Adeneo Embedded | Embedding Success

Salon ENOVA
Android/Linux embarqués

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Company overview

WW Offices

France HQ (30+)

US (25+)

Germany (10+)

Qt Technology Partner

Windows Embedded Gold Partner

QNX SOFTWARE SYSTEMS

Sales Reps

Japan

Taiwan

Korea

India

Italy

Israel

OUR MISSION

Secure OEMs embedded design success by providing OS Expertise combined with in-depth knowledge of processors' architecture on multiple operating systems such as Windows CE, Embedded Linux, Android and QNX.

Competitive Partner for Embedded Devices

Silicon Vendor partners

Texas Instruments Design Network Platinum Member

Qt Technology Partner

freescale Connect Proven Partner

XILINX ALLIANCE PROGRAM MEMBER

intel Embedded Alliance

Windows Embedded Gold Partner

QNX SOFTWARE SYSTEMS

Market Focus


Automotive


Handheld Devices


Medical


Consumer


Industrial Automation

Adeneo Embedded

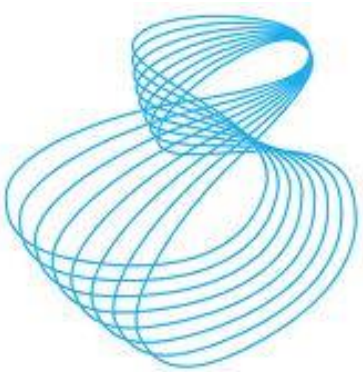
System Integration partners

Specializing in

Business Model

Key partnerships with Silicon Vendors and OS providers allows us to build strong expertise on the latest processor offerings and OS technologies. Combined with our engineering expertise we offer the best technical expertise and services to enable customers design their products

Adeneo Embedded - Core Expertise



Product Expertise

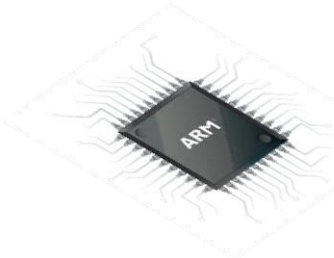
- Power management – optimization to meet device specific requirements
- Boot time – fast boot implementation (<500ms boot times)
- Communication stacks – performance improvements (NDIS 6.1 etc…)
- BSP and Application testing (for certifications)

Application Expertise

- Full custom application development using
  - Silverlight, .Net CF
  - Qt
  - HTML5
  - Native C++, Java
- Data management, cloud connectivity and middleware stack integration

System Expertise

- Custom device driver development
  - Connectivity – wireless, bluetooth, cellular
  - Multimedia – audio/video h/w acceleration, codecs integration, camera interface, OpenGL/VG/CL, DirectShow etc…
  - Storage/Industrial – SATA, PCIe, USB, CAN etc…
- OS feature implementation
  - Real-time, full power management, 3rd party stack integration



Firmware Expertise

- development of reference BSPs for SV architectures
- adaptation of reference BSPs for custom designs
- OS optimizations based on final product requirements

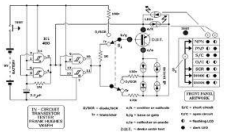
Services offering

Productization

- Production quality BSP and driver optimizations
- System performance optimizations including graphics, boot time and real time behaviors
- Validation and testing of entire BSP and other software stacks
- Testing services for certification
- Full application development

Prototyping

- BSP customization and driver development
- 3rd party stack integration support
- Application technologies enablement



Design

- BSP and OS Support – support contracts
- Design reviews
- Reference BSP support and updates
- 3rd party software and h/w selection/integration guidance

Evaluation

- Trainings – scheduled/customized onsite (3-5 days)
- System level consulting
- Benchmarking, proof of concept development

Competitive Partner for Mobile Devices

Mobile Applications

- UI/UX Design and implementation for Mobile devices
- Natural UI
- Smartphone Middleware
- WPF, OpenGL, XAML
- Performance optimization
  - *Graphical rendering*
  - *UX effects*
- Enterprise, BtoB, BtoC applications

Cloud Connected Applications

Get a full control of your embedded device via the Cloud.

B2C Applications

Experts in XAML, HTML 5, Java and more, our team masters the different technologies for mobile application development.

B2B Applications

Deep, understanding of specific requirements of B2B markets, providing up to date business applications on the latest devices.

Mobile Apps References at a glance

adeneo mobility

Qt Technology Partner digia

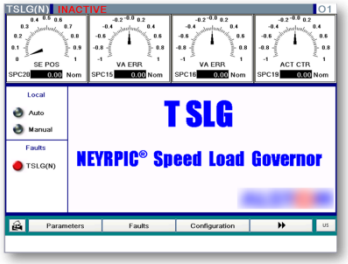
Windows Embedded Gold Partner

Windows 8

Fleet Management
UI and App dev
Navigation integration

Smartphone Applications
Windows Phone and Android
UI Design, Application dev

Interactive Point of Service
Natural UI, Kinect Application



Industrial Supervision
UI and Data management App
Industrial bus communications

Home Energy Management
UI and Data management App
Zigbee/Wifi communications

Consumer Application
Complete UI and SW

Metering Maintenance
Software architecture
UI design

Contact us for more information about our solutions and services

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Adeneo Embedded

Embedding Success

Embedded Linux

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Embedded Linux

- There are many different Linux distributions that target embedded devices
  - Based on the Linux kernel and the GNU tools
- Different UI frameworks can be used to develop applications and graphical user interfaces
  - Qt, DirectFB, GTK, ...
- Integrating the different parts required to develop an embedded Linux device from scratch is possible but challenging
  - Lots of tools available to easily generate system images

Linux kernel key features

- Portability
  - Supported architectures (see arch directory in the Linux sources): alpha, arm, m68k, x86, mips, powerpc, sparc...
- Scalability
  - Used on small embedded devices and super-computers
- Security
  - The code is constantly being reviewed by the community
- Reusability
  - Many drivers and platforms are part of the mainline. No need to reinvent them!
  - Well-defined coding standards
- Community support
  - Easy to find support and documentation

Linux development model

- Latest version is 3.16
  - About one release every 3 months
  - Stable branches are maintained by a dedicated team (only the security fixes are backported)
- Kernel sources available on http://kernel.org/
  - Can be downloaded as archives or with git
  - “Mainline” or “Vanilla” kernel: contain the main, generic branch of development
  - Released by Linus Torvalds after integrating the changes made by all other programmers
- Not all the Linux code is part of the mainline
  - Silicon Vendors typically manage their own tree

Licensing considerations

- The Linux kernel is licensed under the GPLv2
- The GPL does not require you to release your modified version, or any part of it. You are free to make modifications and use them privately, without ever releasing them.
- If you distribute Linux based devices, the GPL requires you to make the modified source code available upon request to the final user only
- Before reusing code and libraries, check the license of the different software packages!
- Other open licenses exist (Apache, BSD, GPLv3, LGPL)
  - Different possibilities/constraints

Yocto

- www.yoctoproject.org
  - *"It's not an embedded Linux distribution - it creates a custom one for you"*
  - Contains a lot of "recipes", defining how to fetch, build and install packages into the target root filesystem
  - Also contains scripts to generate support tools such as toolchains, sysroots, SDKs, etc...
  - Versioning: allows to rely on a stable and validated version of the system
  - Graphical tools to configure and build images (experimental)

Existing open-source projects

- Networking tools
  - Dropbear: ssh server/client
  - Vsftpd/inetd: ftp servers
  - PPP: for managing dialup connections
- System utilities
  - DBUS: inter-application object-oriented communication bus
  - Busybox: tools suite containing base commands for embedded devices
  - Hardware access: libusb, i2c-tools, input-tools, mtd-utils
- Web servers
  - Busybox httpd
  - Lighthttpd
  - Boa, nginx, Apache, etc…
- Multimedia
  - Gstreamer: plugin-oriented framework for handling and processing audio/video streams
  - Many encoding and decoding libraries
- Databases
  - SQLite
- Web browsers
  - Dillo
  - Firefox
  - Webkit

The Qt framework

- Famous cross-platform toolkit, providing widget-based high-level APIs to develop graphical applications
- More than a graphical toolkit, offers a complete development framework: data structures, threads, network, databases, XML, etc…
- Implemented in C++
  - The C++ library is required on the target system
  - Standard API in C++, but with bindings for other languages

Two libraries for designing UIs

  - QtWidget: simple interfaces with buttons and forms
  - QtQuick: advanced graphics and animations using the QML description language
- Can benefit from OpenGL/GLES acceleration when available on the hardware
  - Since Qt5, mandatory for running QtQuick applications

Android

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Android

"Android is an operating system for mobile devices such as cellular phones, tablet computers and netbooks."

(Wikipedia 2010)

"Android is a software stack for mobile devices that includes an operating system, middleware and key applications."

(Wikipedia 2011)

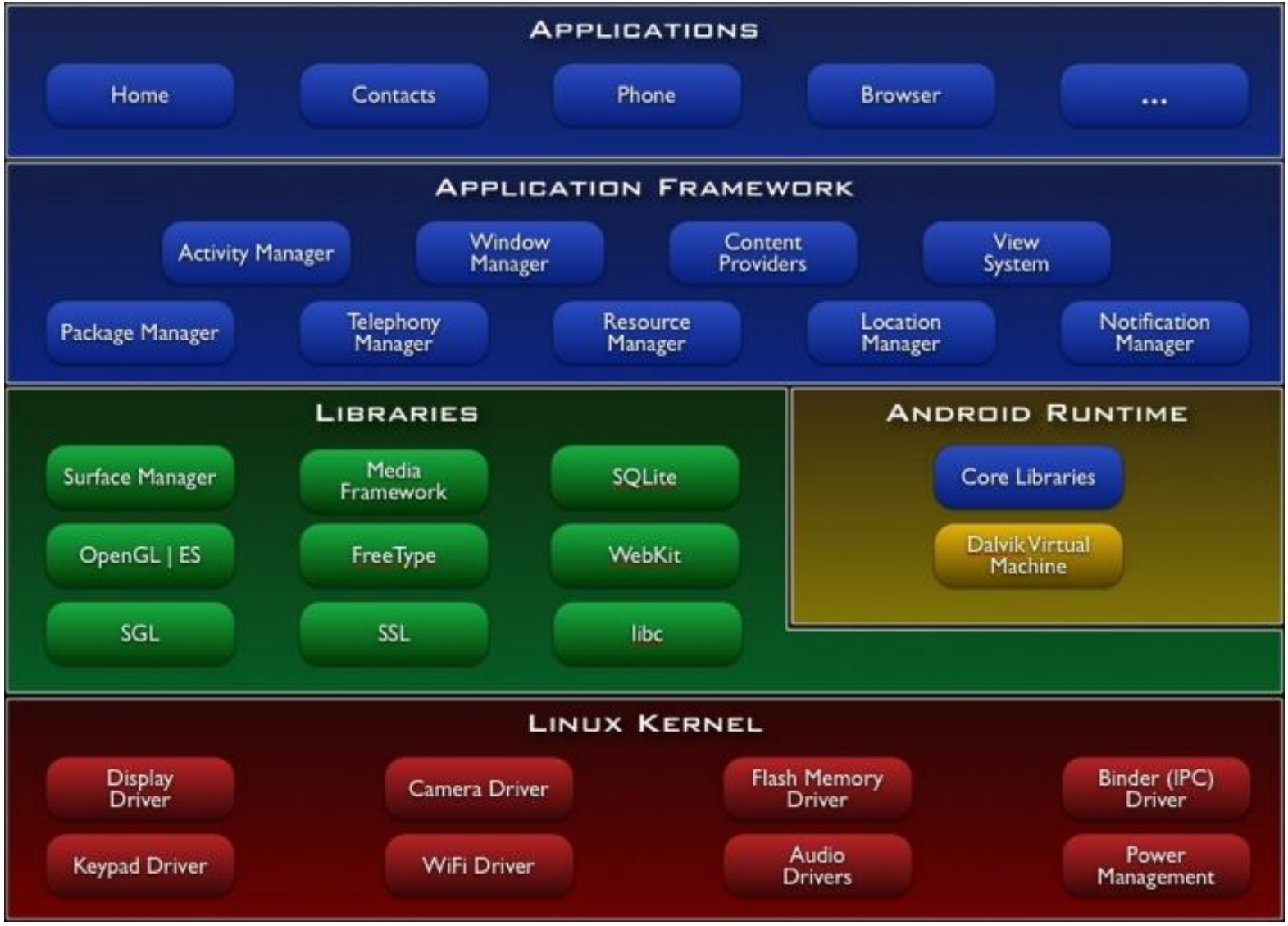
Android Versions

1.0 (sep 2008)
1.1 Petit Four (Feb 2009)
1.5 Cupcake (April 2009)
1.6 Donut (September 2009)
2.0/2.1 Eclair (October 2009)
2.2 Frozen Yogurt (May 2010)
2.3 Gingerbread (Dec 2010)
3.0/3.1/3.2 Honeycomb (Feb 2011)
4.0 Ice Cream Sandwich (Oct 2011)
4.1/4.2/4.3 Jelly Bean (Jul 2012)
4.4 KitKat (Nov 2013)
Android L (????)

Android is Linux?

- Android is based on the Linux kernel
- Includes some architecture changes in the kernel (security, power management...)
- Does not support the full set of GNU libraries (bionic is used as C library)
- Provides a java-based API for application development that is currently not supported on Linux
- Licenses
  - The kernel is released under GPLv2
  - Bionic, the Dalvik virtual machine and other Android key components are released under the Apache Software License 2.0 (less restrictive than the GPL)

Android Architecture



Dalvik

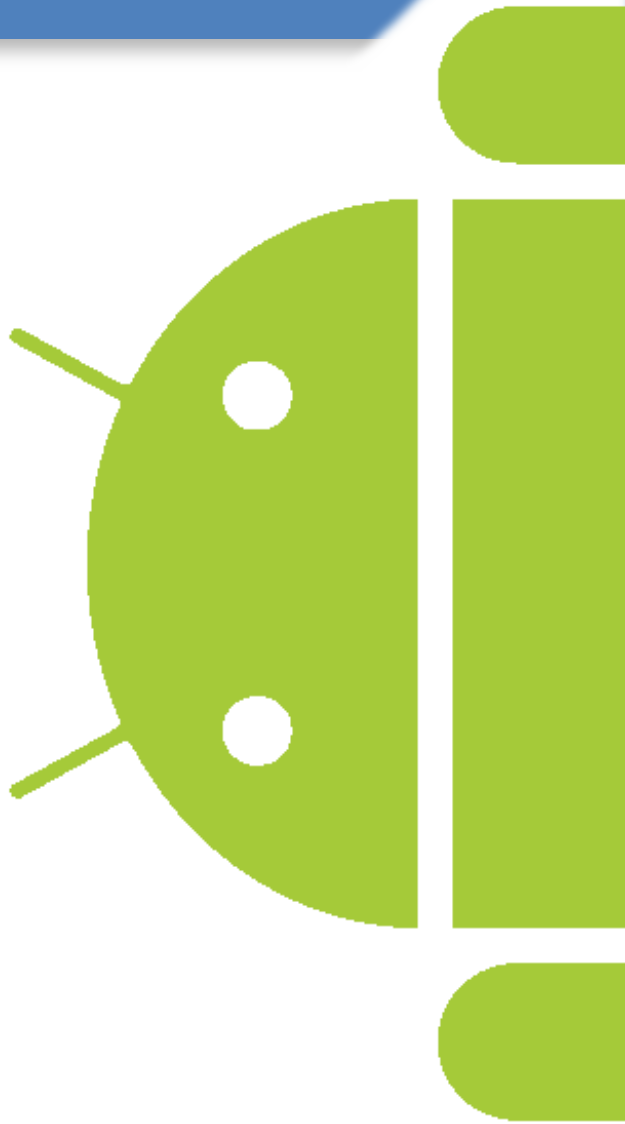
- Open source virtual machine
- Independent from Sun/Oracle implementation
- Just in time compiler since version 2.2
- Does not run standard Java bytecode
- Provides a VM instance for each application and manages limited access to OS resources depending on application privileges
- Soon to be replaced by ART (Android RunTime), experimental version available in KitKat

The Android SDK

- Includes all the tools required to develop Android applications in Java (compiler, debugger, emulator)
- Provides a plugin for Eclipse to support RAD-like application development and interactive debugging inside the IDE
- The «Android Native Development Kit» allows development of native components that can be integrated with the existing class library to provide additional features

Android Device Certification

- To use the Android trademark a device must be certified as compatible with the Android Compatibility Definition Document (CDD)
- Compatibility can be asserted using the Compatibility Test Suite that is available for free
- Compatibility is a mandatory requirement to access the Android marketplace and license Google proprietary apps.



Comparison and case studies

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Comparison

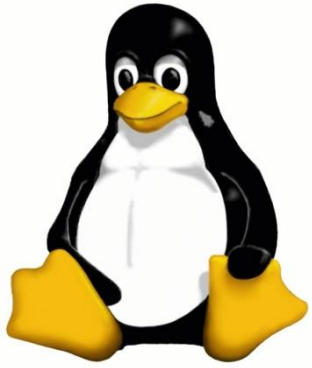
Feature	Linux	Android
Memory footprint	+	-
Bootup time	++	-
Royalties/reuse	++	++
Integration	+-	++
Customizability	++	-
Hardware support	++	--
Real time	-	--
Applicative technologies	++	-
Longevity	+	--

IoT examples

- Health monitoring device
  - Lightweight, mecanically constrained
  - Headless/Small screen
  - Low-power
  - Fast booting
  - Connectivity (Wifi, Bluetooth, ...)

IoT examples

- Embedded Linux is a very good fit
  - Can run on very small low-power microprocessors (even ARM Cortex M4)
  - Modularity for fitting into memory constrained devices
  - Full connectivity available
  - Does not require advanced graphics to be fully functional
  - Lots of components to reuse
    - Database, web services, Bluetooth profiles,…
    - Development can be focused on the application



IoT examples

- Connected fridge
  - Fancy UI with animations
  - Large display with touchscreen
  - Connectivity (Wifi, Bluetooth, ...)
  - Extensive applications
    - SDK for third-party application development
  - Sensors

IoT examples

- Better choose Android
  - Eye-candy modern UI out-of-the-box
  - Very popular in the consumer market => fast learning curve!
  - Full connectivity
  - Easily extensible with a great easy-to-use SDK
  - Heavily customizable

Conclusion

- Android and Linux are used by thousands of developers to develop many different kind of devices
- Choosing the right OS is one of the key steps in making a successful device
- There is no absolute «best» OS, you should evaluate wich OS is the best one for your specific project considering:
  - Hardware support
  - Key features
  - Development team experience
  - Licensing
- Open-source is great for fast time-to-market, but comes with constraints

THANK YOU

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