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FLEXS -

A flexible and versatile
microprocessor and
microcontroller system
cross development and
simulation tool

CeBit'99 Exposé

A flexible and versatile microcontroller cross
development and simulation tool

The FLEXS-Project

Contact

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Research topic

Industrial cooperation

Cooperation

Motivation (short term)

Today there is a growing demand in industry for small embedded systems like intelligent sensors and actuators or smart cards. This kind of systems-on-a-chip is built around reduced or minimal microprocessors architectures using a hardware description language like VHDL. This offers best opportunities for seamless insertion of the processor core as well as the surrounding components into the target system.

Due to the extremely restricted resources assembly language is most-often the preferred programming language for these systems. The availability of effective development tools is a very strong argument for or against the use of a (new) processor core. There is a need for two different development modes. Due to the time pressure on real-life-projects software development must start before the target system hardware has been finished. Therefore, the development system must be able to simulate the target. When the target hardware becomes available, it is necessary to debug the hardware components surrounding the processor core. This is nearly impossible or at least very expensive with simulation only. For this reason the development system must be able to communicate with a debug nucleus inside the target hardware.

Trough highly modularity just about 15% to 20% of FLEXS must be replaced when adapting it to a new microprocessor architecture.

Internal FLEXS-Architecture

The FLEXS system is separated in following hierarchical layers:

CPU-Inspector

The CPU-Inspector visualizes the simulation results by providing the user a window representing the register-set of the simulated processor.

CPU-Simulator

This component simulates the microcontroller core with all its possible states (e.g. instruction pipeline). A small interrupt handler is also implemented.

Memory-Inspector

With the Memory-Inspector the contents of the program and data memory can be modified.

Memory-Simulator

The microcontroller's memory is represented through this component.

Assembler

The Assembler is an external library but it is integrated in the development environment.

Editor

The editor is an integrated component and supports syntax highlighting and bookmark management. Multiple undo and redo functions are also available.

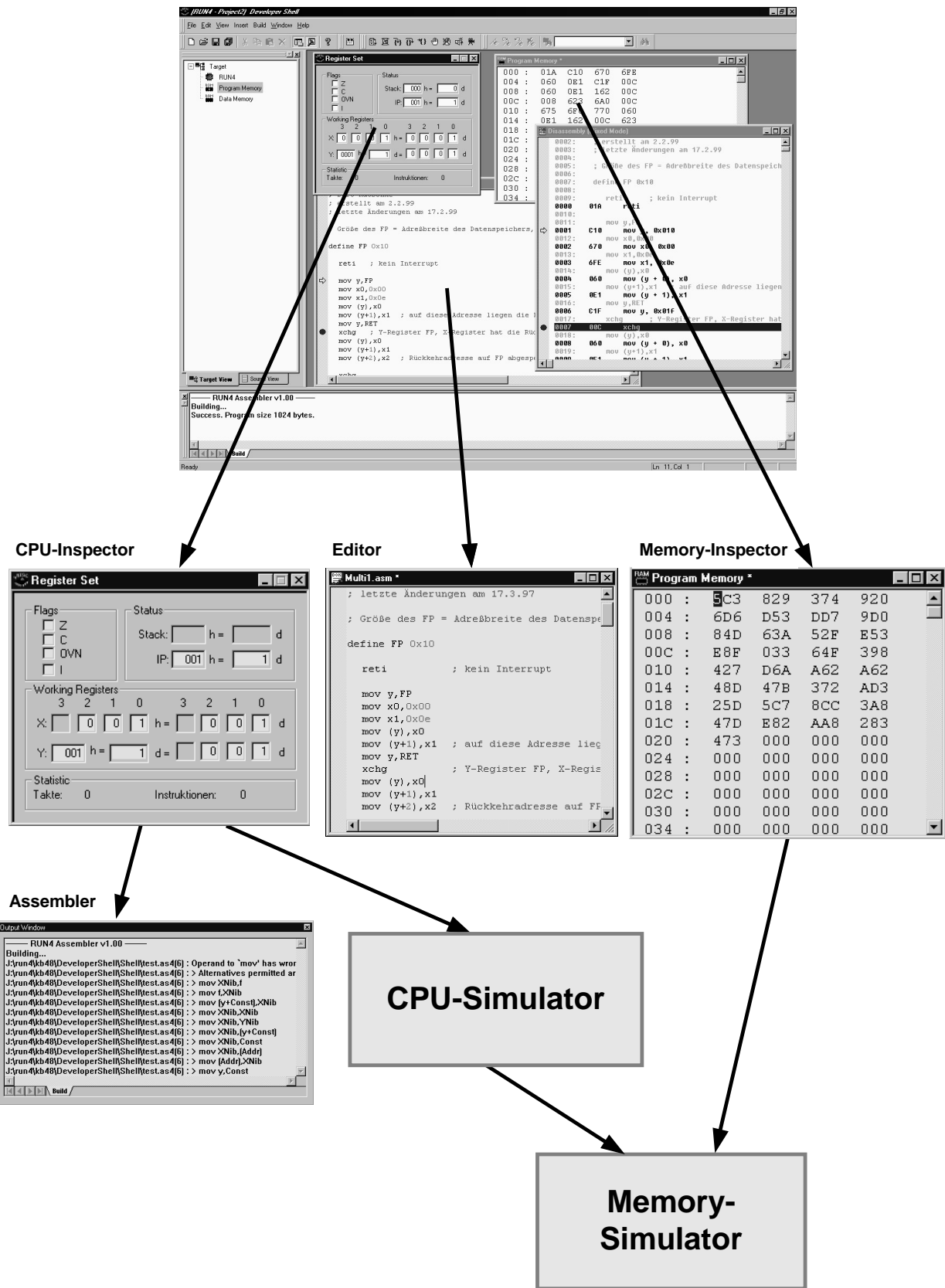


Figure 1 : General structure of the FLEXS-System

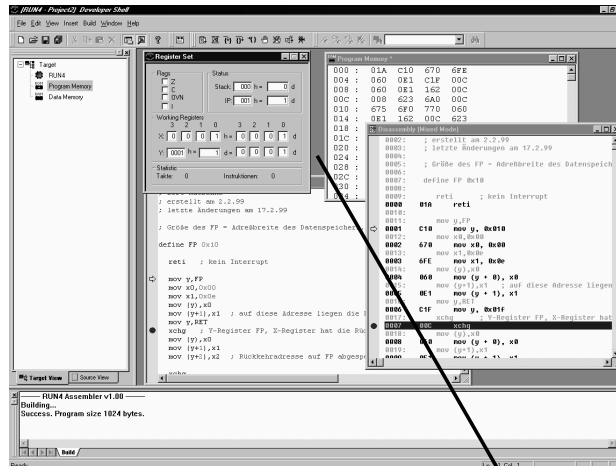
FLEXS Hot topics

- Interactive Cross-development system
- Full state of the art desktop environment (single-stepping, breakpoints, animated run)
- Microsoft Developer Studio '97 Look-And-Feel
- FLEXibility by replacing the inspector modules from different microprocessors
- integrated assembler
- integrated source editor with syntax highlighting

Add on's (under development)

By replacing the simulator modules with corresponding JTAG modules the FLEXS-cross-development system is easily altered from a simulator to real-world-debugging assistance.

FLEX-Simulator



JTAG-interface



Evaluation Hardware

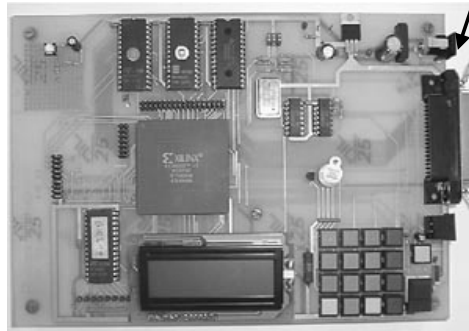


Figure 2 : FLEXS as a real-world-debugging system