
Operating System for Switched Analog Mixed-Signal Circuits

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Introduction

- Operating Systems for Analog-MS (general introduction)
- OS for AMS Implementation
- MSP430
 - Example (multi-channel ADC)
 - SystemC, Verilog, Verilog-A
- Reconfigurable modules: AMS library
- Conclusion



Operating System for AMS Design

- Faster application development
- Ease of reconfiguration or new capabilities
- Application designers need less chip details
- Ease of programming with a well defined OS
- OS defined loops and tasks which are scalable
- Stability and timing considerations are transparent to application engineers

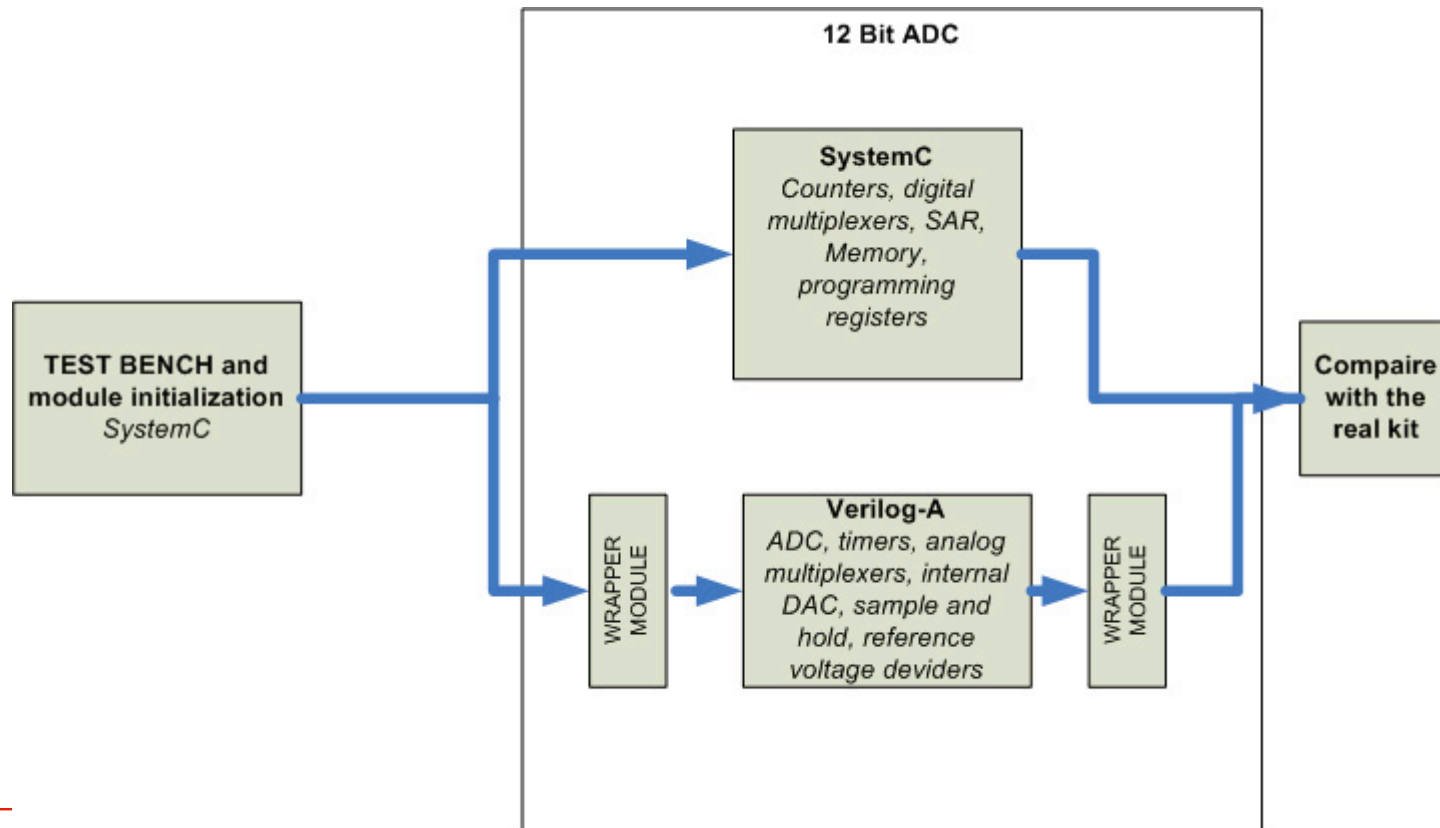


OS for AMS (Implementation)

- Using the MSP430 features as a base for OS design exploration and OS applications
- Macro pseudo-OS provides a higher abstraction of function call groups
- “while loop” approach allows for a simple OS without any resource optimization or process scheduling
- Plans to explore priority and interrupt based OS



System Level Diagram

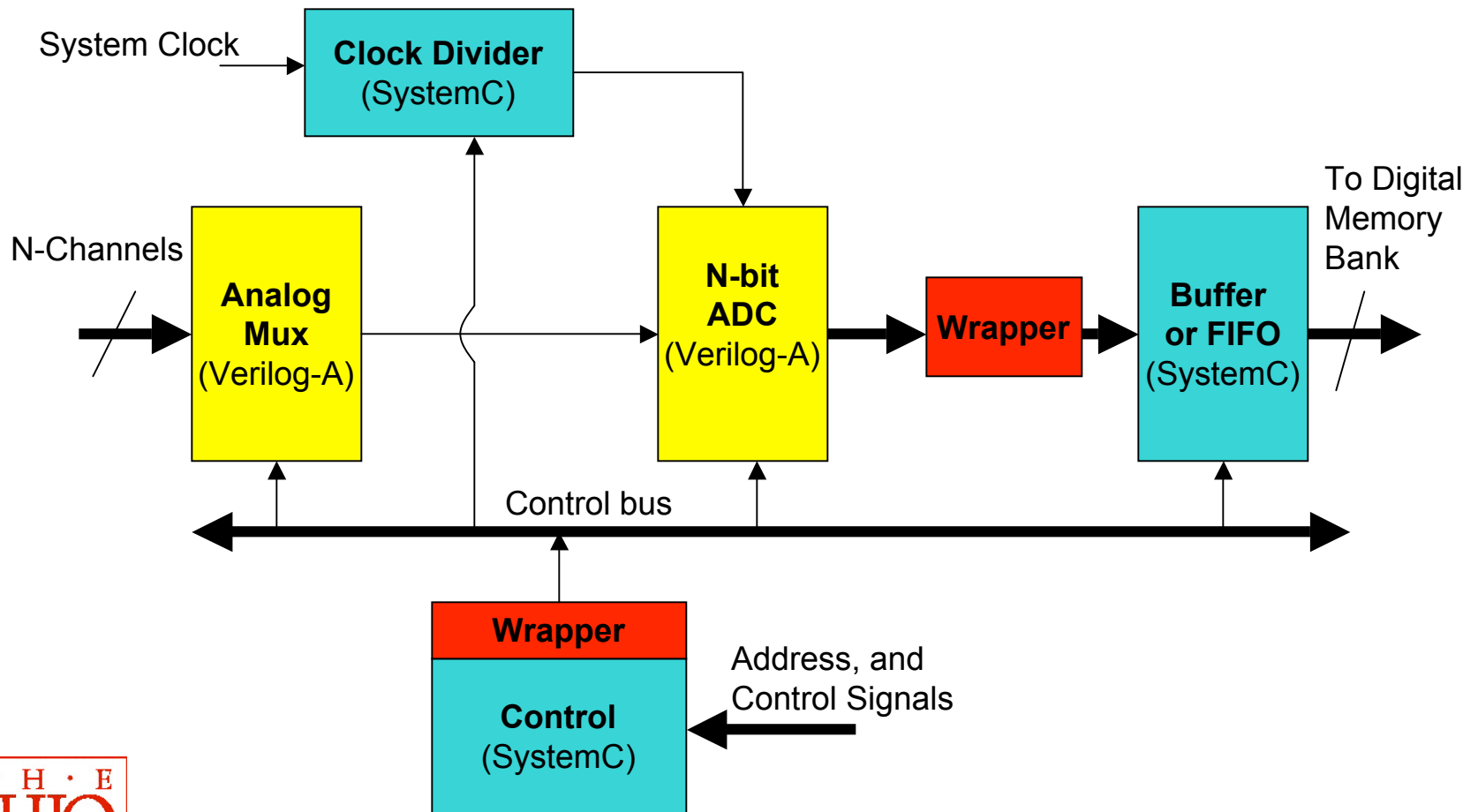


Wrapper Module features

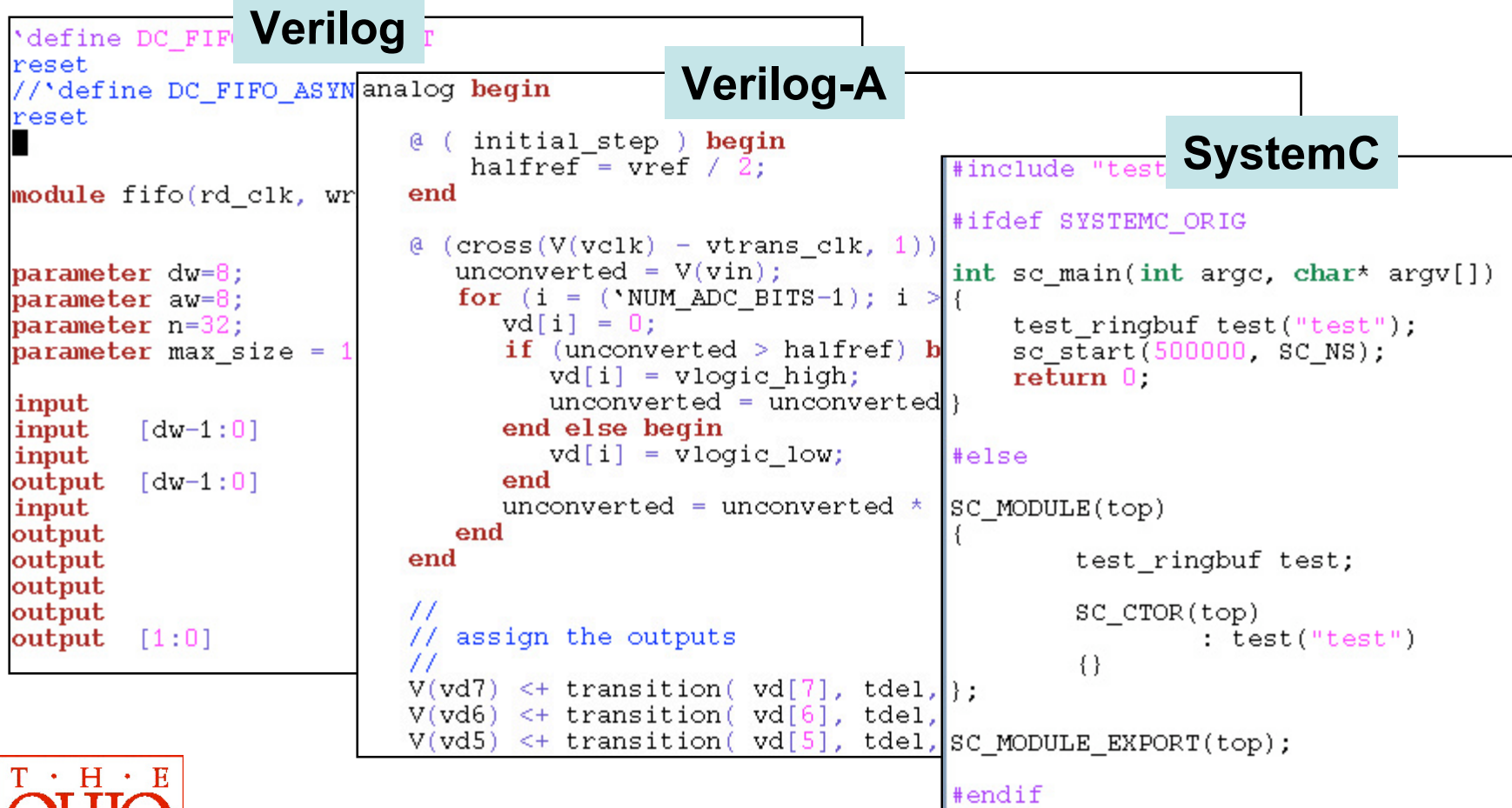
- Hierarchical channel
- Interface definitions
- Data type conversion
- Decoding higher level to lower level
- Mixed mode signal conversion
- Control data masking techniques



SystemC and Wrapper Example



Example Design Files



Analog Behavioral Description

- Many design and performance parameters
- Scalability issues
- Design reuse
- Design for specific technology libraries
- Synthesis



Towards a SystemC-AMS and SystemC-OS standard

- Design development combined with on-going effort to make SystemC-OS and SystemC-AMS a successful design methodology
- Ability to describe more complex systems and verify at a higher level of abstraction
- Attempting to deliver accurate high level abstraction analog descriptions



Analog-MS library for standard modules

- New AMS SystemC library including common analog modules (ADC, PLL, etc.)
- Reconfigurable and scalable library components based on accurate simulations at RTL level
- Attempt to standardize refinement process for analog mixed-signal designs



Conclusion

- Simple project for advanced AMS and OS description
- System Portioning at an early stage of design
- Testbench reuse for AMS
- Ease of Interface refinement enables smoother module swap

