

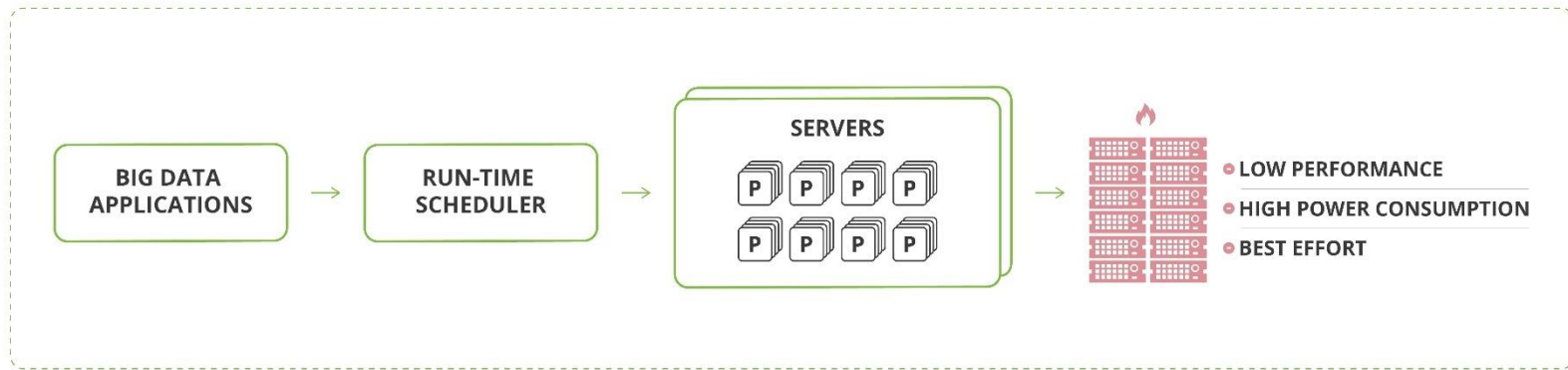


VINEYARD

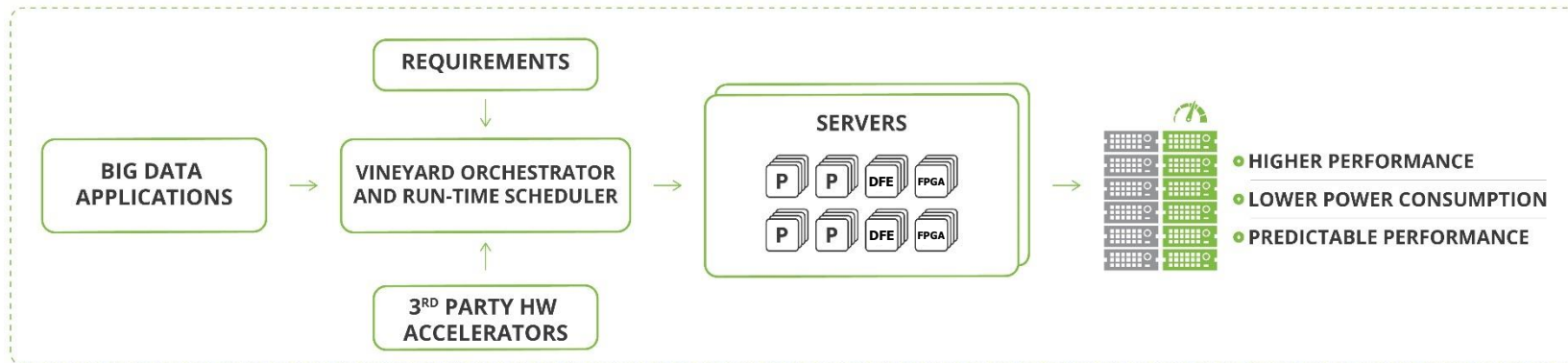
**Versatile Integrated framework for
Accelerator-based Heterogeneous Data Centres**

Heterogeneous DCs for energy efficiency

TODAY'S DCs



FUTURE HETEROGENEOUS DCs WITH VINEYARD INFRASTRUCTURE

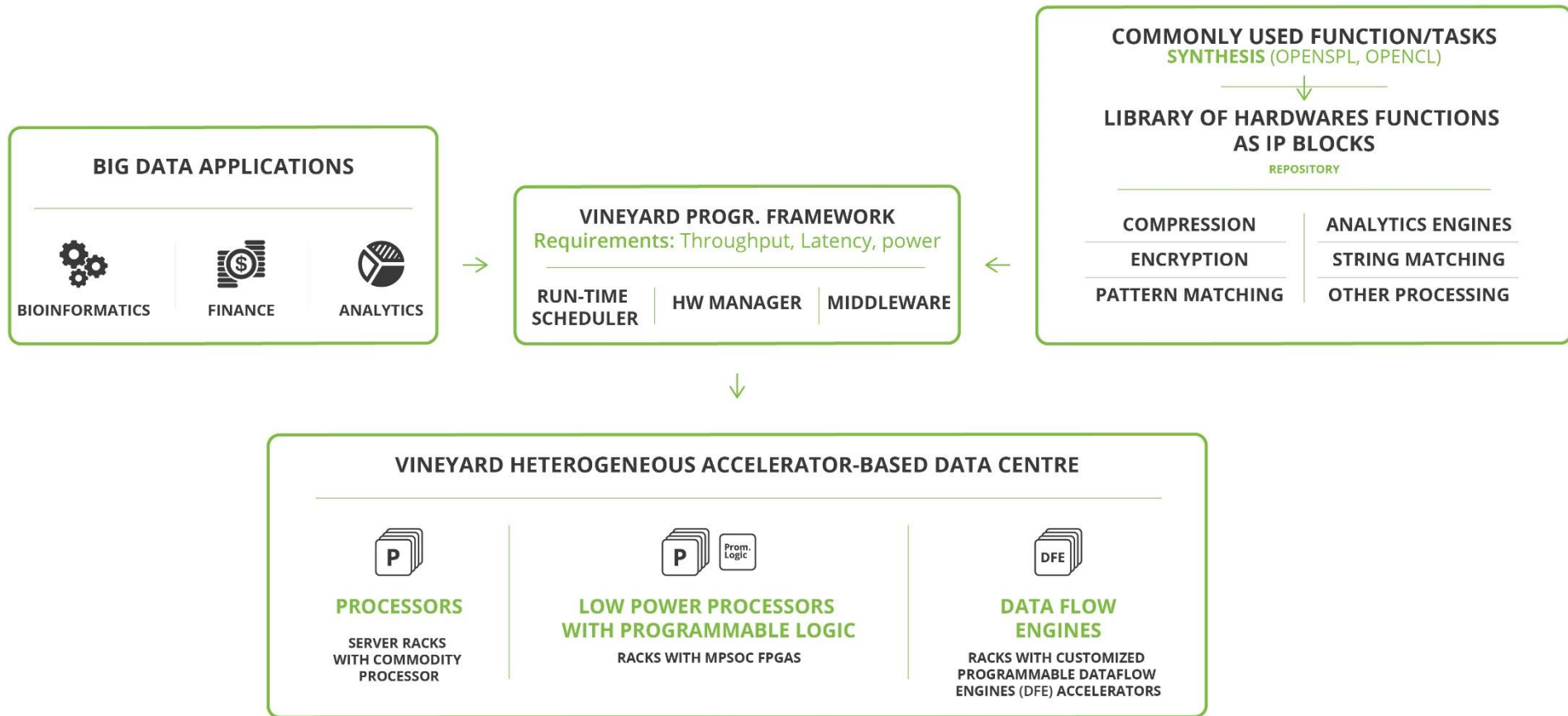


VINEYARD aims to:

- Build an integrated platform for **energy-efficient data centres** based on novel programmable hardware **accelerators: (i.e. Dataflow engines and FPGA-coupled servers)**
- Develop a high-level **programming framework and big data infrastructure** for allowing end-users to seamlessly utilize these accelerators in heterogeneous computing systems by employing typical data-centre programming frameworks (i.e. Spark).

The main goal is to increase significantly the performance and the **energy efficiency** of the data centers.

VINEYARD Heterogeneous Accelerators-based Data centre



Objectives

- **Objective 1: Development of novel Programmable Dataflow Engines (DFE) for servers:** One of the main objectives of VINEYARD will be the development of novel programmable dataflow engines (hardware accelerators) based on coarse-grain programmable components that can be coupled to servers' processor in heterogeneous data centres.
- **Objective 2: Development of novel FPGA-accelerated servers:** VINEYARD will develop novel server blades that will be based on high performance and energy-efficient FPGAs that incorporate multiple low-power processing cores.

Objectives

- **Objective 3: Development of an open-source integrated programming framework** that can be used for the programming of heterogeneous systems consisting of general purpose processors (CPUs), and accelerators (programmable dataflow engines and FPGAs) based on traditional data centre programming frameworks (e.g. Spark, Storm, MapReduce, etc.).
- **Objective 4: Development of a run-time scheduler/orchestrator** that controls the utilization of the accelerators based on the applications' requirements (execution time, power consumption, available resources, etc.).

Objectives

- **Objective 5: Development of a novel Virtual-Machine (VM) appliance model for provisioning of data to shared accelerators.** Targeting cloud deployments, this VINEYARD effort will bring both tangible and novel results. The enhanced VINEYARD middleware augments the functionality of the orchestrator, by enabling more informed allocation of tasks to accelerators.
- **Objective 6: Ecosystem Establishment and Support.** The establishment of an ecosystem that will empower open innovation based on hardware accelerators as data-centre plugins, thereby facilitating innovative enterprises (large industries, SMEs, and creative start-ups) to develop novel solutions using VINEYARD's leading edge developments.

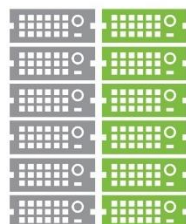
Three real-world scenarios

The VINEYARD project will be demonstrated on three real-world applications:

- **Computational neuroscience:**
 - high-accuracy simulation of the Olivocerebellar system of the brain, crucial to the understanding of brain functionality
- **Financial applications:**
 - Trading system operations
 - Pre-trade risk management
- **Data analytics**
 - TPC-C (on-line transaction processing (OLTP) benchmark)
 - TPC-H (decision support benchmark).
 - IoT application (Linear Road will also be used as a representative workload in IoT applications)

The VINEYARD value-chain

VINEYARD FRAMEWORK



**SOFT IP-CORES
VENDOR**

**HETEROGENEOUS
PLATFORM**

**APPLICATION
DEVELOPERS**

**END
USER -CLIENT**

VINEYARD details

- **PROJECT DETAILS**

Contract number: H2020- ICT 4 – 687628

Community contribution: 6.28M€

Start date: February 1st, 2016

Duration: 36 Months

Project Coordinator: Dimitrios Soudris, ICCS/NTUA, dsoudris@microlab.ntua.gr

Technical Project Manager: Christoforos Kachris, ICCS/NTUA, kachris@microlab.ntua.gr

Website: www.vineyard-h2020.eu

Email: info@vineyard-h2020.eu

PARTNERS



(Coordinator)

www.microlab.ntua.gr



www.maxeler.com



www.bull.com



www.qub.ac.uk



www.ics.forth.gr



www.hartree.stfc.ac.uk/hartree



www.neurasmus.com



www.neurocom.eu



www.helex.gr



www.leanxcale.com



www.loba.pt



Thank You

See more on the website



Co-funded by the Horizon 2020 Framework Programme
of the European Union under Grant Agreement n° 687628

CONTACT INFORMATION
Project Coordinator: Institute
of Communications and
Computer Systems, Greece

Prof. Dimitrios Soudris
Dr. Christoforos Kachris

Email
info@vineyard-h2020.eu

www.vineyard-h2020.eu