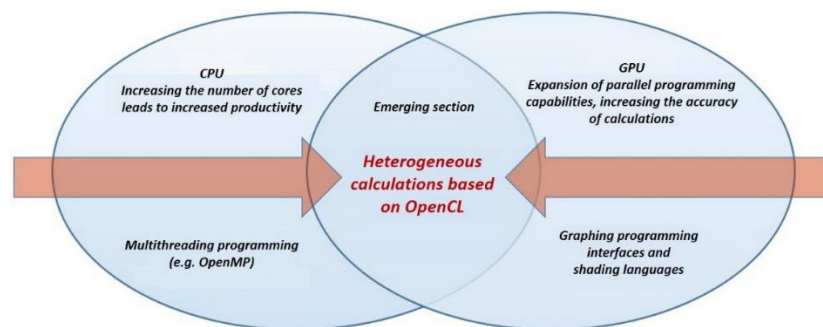


## THE USAGE OF OPENCL FOR PARALLEL COMPUTING

Nowadays there are more and more tasks related to the processing of large volumes of information. They relate to various areas of activity: economic calculations, physical modeling, architecture, multimedia, medicine, graphics processing, et cetera. One of the main techniques for solving similar problems is the method of parallelism, when one big task is divided into several subtasks, which are executed in parallel and independently. For systems that solve similar problems a large amount of computing resources is required. Previously, such resources could provide only large clusters in computer centers, however, with the development of technology, computing resources became more affordable and new ways of creating highly productive systems appeared.

OpenCL (Open Computing Language) – is a new industrial standard and framework that implements the GPGPU technology for parallel tasks and parallel data of heterogeneous calculations on various modern processors, graphics processors, DSPs and other microprocessor designs (pic. 1) that can be found on personal computers, servers, mobile devices and embedded target.



Pic. 1 Scope of OpenCL

Recently, the OpenCL standard has reached a wider audience due to the growing number of devices that support it. At the same time, there is an increase of differences between devices that support this standard. This situation offers developers, who want to reach high level of productivity, a wide range of platforms. Considering the additional parameters of the OpenCL platform along specific application settings, the design space for research is extremely large. In addition, the availability of more than one kind of device allows to distribute of computing on heterogeneous platforms.

OpenCL applications are intended to perform calculations on OpenCL 1.1 or higher standard of graphics cards. Modern graphics cards contain hundreds of small specialized processors, which simultaneously perform simple mathematical operations over incoming data streams. OpenCL covers SMP and SIMD levels of parallelism areas. The OpenCL language undertakes the organization of such parallel calculations and allows to achieve great acceleration for a large class of tasks.

The main features of the standard:

1. The source code of the application is easily ported to other platforms.

2. Support of a wide range of devices is achieved through the introduction of generalized data model systems: platform model, memory model, execution model, programming model.

3. All models are abstract ( have no bind to specific devices), the implementation is provided by the manufacturer.

The main advantage of OpenCL is the transferability between different computing platforms. Currently OpenCL is a one of this kind tool.