TECHNICAL WORK PACKAGES

SOFTWARE CONTRACTS

In this work package, we develop new tools and techniques that allow programmers to reason about time, energy, and security at the program source level. To achieve this, we build new language constructs to allow developers to reason about these extra-functional properties as first-class citizens of the source code and express contracts in the source code that are machine-checkable by an underlying proof system.

HETEROGENEOUS MULTICORE COORDINATION

In this work package, we focus on energy-, time-, and security-aware multicore coordination. Starting out from a high-level streaming-oriented componentised application specification, we map individual tasks to heterogeneous compute units according to global optimisation and constraint objectives with respect to energy, time, and security.

COMPILATION AND OPTIMISATION

In this work package, we realise compiler techniques trading energy consumption, security, and time in a multi-objective fashion, by setting up a common compiler platform for TeamPlay architectures, finding feasible multi-objective optimisation approaches, and developing actual energy- and time-aware optimisations.

MODELLING AND ANALYSES

In this work package, we measure and model energy consumption, timing, and security properties of embedded systems to produce novel models that can be used to perform static resource usage analysis, assess, and predict energy consumption at runtime, and characterise the security level of a system.

LEARN MORE

TeamPlay website: www.teamplay-h2020.eu

CONTACT INFORMATION

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TEAMPLAY

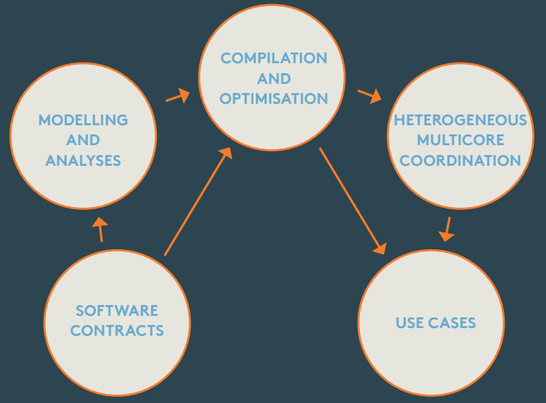
PROBLEM AND APPROACH

Energy efficiency, time, and security are increasingly important, as mobile applications, the internet of things (IoT), and cyber-physical systems become more commonly used in everyday life. However, there are no effective analyses that can predict energy usage or allow the programmer to balance their non-functional properties such as energy efficiency, execution time, and security.

TeamPlay aims to:

- Treat non-functional properties (e.g. energy usage, execution time, and security) as first-class citizens.
- Enable the developer to reason about both the functional and the non-functional properties of their software at source code level.
- Allow programs to reflect directly on their own energy consumption, time, security, etc.
- Effectively manage energy consumption for parallel systems while maintaining the right balance with time and security.
- Develop formally-motivated techniques that will allow energy usage, execution time, and security of parallel software to be treated effectively.

TEAMPLAY OVERVIEW



USE CASES

DRONES

TeamPlay aims at implementing edge computing in a drone, supporting real-time object detection in agricultural and search and rescue scenarios. The goal is to do this in an energy-optimised way, in order to reduce heat generation and extend flight time.

SMART-IoT

TeamPlay aims at implementing visual perception algorithms in IoT devices by using deep-learning techniques. For instance, this will be used to develop a smart and automated parking-lot inspection system. The goal is to improve the response speed and reduce the power consumption, aiding long-term autonomous operations.

CAMERA PILL

The camera pill performs endoscopy in search for cancer by recording images of the intestines. To ensure long operating time and privacy, energy consumption and security are important. The goal is to improve the operating time by reducing the power usage, increasing communication security, and defending against side-channel attacks.

SPACE

Teamplay aims at implementing high-end algorithms used in the space industry where the power and time budgets are very strict. The goal is to use the developed technology for optimising the energy consumption and incrementing the time availability of the space platform.