Design And Verification Of AMBA APB Protocol Using System Verilog

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Abstract

The Advanced Microcontroller Bus Architecture (AMBA), Advanced Peripheral Bus (APB) protocol stands as a cornerstone in modern System-on-Chip (SoC) designs, serving as the vital link between peripheral components and the central processing unit (CPU). Crafting this interface demands meticulous attention to detail, encompassing the development of an AMBA APB interface that strictly adheres to the protocol's exacting standards. This entails designing and integrating the APB controller, the APB bus interface, and various peripheral modules. Leveraging System Verilog facilitates a modular and adaptable design approach, accommodating diverse data widths, address spaces, and peripheral requisites. AMBA APB protocol's specifications

Introduction

In the domain of digital system design, industry standards are crucial for guaranteeing the compatibility, dependability, and seamless operation of integrated circuits, microcontrollers, and System-on-Chip (SoC) designs. The advanced peripheral bus protocol, a vital element of ARM's AMBA, exemplifies the importance of these standards. AMBA APB has emerged as the preferred option for crafting interfaces between microcontroller peripherals and the central processing unit (CPU) in ARM-based systems, and its remarkable balance of simplicity and effectiveness.

Problem Statement

The digital interfaces in embedded systems are crucial for ensuring the correct functionality and reliability of modern microcontroller-based applications. The rapid evolution of System-on-Chip (SoC) designs demands robust communication protocols for seamless data transfer between integrated circuit components. The APB protocol holds significant importance in this field, demanding accurate implementation and thorough verification. This project tackles the necessity for a comprehensive framework in designing and verifying the APB protocol using System Verilog. It aims to enhance the dependability and effectiveness of data communication within contemporary digital systems.
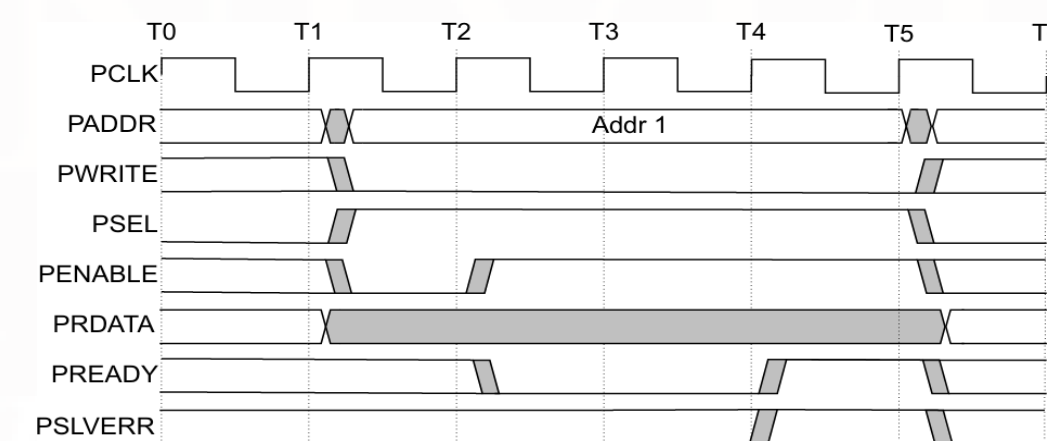
Methodology
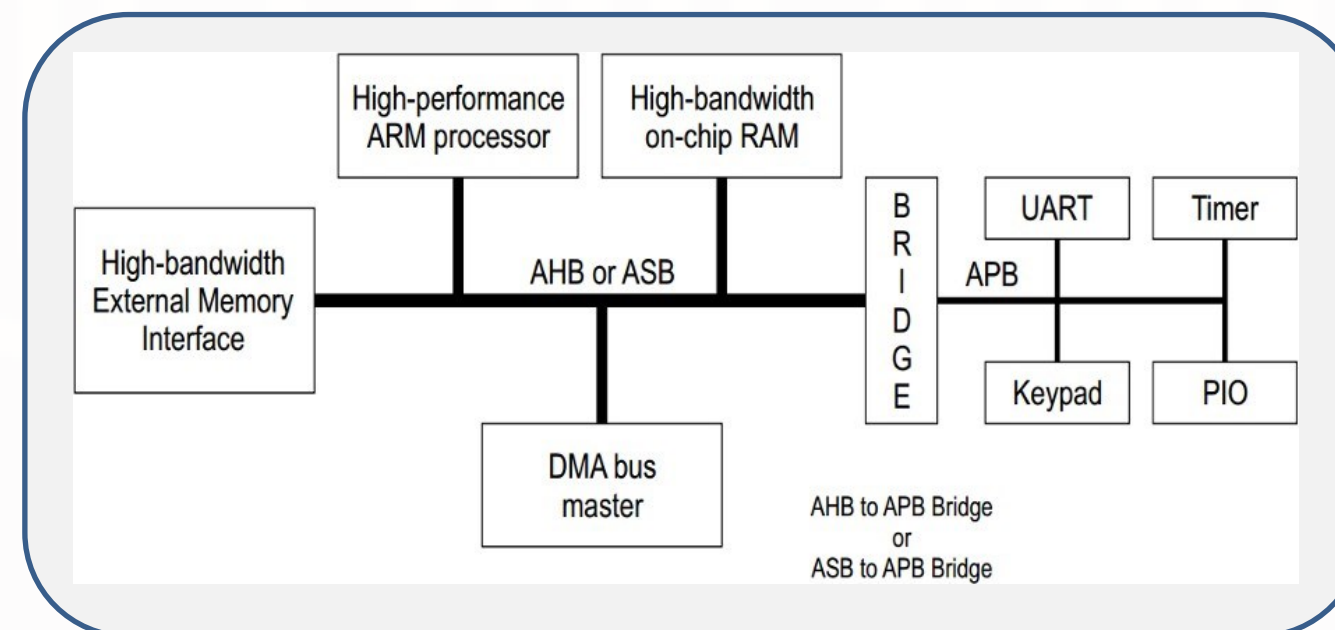
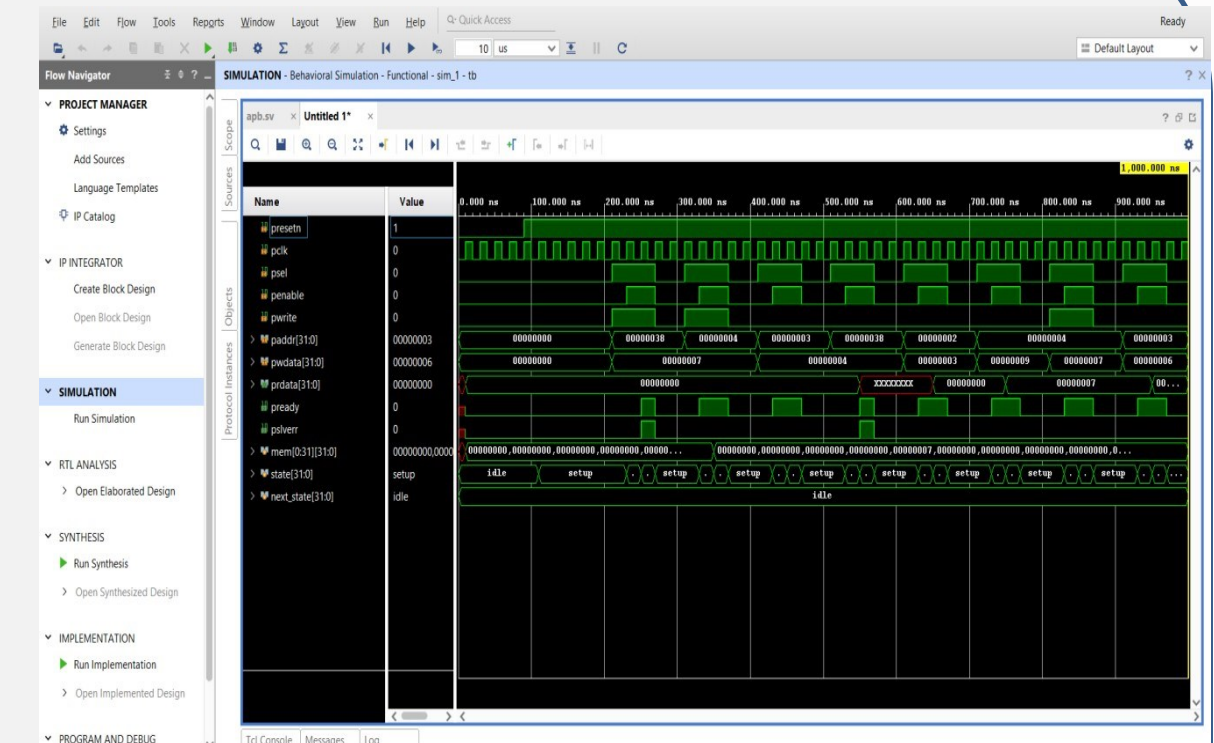## Figures/Tables/ Flowchart
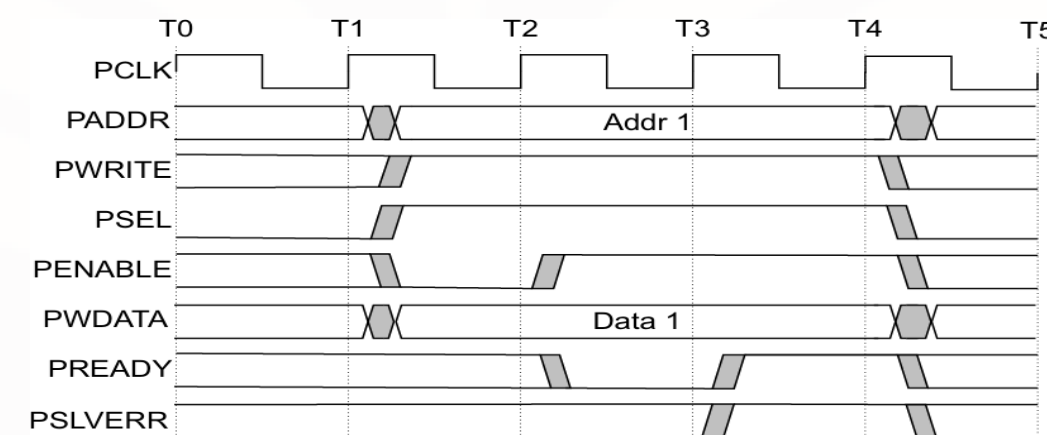
Write Transfer

Read Transfer

Results

Conclusion

The project on "Design and Verification of AMBA APB protocol using system Verilog" addresses the complexities involved in designing and verifying high-performance bus protocols for on-chip communication. Through the application of system Verilog, a powerful hardware description and verification language, the project demonstrates a methodical approach to model the AMBA APB protocol, highlighting its flexibility and efficiency in handling high-speed data transfers and multiplebus masters.

References

Anushka Dwivedi, Anand Jatti, "Design and Implementation of AMBA APB Protocol Using System Verilog", International Research Journal of Modernization in Engineering Technology and Science, Vol. 4, Issue. 07, July 2022.