reason, native applications can be distributed in an encrypted format with our DRM processing.

✓Acrodea intends to monetize this business at the electronic delivery platform for DRM-protected native applications.

1. VIVID Runtime

What is "VIVID Runtime"?

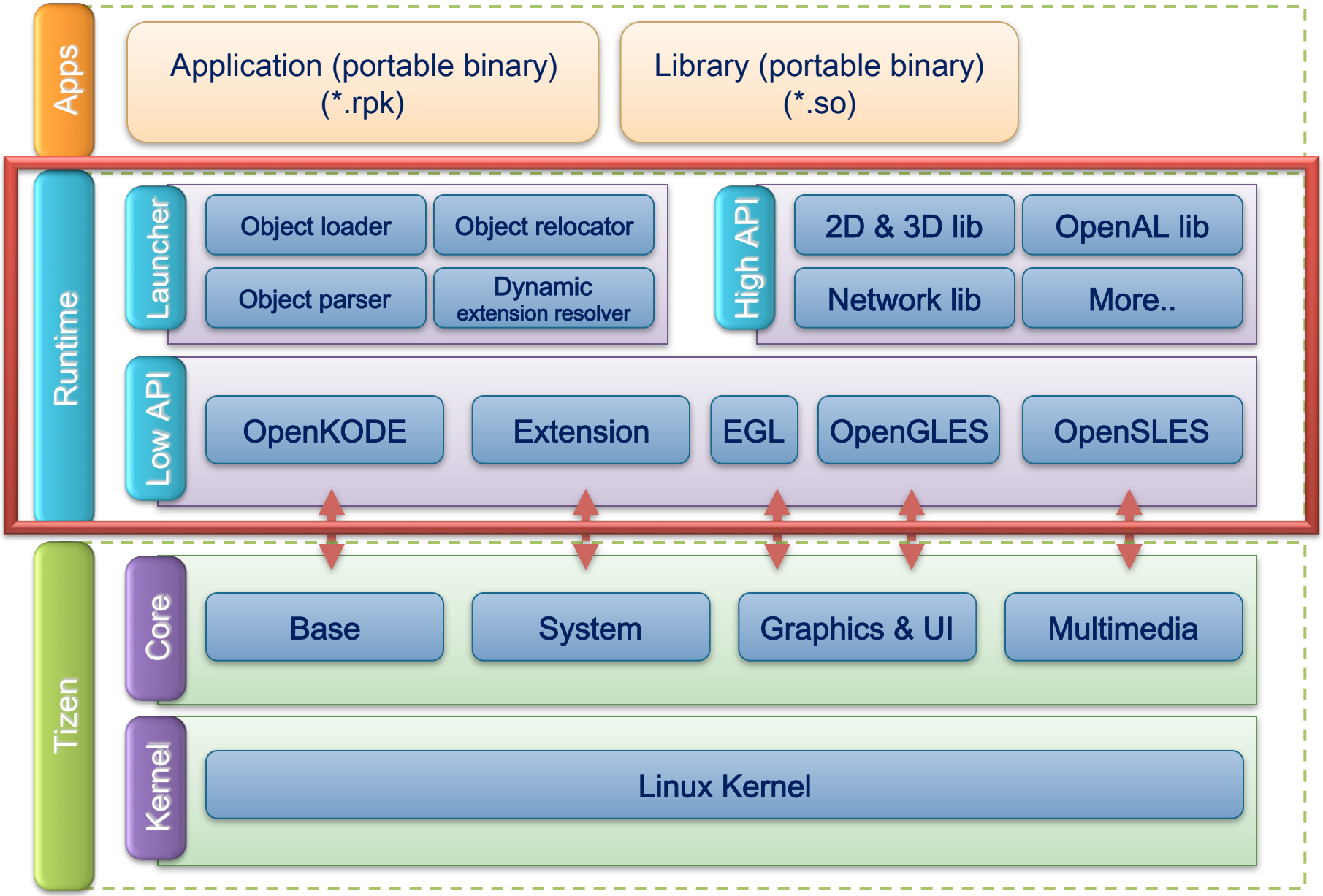
To enable the same application binary to be executed on any mobile terminal.

- VIVID Runtime = Program Execution Environment
- The same binary program operates without any underlying OS dependence.
- Offers full C++ functionality across multiple environments.
- No Game Engine Dependence
- Dynamically linked shared libraries are also supported.

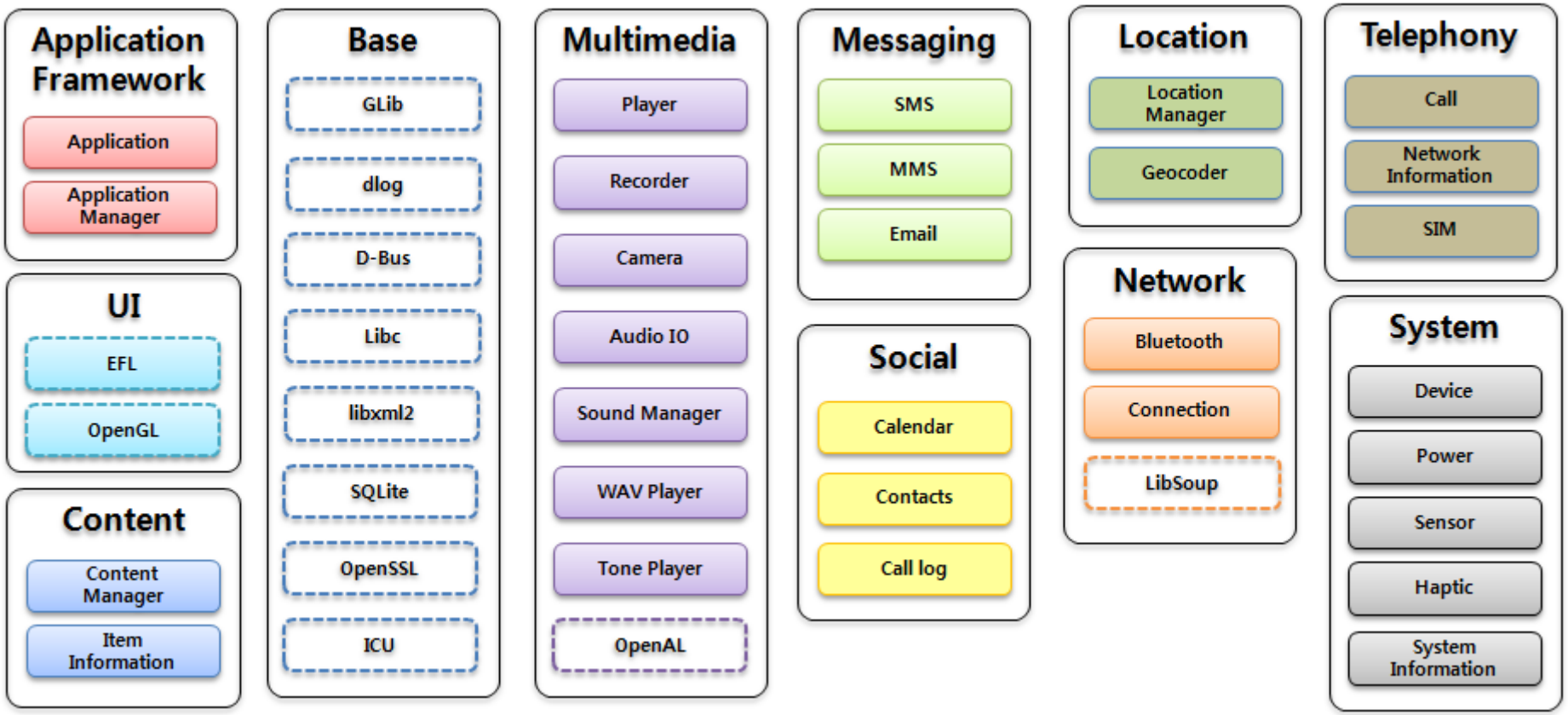
Features

- **Improves software portability, lowers cost and fosters consistency on multiple platforms**
- **Brings application development advantages**
- **Provides an attractive platform to both mobile operators and handset makers**
- **Development process non-reliant upon handset environment**

VIVID Runtime Architecture on Tizen



Tizen APIs Cover VIVID Runtime Requirement

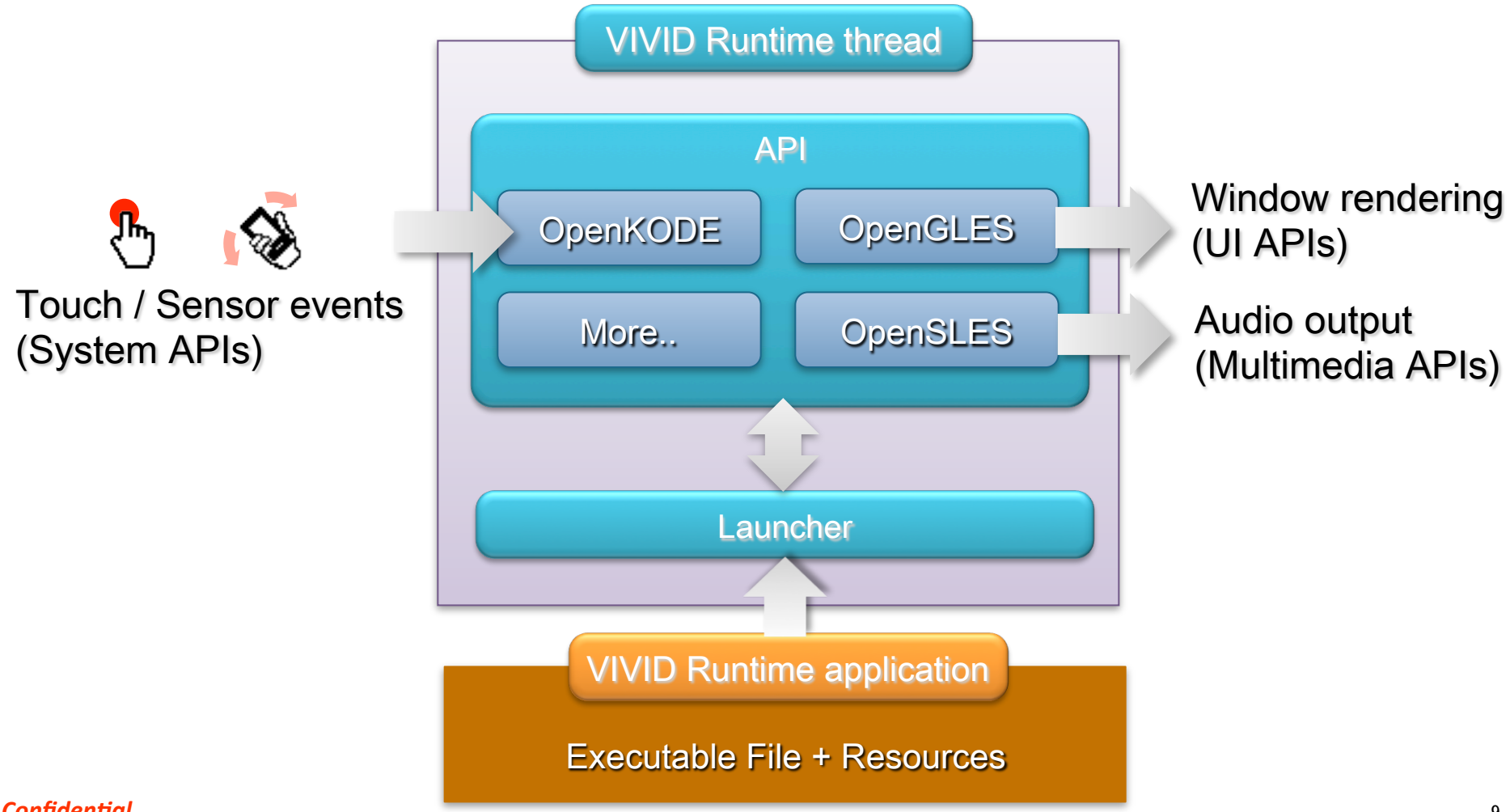


The following native APIs are used to link functions when porting with VIVID Runtime.

- OpenKODE => Base-Libc & POSIX API
- OpenKODE Extension => System–Sensor–Accelerometer
- OpenSLES => Multimedia–Audio IO–Audio Output
- Launcher /Loader => UI-OpenGL

VIVID Runtime Application on Tizen

Touchscreen and sensor events generated from Tizen are transferred to Runtime apps via Runtime's OpenKODE interface.
Expressions related to visual graphics and audio are sent to UI and multimedia APIs, respectively.



Architecture: Additional Native Bindings

Application Loader Module

Providing a plug-in system for defining additional native functions that should be available for the portable application.

Enables additional hardware capabilities

To be efficiently exposed to the ported side, e.g, GPS and accelerometer

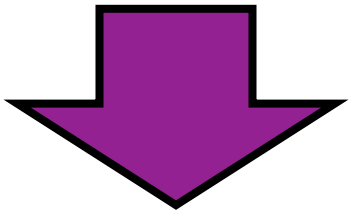
Dynamic linking

- Function discovery at runtime using dlopen() / dlsym() style calls
- Direct .so linking (optional)

Selection of Development Environment

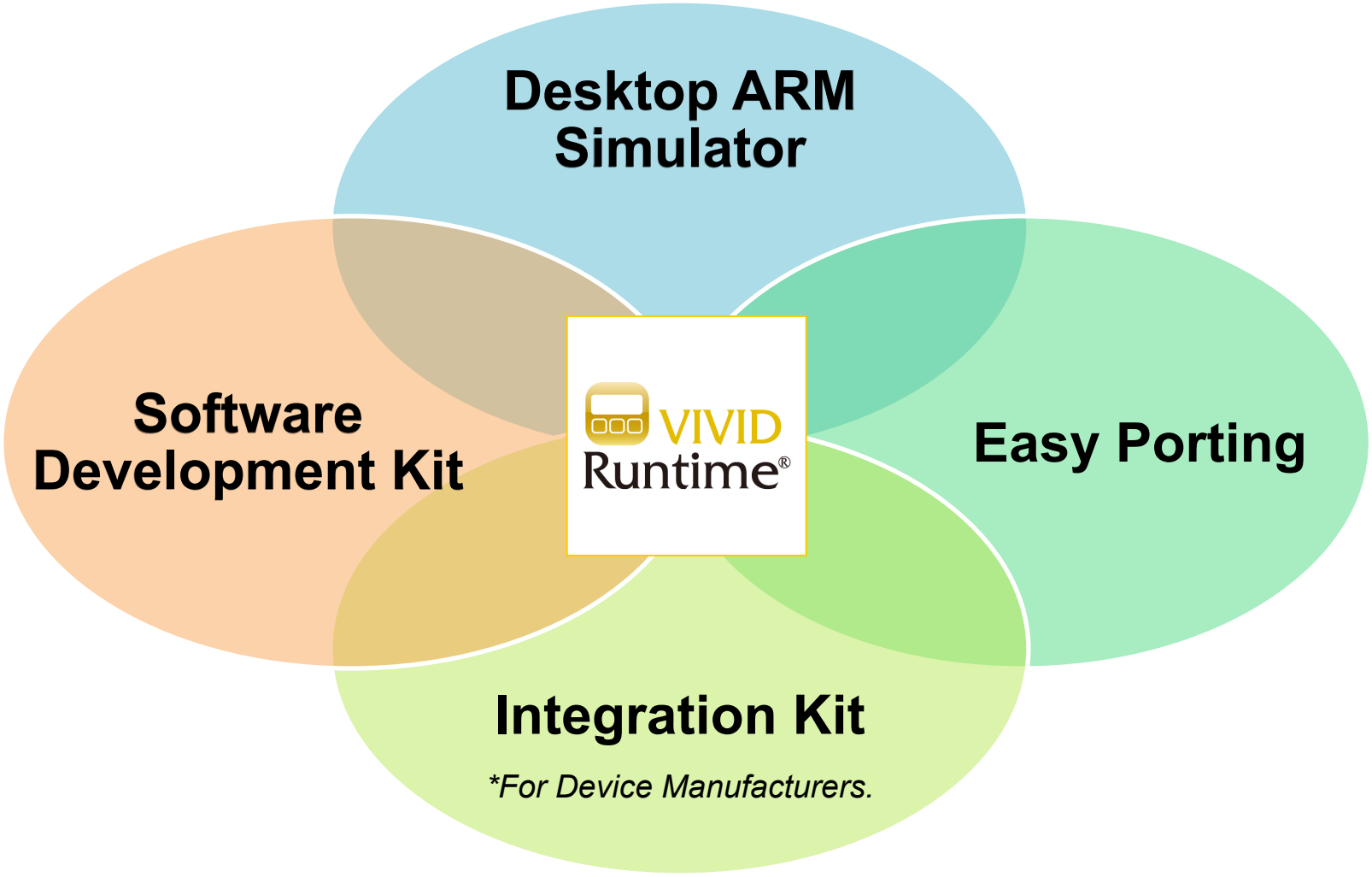
Any dev platform may be used, if the compiler (gcc) supports elf objects. Developers can work in their accustomed environment.

- ✓ Dev environment with debugger can be built without IP fees.
- ✓ Open platform provides public releases of all notices.
- ✓ No charges are assessed for information.



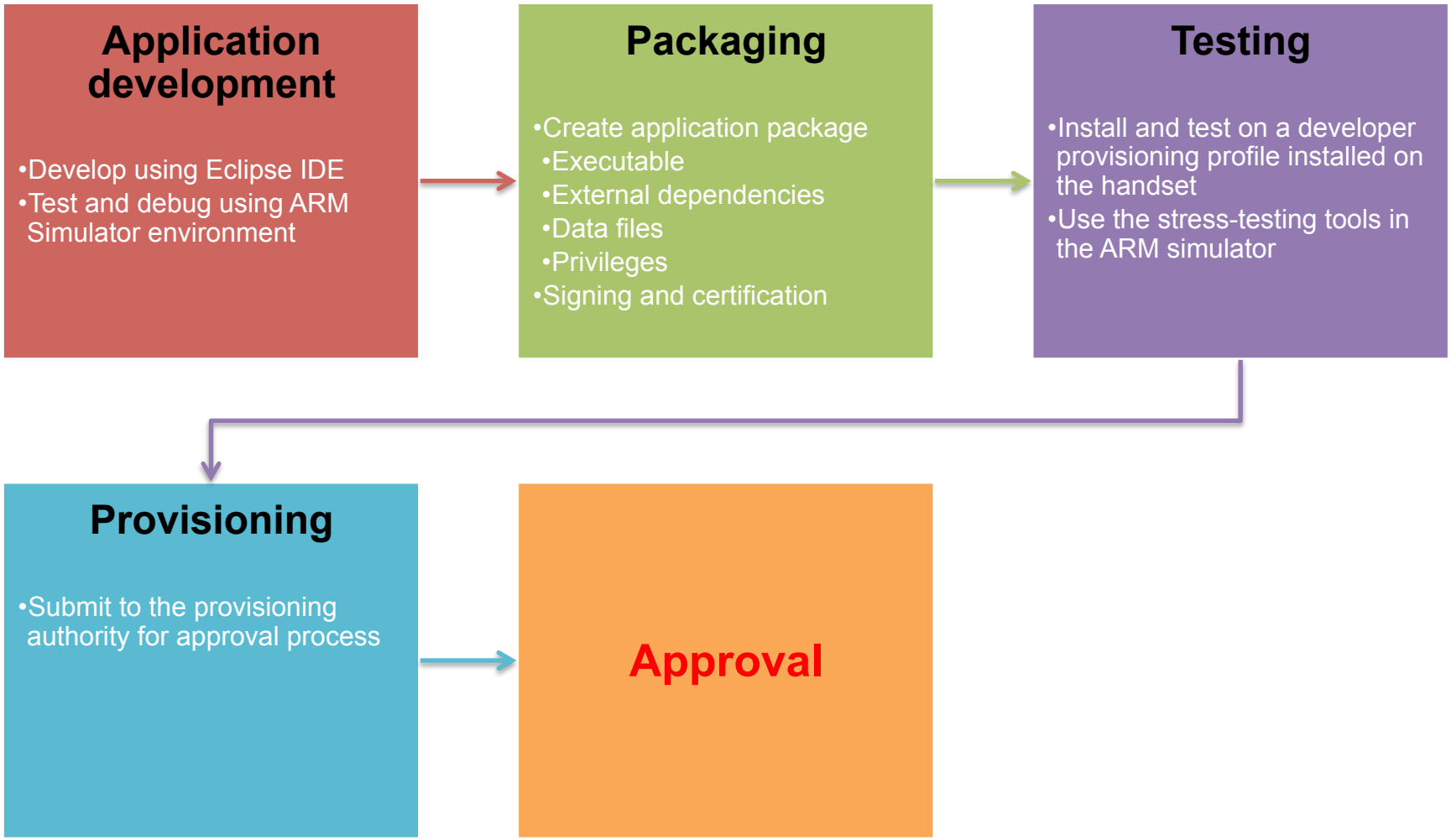
Dev Environment with Ready Access

Dev Environment's 4 Main Features

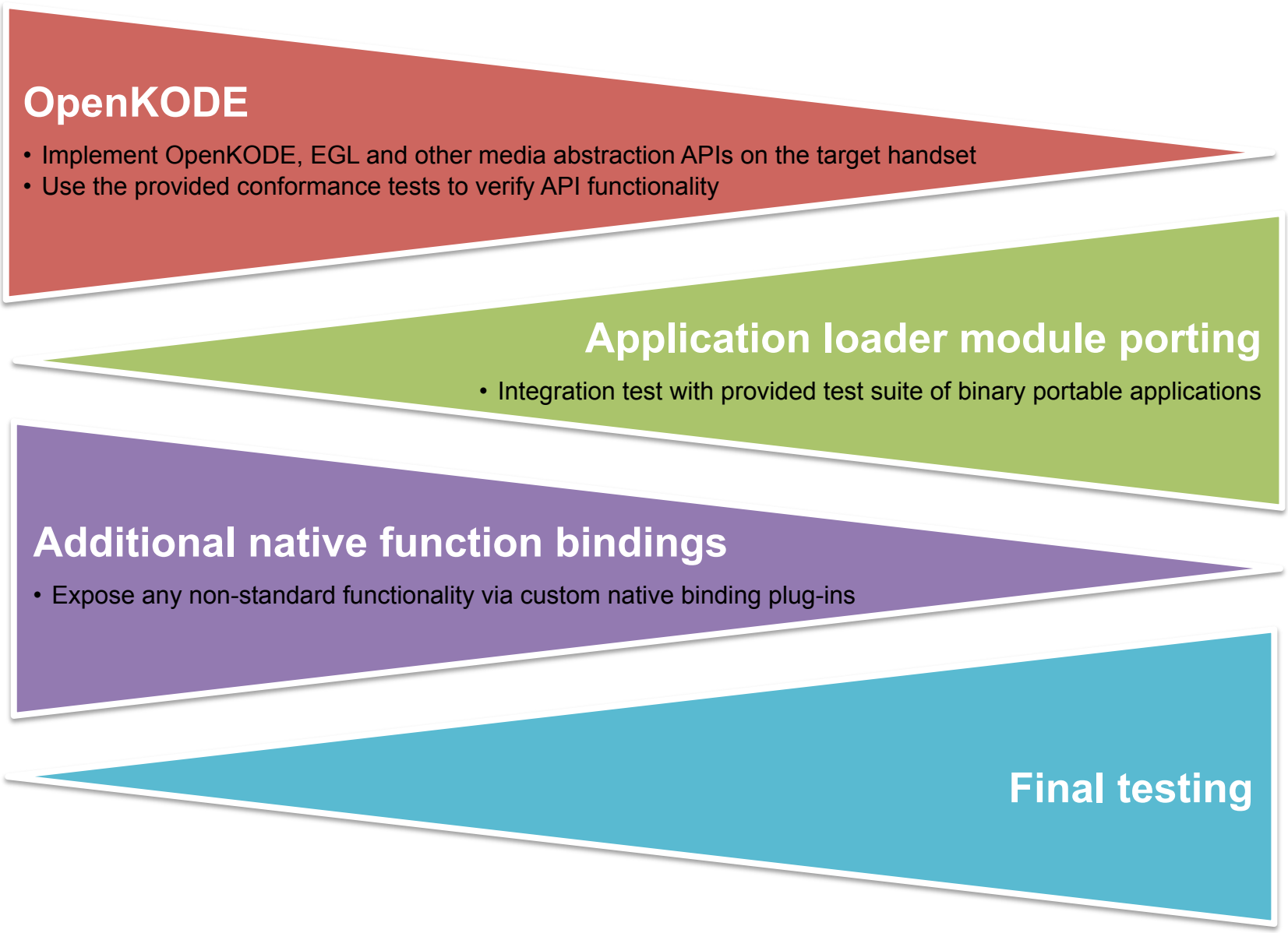


Objective C/C++, ECMAScript are supported.
Built-in support for shared libraries (SysVr4-style shared objects)

Porting: Typical Application Development Process



Typical Integration Process Overview

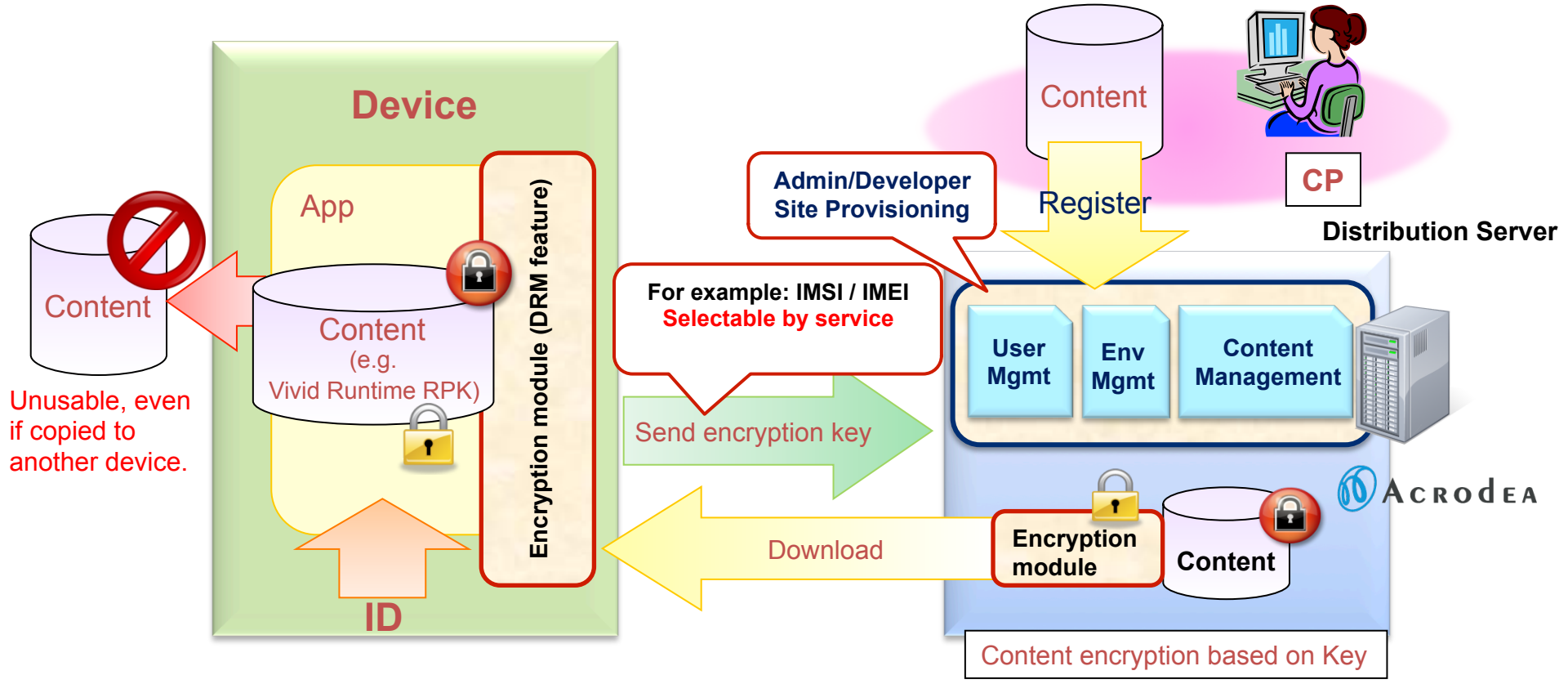


2. Secured Content Delivery System

Acrodea Content Delivery System Overview

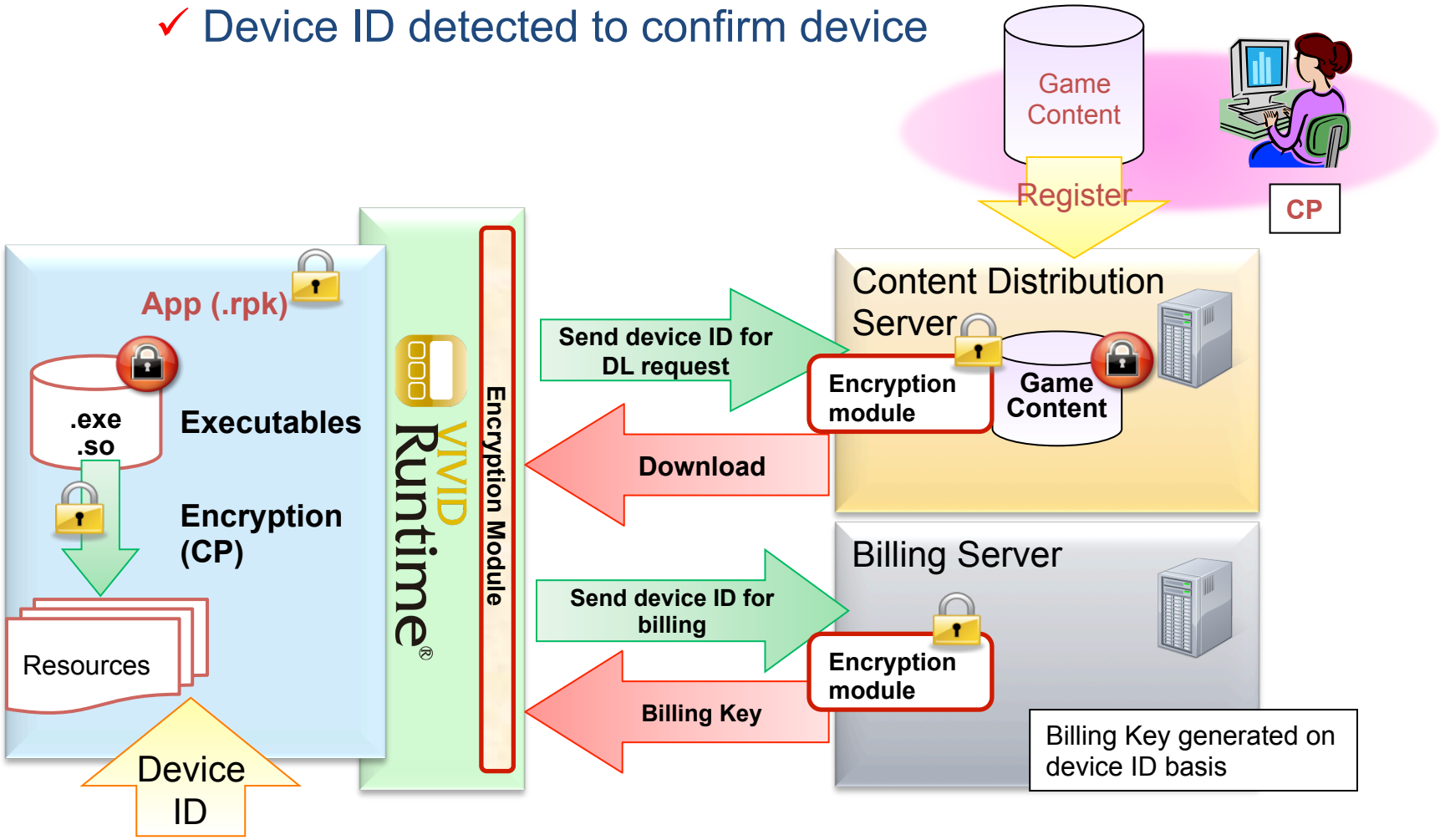
ACRODEA
www. acrodea. co. jp

- Content distribution server features content management and content encryption facilities.
- Distribution server encrypts automatically.
- Content data generates “rights object” with encryption key generated on basis of User ID.
- App authenticates at content usage, based on User ID.
  ⇒ User with Unauthorized ID cannot use downloaded content.
- ID is unique to user.
  ⇒ User ID unique to service or unique to terminal (IMSI, IMEI, etc) is used.



Acrodea DRM for Game Apps

- ✓ Protection from illicit copying of video/audio
- ✓ Designed to protect downloaded content
- ✓ Data and apps are all subject to encryption as data
- ✓ Device ID detected to confirm device



DRM Feature Comparison

ACRODEA
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	w/Acrodea DRM		w/o Acrodea DRM	
Scope of DRM		Premium (pay) and free apps, content files		Premium (pay) apps only
Encryption		Apps and content encrypted		App data is not encrypted
DRM settings per handset		DRM keys are uniquely identified by IMSI (or IMEI, MAC address, etc.)		Google ID used; not handset discrete
Network connection at app launch		Not required		Required
Copy protection		Encryption prevents copying		Root permission access enables copying

Features Comparison Table

	VIVID Runtime	Dalvik	Dalvik/NDK	iPhone
C/C++ development				
Objective-C development				
DRM (Encryption)				
3rd party SDK support				
IDE environment	Eclipse Visual Studio	Eclipse	Eclipse	X-Code
OS abstraction				
VM/Native	Native	VM	VM/Native	Native
Performance	High	Mid/Low	High/Mid	High

Tizen game demo

Thank you!

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