MAPS and a high-level virtual platform (MVP)

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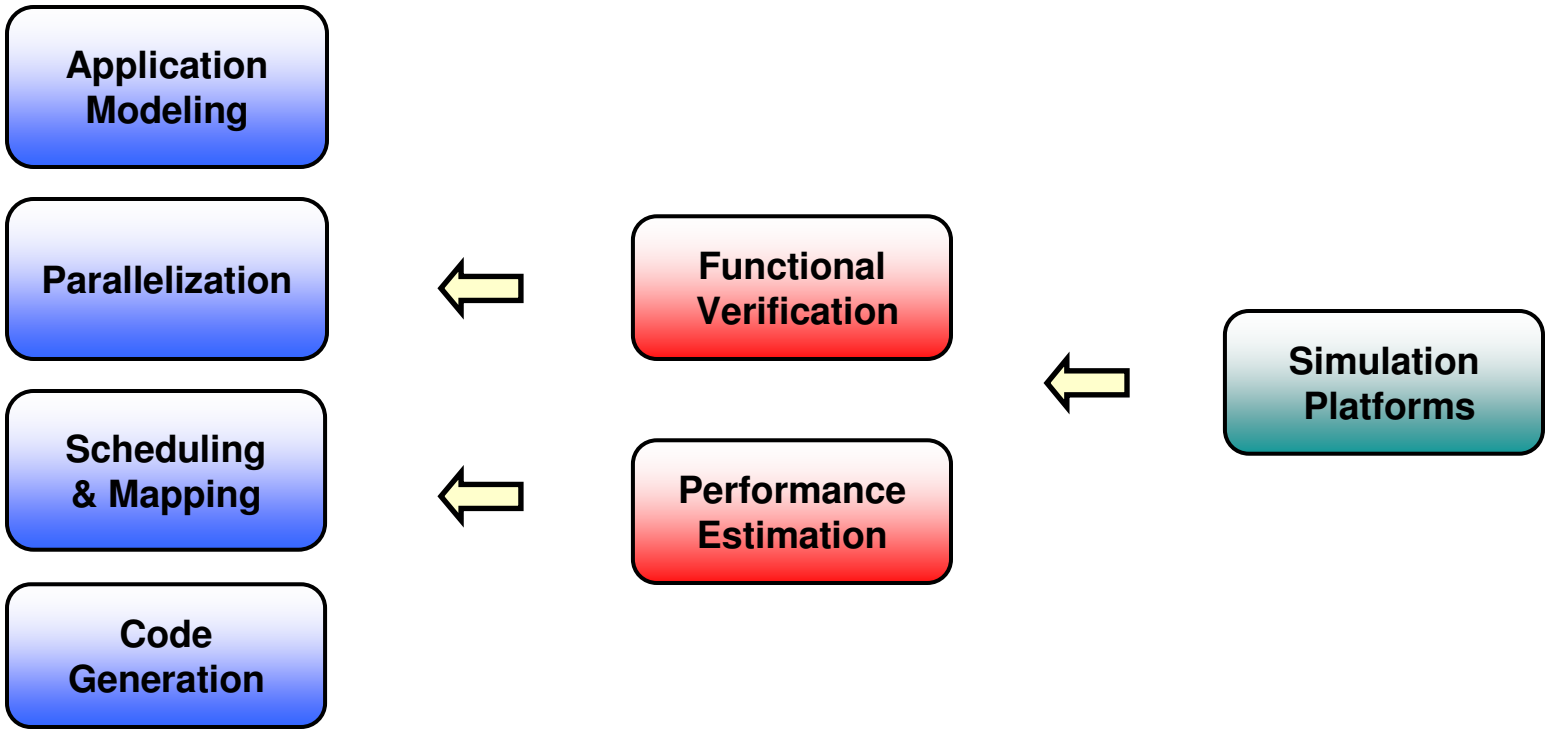
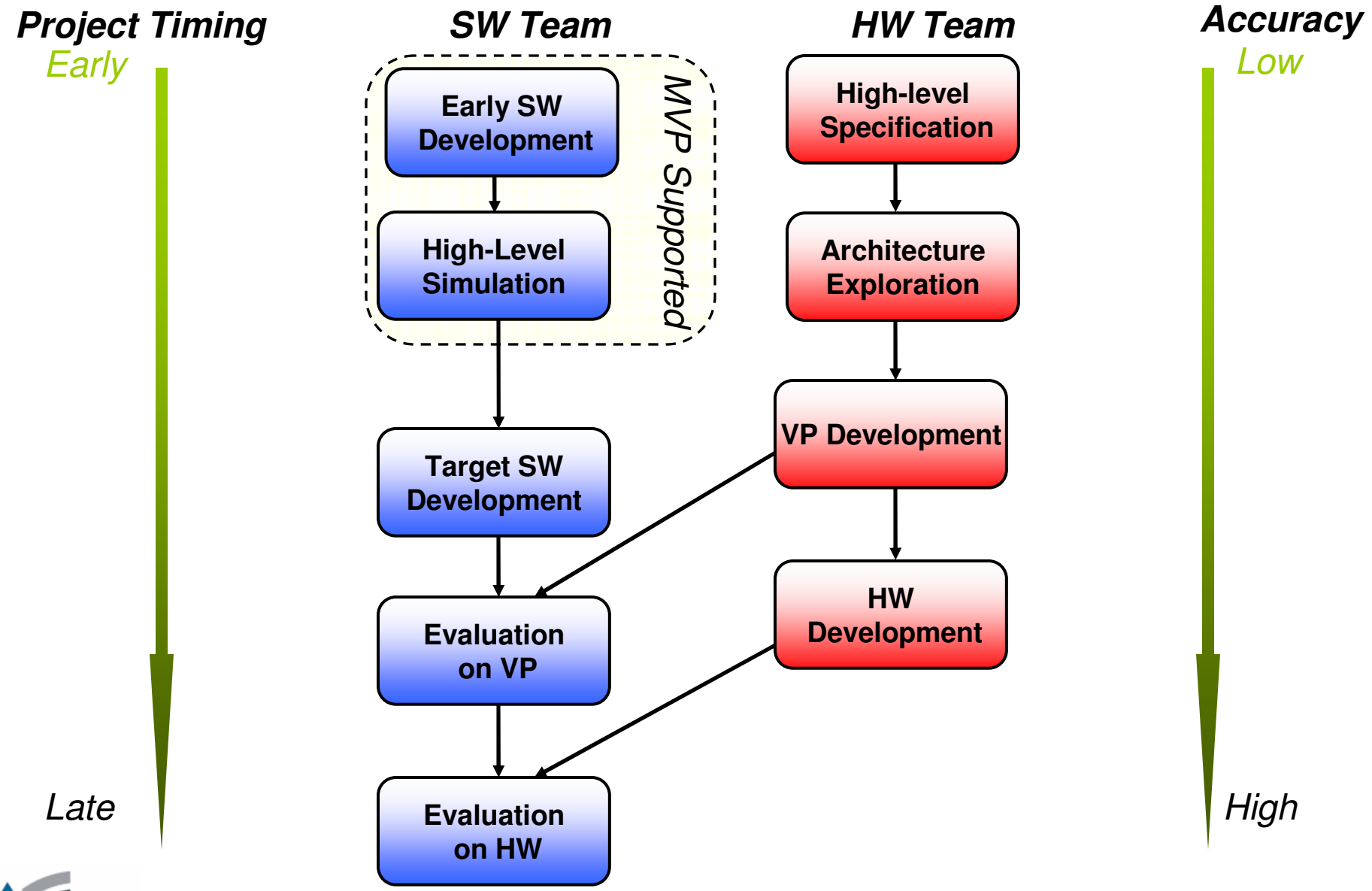
Outline

- **A Brief Introduction of the MAPS Project**
- **MAPS High-level Virtual Platform (MVP)**
  - MVP in the MPSoC SW design flow
  - MVP Overview
  - Instrumentation toolchain
  - VPE structure
  - Related work
- **Summary**

- **MAPS is a research project which targets the problem of MPSoC software development.**

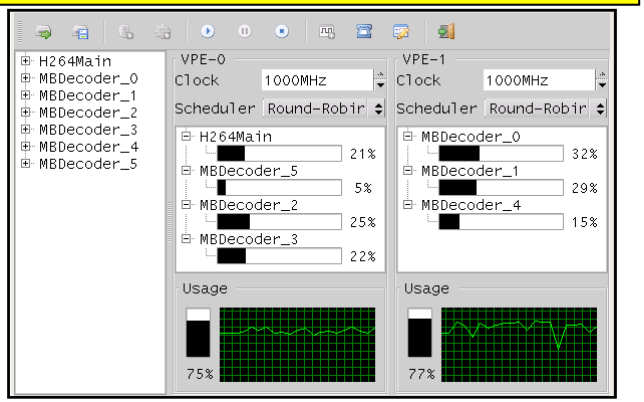


MVP in the MPSoC SW Design Flow



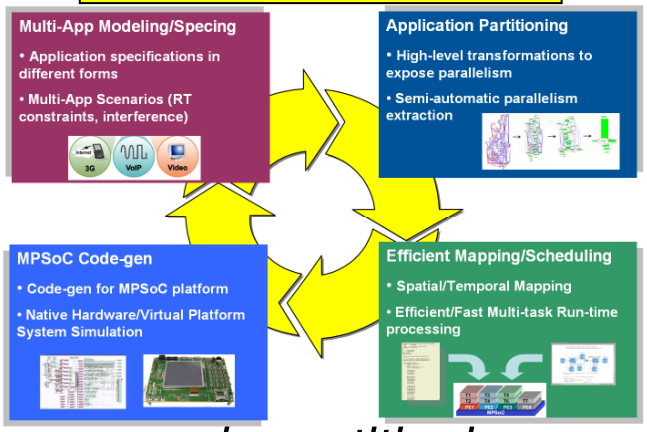
MAPS tool framework

MAPS virtual platform



functional verification, early SW performance estimation

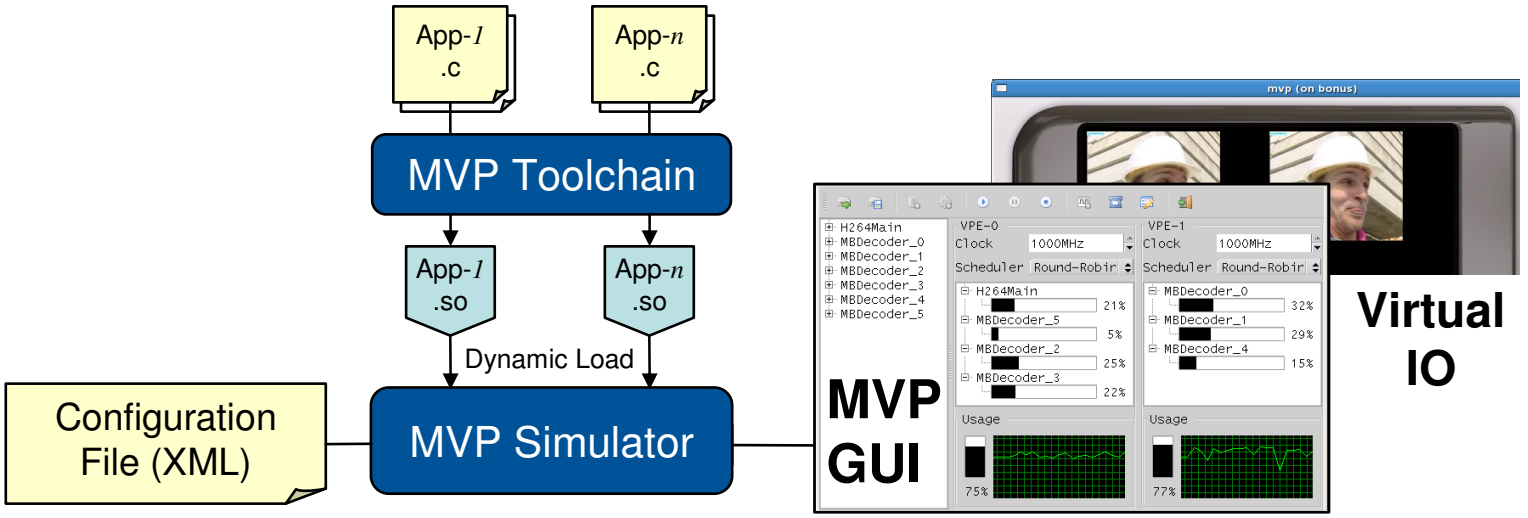
MAPS compiler



code partitioning, spatial+temporal task mapping

SW release

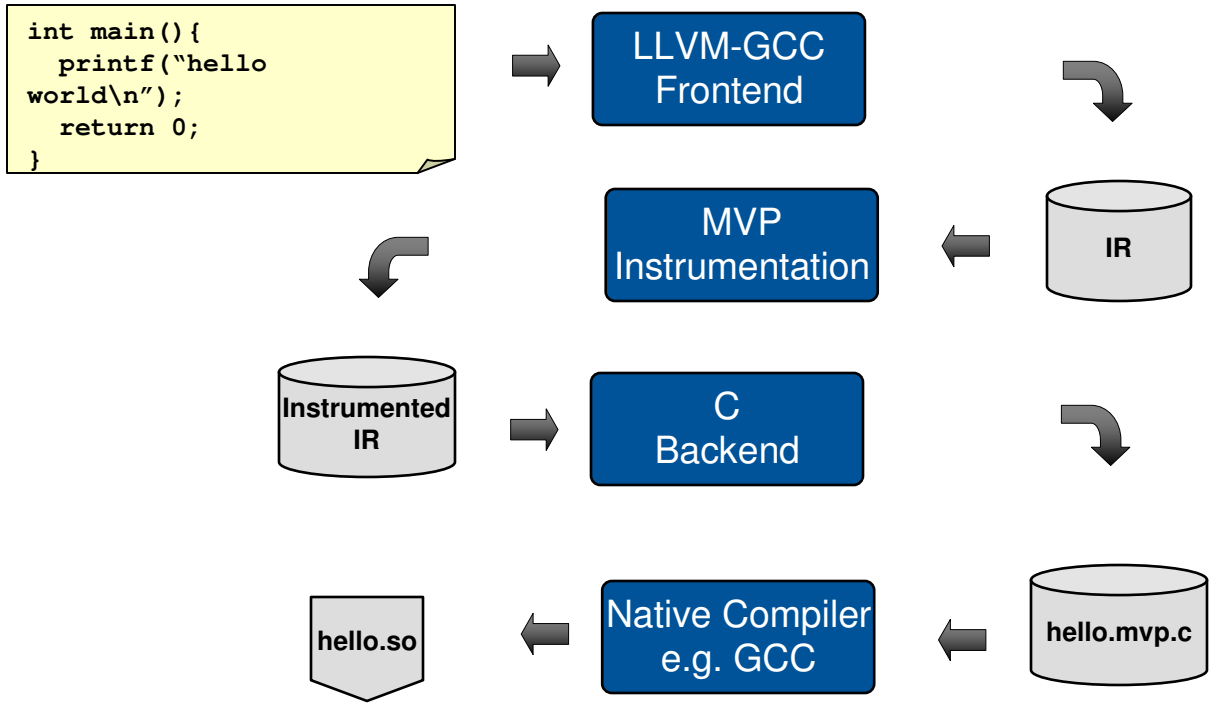
MVP Overview



- C applications are directly compiled by the MVP specific toolchain into dynamic libraries
- The SystemC based MVP simulator dynamically loads the compiled binaries
- Configurations can be stored as XML files for reconfiguration
- A virtual IO device is available, which can be used to see the execution result directly

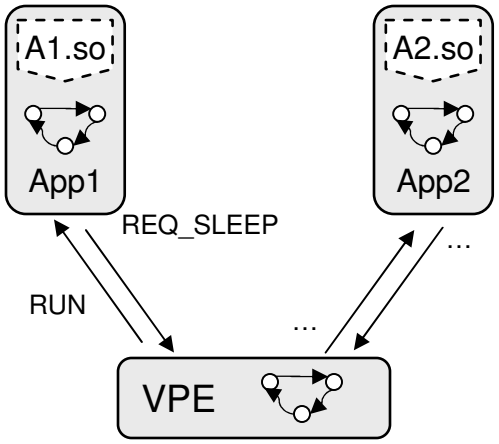
Software Toolchain

- The MVP software toolchain enables normal C applications to be executed in the SystemC based simulator
- IR level instrumentation is performed
- The toolchain is built on the LLVM (alternatively CoSy) compiler framework



Virtual Processing Element (VPE)

- **A parameterized abstract processor**
  - Clock Frequency: f
  - Type: vt (RISC|VLIW|DSP|SIMD|User_Defined)
- **Generic OS behavior:**
  - Scheduling Algorithm
    - Round-Robin
    - Earliest Deadline First (EDF)
    - Priority Based Scheduling



Simulation based approaches for ESL

Framework	Arch. modelling effort	MoC	OS modelling	Multi-applications oriented	Speed	Timing accuracy
SHAPES VP HOPES VP	High	HW restricted	Target	No	Low	CA, IA
SystemCoDesigner, VPC	Medium	Rule-based (SysteMoC)	Not included	No	Medium	TA
VPU, Coware Inc.	Medium	SystemC threads	Generic	No	Medium	TA
HdS, TIMA	Medium	C processes	Generic	No	Medium	TA
HW/SW cosim. with RTOS for MPSoC, Takada Laboratory	Low/Medium	C processes	mITRON	No	High	No timing
RTOS modelling for SLD, University of California	Medium/ High	SpecC processes	Generic	No	High	Lower than TA
MVP	Low	C processes	Generic	Yes	High	Lower than TA

CA- Cycle Accurate

IA- Instruction Accurate

TA- Transaction Accurate

Summary

- **MVP is an easy-to-use high-level virtual platform**
  - Platform and multi-applications scenarios modelling effort is reduced to almost ZERO
- **The platform focuses on functional simulation for early MPSoC software development**
  - C applications can be directly compiled and executed (no SystemC coding is required)
  - C code developed for the platform is completely reusable (due to light MVP APIs)
- **MVP allows to model broad range of applications due to generality of its MoC**
- **Application execution can be monitored via GUI**
  - SW developer can get early performance estimation information

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Thank you !