

# Embedded system design in CAD on the basis of behavioral model

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**Abstract – The purpose objective is to develop the formalist approach of specification planning, which is based on behavioral model.**

**Keywords – embedded systems, computer-aided design, system specification, design trajectory, behavioral model, specification division, hardware-software partitioning.**

## I. INTRODUCTION

In spite of that wide spectrum of planning tools of the embedded systems (ES) in CAD has been developed, particular emphasis should be placed on specification development.

Most planning stages in CAD are automated, however initial stage – a specification development of the system process by reason of its complexity is not fully computer-aided [1-4].

The purpose objective is to develop the formalist approach of specification planning, which is based on behavioral model and additionally decides the problem of optimal choice of number of process and describes a conversion from the system specification to its final realization.

## II. MAIN PART

The stages of ES planning are: specification development, division of system specification, hardware-software partitioning, hardware-software realization.

Development of specification begins with development of directed system graph of process. Each process executes the certain sequence of operation. For provide exchange of information between processes data channel are . The graph of process obtained are then may be translated into specification language (VHDL, Verilog, SystemVerilog, SystemC).

Next stage is division of specification into tasks. It starts with a system-level description and proceeds by splitting system graph into increasingly functional blocks (tasks), until it reaches a level at which the single task can be constructed by compiling library components or are described directly.

After division of specification into tasks, the hardware-software partitioning stage starts. According to cost function which takes into account given criteria (performance, timing delays, manufacturing cost, hardware resources, reliability, configurability) it maps task onto hardware and software components. One of the important task of this stage is clustering of process.

The aim of clustering of process is to reduce the number of task to be partitioning with the

purpose of reducing the complexity of the problem of hardware-software partitioning. On the basis of graph of process clustering algorithm constructs a weighed graph and works on it to group them into clusters. Each weight associates with amount of interaction between processes introduced by transaction. The algorithm according given criteria iteratively groups one or more tasks into one in order to minimize its coupling degree.

The last stage of the development process is the programming of erasable programmable logic device and writing a system driver for it. Multitude of software and hardware process are used as basic for writing system driver and hardware implementation of final system. System driver must include definition of the interfaces between the hardware modules and scheduling algorithm needed to manage the active task.

## III. CONCLUSION

One of the most difficult design stage in a computer-aided design of ES is specification development. Suggested in the paper is formalist approach of specification planning, which is based on behavioral model and additionally decides the problem of optimal choice of process number and describes a conversion from the system specification to its final realization. The approach can be used in developing of ES in the CAD.

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