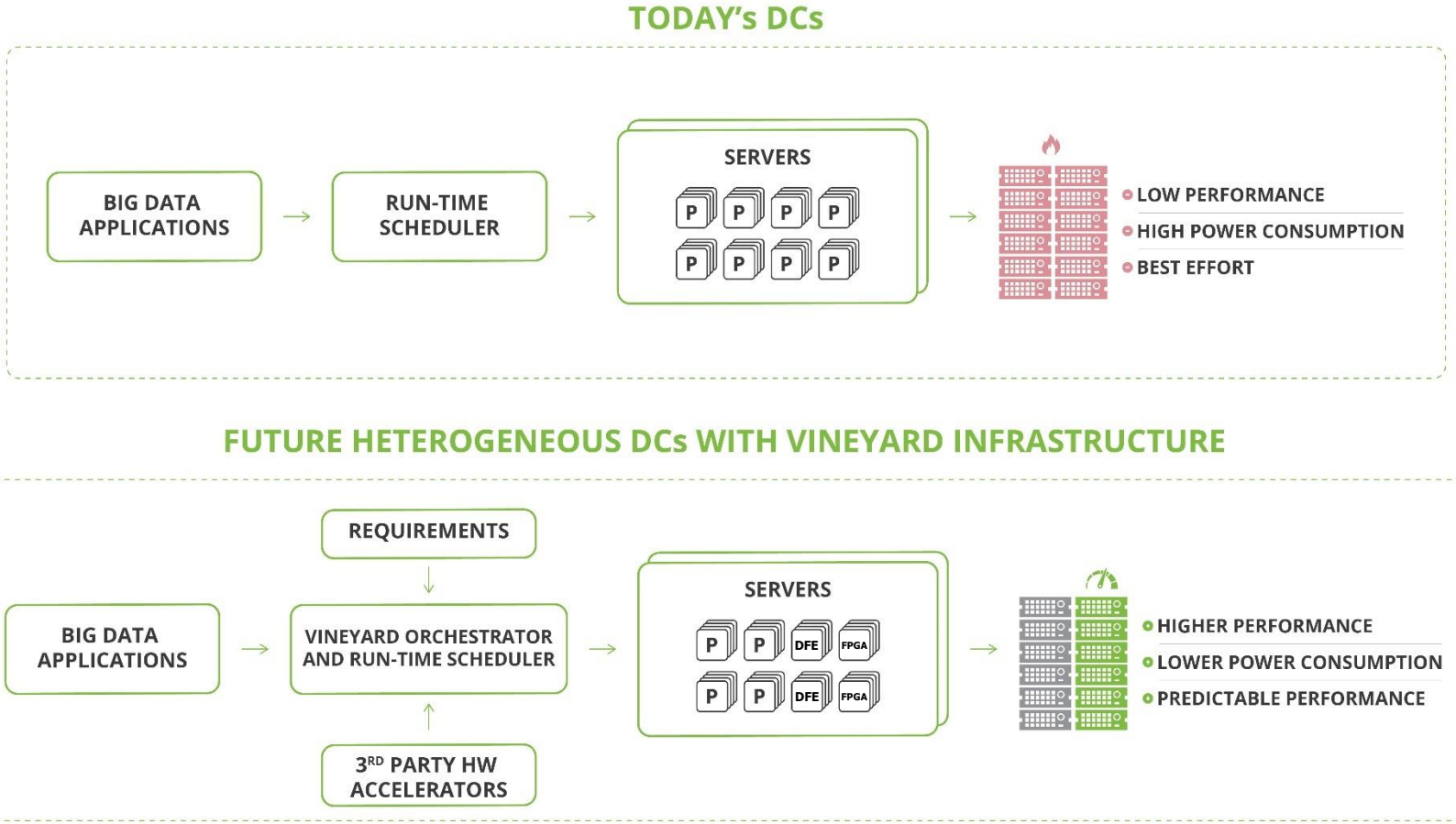
VINEYARD

Versatile Integrated framework for Accelerator-based Heterogeneous Data Centres

Heterogeneous DCs for energy efficiency

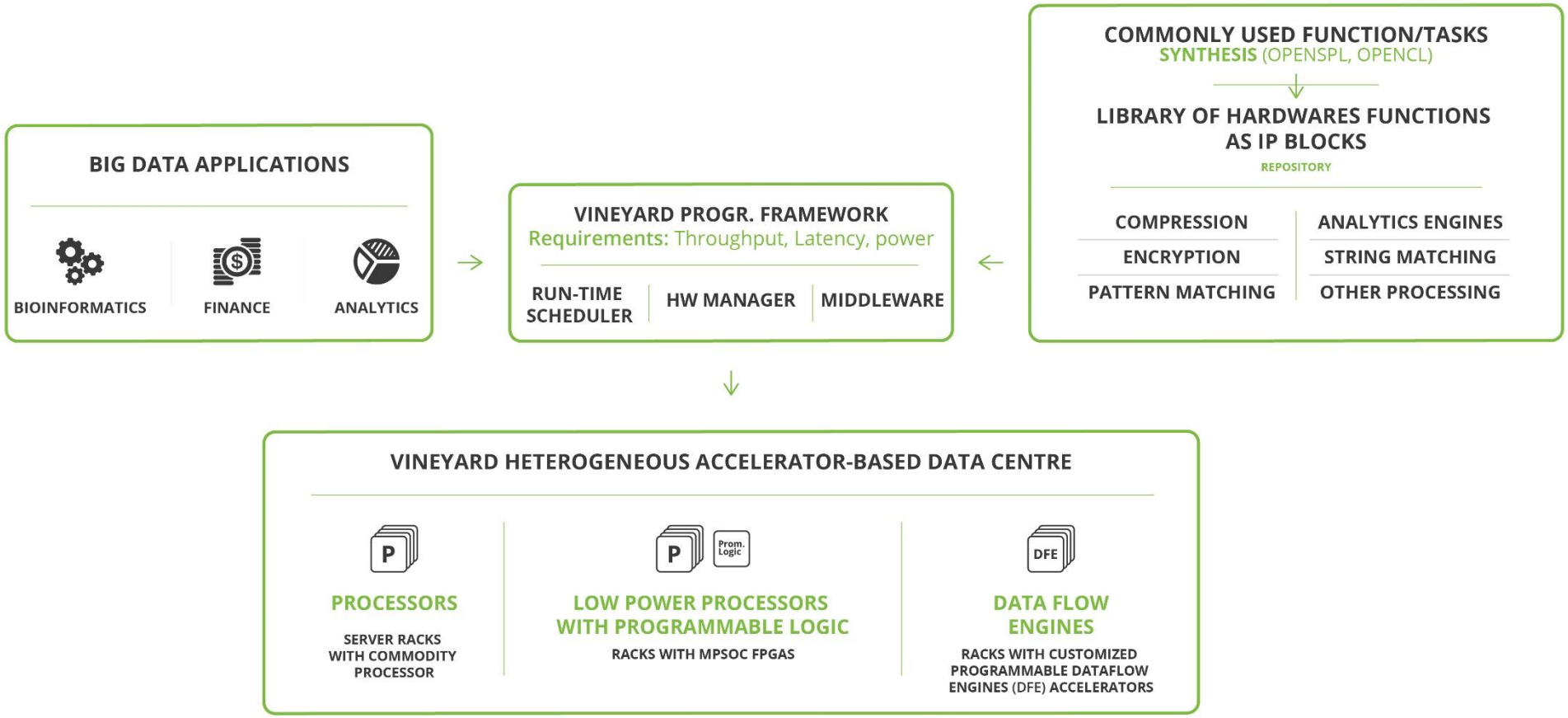


VINEYARD aims to:

- 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.

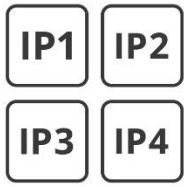
Three real-world scenarios

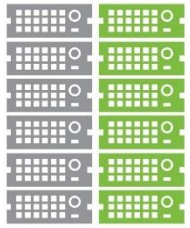
The VINEYARD project will be demonstrated on three real-word applications:

- **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

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VINEYARD

Thank You

See more on the website

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