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Mobile Programming Laboratory

ANDROID
Introduction

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Teaching Materials

Available on MOODLE platform

http://www.didattica.univaq.it

Google Drive Repository

https://drive.google.com/drive/folders/1ISqZfn0i9Ub3eWNXbvW00rd0hD9ya8OL?usp=sharing

Topics

- Brief History
- Architecture

Brief History

Android is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets.

Originally developed by Android Inc. which Google bought in 2005.

Android is popular with technology companies that require a ready-made, low-cost and customizable operating system for high-tech devices.

Its open nature has encouraged a large community of developers and enthusiasts to use the open-source code.

The extensive variation of hardware in Android devices causes significant delays for software upgrades.

Architecture

Android is an open source platform and its native applications are wrote in Java and in recent time in Kotlin.

Lately Google changed the Java framework using an open source release.

Kotlin is a new language developed by JetBrians and released in 2012.

All Java application need to be perform of a Virtual Machine. Thus Google developed an own VM called Dalvik because the standard VM is subjected to Oracle Royalty.

Dalvik not perform the bytecode but use some specific file with *.dex extension based on *.class files and created during building mechanism.

Architecture

How Dalvik works?

When Android is born, Dalvik is based on JIT (Just-In-Time) technology: during the installation the application was partially compiled and so when the other parts of the application was requested, it was compiled in real-time.

- Worse Performances
- Fewer Saving Storage
- Fewer Installation Time

In recent time the hardware of the smartphones is improved. Since Android v5.0, Dalvik was renamed in ART (Android-Run-Time) and it is based on AOT (Ahead-of-Time): during the installation the application is compiled totally.

- Better Performances
- Fewer Battery Usage
- More Installation Time
- More Saving Storage

Architecture

The architecture include a set of tools like:

- Linux Kernel
- a set of native libraries to communicate with hardware
- a virtual machine
- a set of native Java libraries (SDK)

It is based on a layers architecture, where lower levels give services to higher levels.

Architecture

Android is based on Linux Kernel, the current version is 4.x.

The Kernel is the lowest layer of the system.

It permits to use a real operative system, giving the low level tools to perform the virtualization of the hardware through some defined drivers.

Furthermore the Kernel give the essential, reliable and tested features of management of the security, storage, process and power.

Architecture

The lowest layer include the native libraries created in C and C++ representing the Android main core.

When we develop an application we never use this layer, also using the NDK.

Android give us an Application Framework in a higher level to communicate with the device hardware that we can use to develop our application. This layer include some tools called Manager:

- Activity Manager
- Notification Manager
- Window Manager
- Telephony Manager
- …

Architecture