

СЕКЦІЯ 3. МУЛЬТИПЛАТФОРМЕННІ ПРОГРАМНІ ЗАСОБИ, МОБІЛЬНІ ТЕХНОЛОГІЇ

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PERFORMANCE COMPARISON OF ANDROID RUNTIME AND DALVIK ENVIRONMENTS ON AN ANDROID DEVICE

Android applications are delivered to end users in the Android application package format. The files with the .apk extension are compressed file archives that contain bytecode files for the application's java classes. The .apk archive also contains a manifest .xml file, the application resource files, security certificates etc. At the runtime, the bytecodes are sent for execution into that or other type of a virtual machine, such as Dalvik – an open-source software used in Android of versions 4.4 and earlier, which is typically used on gadgets such as mobile phones and tablet computers. Recently, there emerged a new runtime environment called Android RunTime (ART), which replaced Dalvik in Android 5.0 and the later versions, while the Dalvik environment is claimed to be discontinued.

The Dalvik consumes a special type of bytecodes stored in .dex format (Dalvik EXecutable) or .odex format (Optimized Dalvik EXecutable) files. There is also Compact Dalvik Executable format designed for low-resource systems. To maintain backward compatibility, ART uses the same input bytecode as Dalvik, supplied through standard .dex files as part of APK files, while the .odex files are replaced with Executable and Linkable Format (ELF) executables, so there is no problem running old .apk in ART environment.

To test the performance, the Nexus smartphone was taken. Firstly the Android 4.4 with Dalvik was installed on the smartphone and different benchmarks that are shown in the Table 1 were used to test the runtime environment. Then, the device was updated to Android 6.0 and the same tests were done. The difference between these versions of Android is that the 4.4 version includes a choice what runtime to use, while the 5.0 version has only ART pre-installed. The performance gain (under ART in comparison to Dalvik environment) for the Quadrant benchmark was 2.9; AnTuTu – 1.2; CFBench – 3.7; Caffeine Mark – 1.8. The obtained results show that in the same conditions but on the different environments ART demonstrated higher performance than Dalvik.