

PRiME Demonstrator (2018) – Theme 2

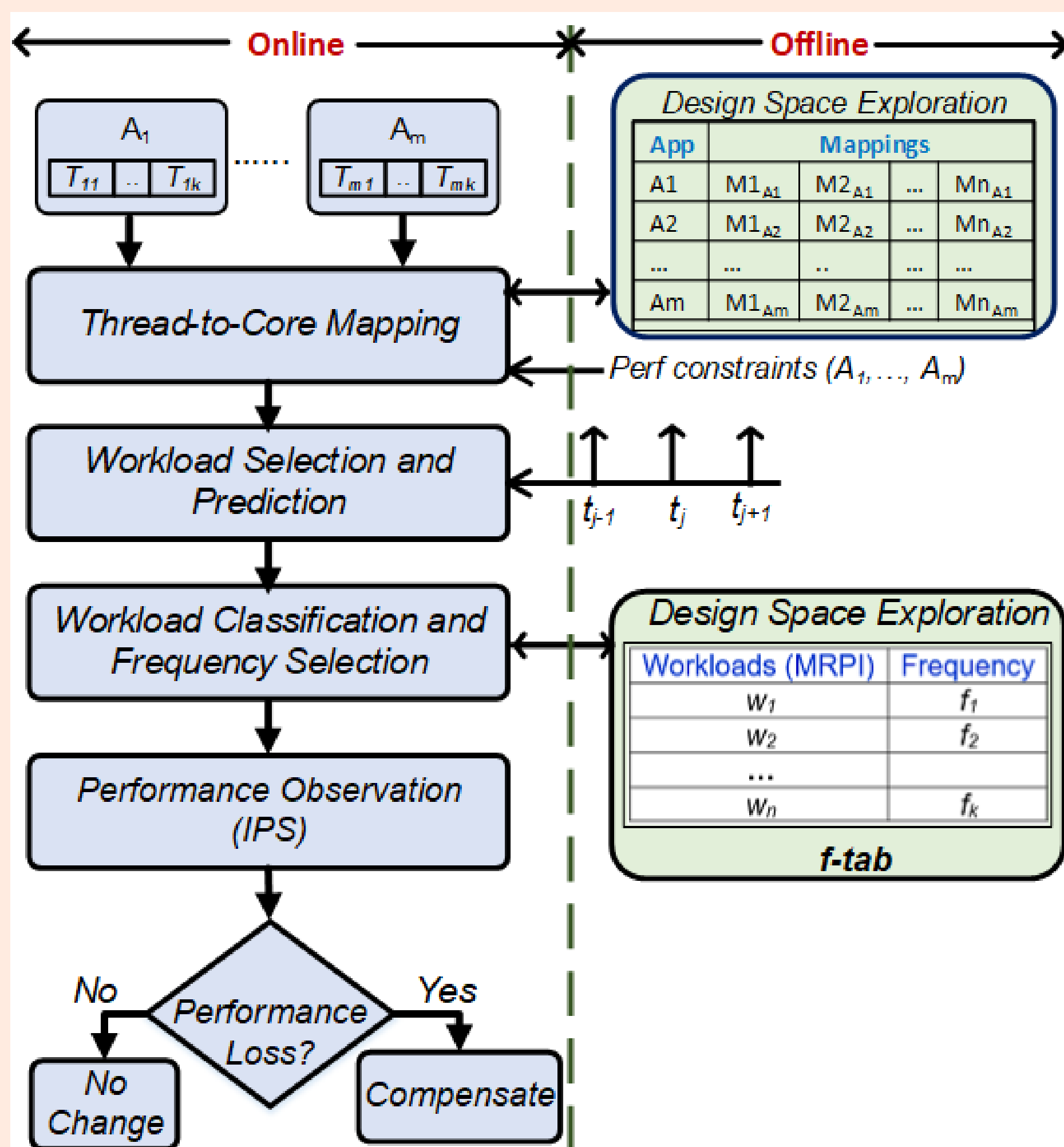
Introduction

- Heterogeneous multi-cores deal with multiple applications concurrently, having different performance requirements
- Runtime mapping and adaptation is required to meet such requirements under workload variabilities
- In such systems, it is challenging to exploit,
 - Various types of cores simultaneously
 - DVFS potential of cores

Demonstrator

Figure shows proposed energy efficient runtime management approach (ITMD) that,

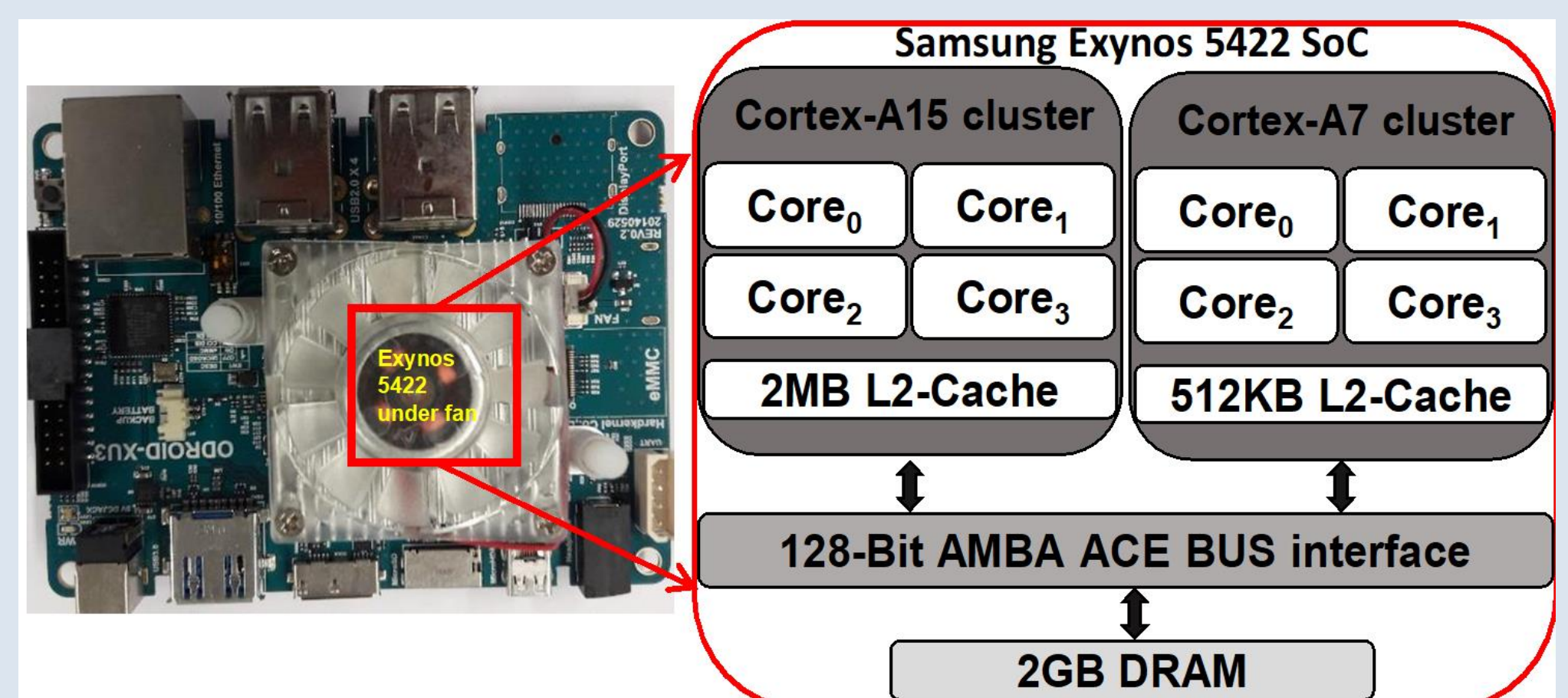
- does inter-cluster thread-to-core mapping (ITM) considering performance and resource constraints
- Adapts to workload variations through voltage-frequency scaling based on the metric Memory Reads Per Instruction (MRPI)



System Model

Hardware Platform (Odroid-XU3) Specifications:-

- 4 ARM cortex-A15 cores (A15 cluster) and 4 ARM cortex-A7 cores (A7 cluster)
- Shared L2 Cache per cluster; 2MB for big and 512KB for LITTLE;
- On-chip power and temperature sensors
- Operating frequency range
 - big: 0.2GHz-2GHz with 100MHz step
 - LITTLE: 0.2GHz-1.4GHz with 100MHz step



Applications:

- Multi-threaded applications from PARSEC and SPLASH
- Parallelism can be set by a command-line argument

Results

- Figure shows variation in frequency and workload (MRPI) for *ondemand* (HMPO) governor and *proposed* approach
- A high MRPI leads to scaling down the frequency
- Achieves up to 33% energy savings

