arm Training

The AMBA Bus Architecture and Protocols

Summary:

This course forms a comprehensive introduction to the popular AMBA AXI4 on-chip interconnect protocol. It describes the main features of the protocol, together with a number of typical use cases.

Prerequisites:

- A working knowledge of system-on-chip design

Audience:

The course is aimed at Hardware and Software Engineers needing to get an overview of the features, capability and application of the AMBA AXI4 protocol.

Delivery Method:

- Online

Length:

- 1 hour

Modules:

1. **AMBA evolution and AXI protocol overview**
   - What is AMBA and why use it?
   - How has AMBA evolved?
   - The AXI protocol
   - The AXI protocol in multi-master system design
   - AXI channels
2. **Channel transfers and transactions**
   - Main AXI features
   - Channel handshake
   - The difference between transfers and transactions
   - Examples of channel transfers
   - Write transaction behavior - single data item
   - Write transaction behavior - multiple data items
   - Read transaction behavior - single data item
   - Read transaction behavior - multiple data items
   - Active transactions
3. **Channel signals in detail**
   - Data size, length, and burst type
   - Protection level support
   - Cache support
   - Response signalling
   - Write data strobes
   - Atomic accesses with the lock signal
   - Quality of service
   - Region signalling and user signals
   - AXI channel dependencies
   - Read channel signals
   - Write channel signals
4. **Atomic accesses**

- Two types of atomic access
- Locked access overview
- Locked access operation
- Exclusive access overview
- Exclusive access hardware monitor operation
- Exclusive transaction pairs - pass/pass
- Exclusive transaction pairs - pass/fail

5. **Transfer behavior and transaction ordering**
   - Examples of simple transactions
   - Transfer IDs
   - Write transaction ordering rules
   - Read transaction ordering rules
   - Read and write channel ordering
   - Unaligned transfer start address
   - Endianess support
   - Write interface attributes
   - Read interface attributes