

RAPID: Accelerating the world



Heterogeneous Secure Multi-level Remote Acceleration Service for Low-Power Integrated Systems and Devices (RAPID) targets a novel heterogeneous CPU-GPU multi-level Cloud acceleration focusing on applications running on embedded systems found on low-power devices.

Cloud computing, as a technology trend, has caught up fast in recent years by providing more and more services to end users in a reliable and efficient manner. At the same time, embedded systems are becoming more and more powerful while mobile applications are becoming more and more performance and power hungry, pushing the boundaries of devices' capabilities to the limits, especially noticeable in old devices. Cloud computing seems to be an attractive solution to this challenge, however, the overhead in energy and response time involved in transmitting data via wireless networks may be greater than the offloading savings.

RAPID tackles this challenge by taking advantage of high-performance accelerators and high-bandwidth networks, proposing a secure unified model where almost any device or infrastructure can operate as an accelerated entity and/or as an accelerator serving other less powerful devices in a secure way. RAPID also offers a registration mechanism, which permits the accelerated entity to automatically find and connect to nearby accelerators with the required resources.

Following RAPID's approach, compute or storage intensive tasks are seamlessly offloaded from the low-power devices to more powerful heterogeneous accelerators, supporting multiple virtual CPUs and GPUs.

Novel scheduling algorithms, admission control policies, Service Level Agreements (SLAs) and license policies are employed to serve multiple accelerated applications efficiently on heterogeneous Cloud infrastructures. And easy-to-use task-based programming model will be defined while a novel runtime will automatically offload and execute the tasks transparently to the developer.

RAPID opens the door to many new innovation opportunities to service providers by introducing the concept of **Acceleration as a Service**, a novel heterogeneous multi-level cloud-based service. Moreover, RAPID opens the door of GPU-based computation in the cloud. **Within RAPID, the first public acceleration cloud service will become available and commercially exploitable.** Three real-world scenarios have been implemented to validate the RAPID proposed solution: an antivirus app, a Kinect 3D hand-tracking app and a face recognition one.

"For the first time, cloud resources will be used easily and efficiently by any application and thus, it will have widespread adaptation permitting service providers to enter in many other domains."

Iakovos Mavroidis, Project Coordinator, FORTH

The consortium, led by FORTH, is composed of complementary organisations including industry and academia. It consists of the following organisations: Foundation for Research and Technology-Hellas (Greece), Sapienza University of Rome (Italy), Atos Spain SA (Spain), Queen's University Belfast (United Kingdom), Herta Security SL (Spain), SingularLogic SA (Greece), University of Naples Parthenope (Italy).

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For more information visit our website www.rapid-project.eu or contact the project coordinator Iakovos Mavroidis (jacob@ics.forth.gr).