Academy of Sciences of the Czech Republic
Institute of Information Theory and Automation
department of signal processing

ASVP: The Smart Camera Demo

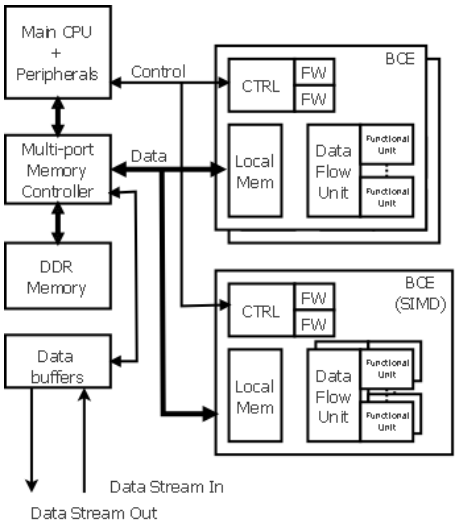
[SMECY: Smart multicore embedded systems 2010-2013]
http://www.smecy.eu

Artemis JU100230
MSMT 7H10001

HARDWARE - UTIA ASVP Platform for video processing

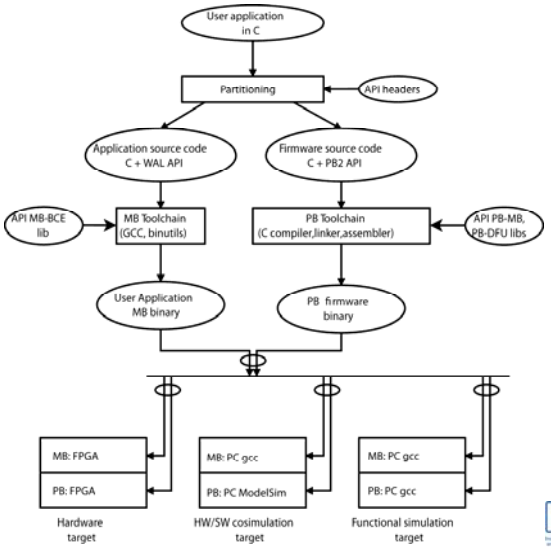
Application-Specific Vector Processor:

- Heterogeneous multi-core platform
  - System on a chip
    main CPU, memory controller, peripherals and
  - BCE - Basic Computing Element (hardware accelerator)
    - Controller with runtime re-programmable firmware
    - Local memories
    - Re-configurable data flow units (1-8 SIMD units)
    - Various computing units
      (Floating Point/Fixed Point/Integer operations)
- Data transfers
  - Heterogeneous multi-core network with the star topology
  - Batched data transfers
  - Max data transfer rate 2200 MB/s from DDR (2xNPI @ XC5V)



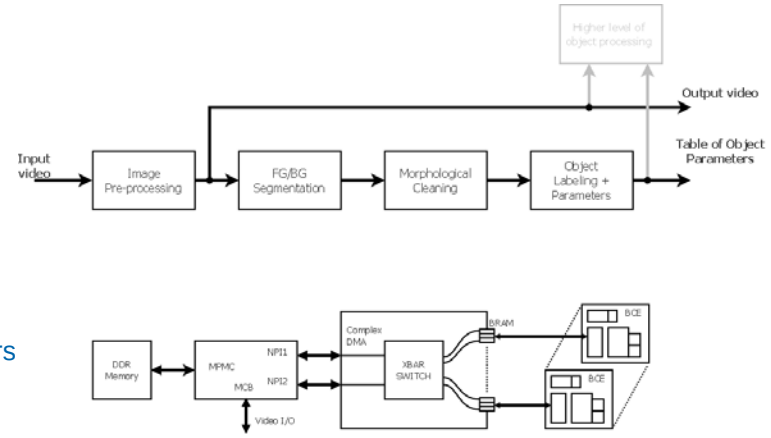
SOFTWARE – Compilation and Simulation Tools

- For accelerators based on the UTIA platform
- Compilation Tools - PB toolchain
  - Simplified C compiler – from firmware in C
  - Linker – add API libraries
  - Assembler – to PB binary
- Application Programming Interfaces
  - WAL – Worker Application Layer library
    unified access to basic computing elements (BCEs)
  - PB2 – PB2MB, PB2DFU libraries
    unified communication with main CPU and DFU
- Simulation Tools
  - Hardware/software co-simulation for architecture analysis
  - Functional simulator for SW development



APPLICATION – Embedded Smart Camera for Video Surveillance

- Process input video stream from camera
- Algorithms for video processing
  - Foreground/background segmentation
    (motion detection)
    based on the adaptive Gaussian Mixture Models
    - Opening as morphological noise removal
    - Single-pass object labeling and
      collecting object parameters
- Implementation
  - In Matlab as reference models
  - In ASVP SoC with a set of hardware accelerators
- Testing of implementation
  - On generated scenes
  - On real testing scenes, in real environment



http://sp.utia.cz

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