How to leverage IP-XACT benefits in an ARM based Design Flow?

Serge Poublan – ARM
IP-XACT Program Manager
Connected Mobile Computer

- WiFi
- Platform OS
- Touch screen
- 13 days standby
- Bluetooth
- Camera
- 128 MB DDR
- Skype
- MP3
- Flash 9
- H.263
- NOKIA N800

ARM Developers’ Conference & Design Pavilion 2007
…You Have to Design the Silicon!

- Which Operating System?
- What Power, Performance, Area?
- Which processors do I need?
- What process and which Physical IP?
- How much Interconnect bandwidth?
- What memory system and peripherals?
- How do I shorten my design time?
- How can I enable 3rd party developers?

Completed SoC
Low Risk System Level Design with ARM

System Architecture Exploration → IP Deployment & Implementation → Software Development

Cortex Intelligent Processors by ARM®

ARM Developers’ Conference & Design Pavilion 2007
Design Challenges where IP-XACT can help?

System Architecture Exploration

Link between ESL and RTL

IP Deployment & Implementation

IP Deployment, re-use at RTL
IP, sub-system and SoC design portability between EDA design chains
Sub-system and SoC Assembly
Description of Debug and Trace topologies

Software Development

HW target description
HW and SW bring up

A Unified Flow from System Architecture to HW and SW Debug?

ARM Developers’ Conference & Design Pavilion 2007
IP-XACT in an ARM Based design flow
IP Deployment: IP-XACT for ARM IP

- Leadership:
  - ARM is a founder and board member of the SPIRIT consortium since its creation 2003
  - ARM is one of the first IP provider providing IP-XACT 1.2 descriptions for its key IP to its licensees (on demand)
  - AMBA Bus Definition are available publicly on ARM web site to enable design inter-operability
    New release planned in Nov’07.
  - ARM has donated its IP-XACT editor to the Eclipse community
IP Deployment: Configure the Interconnect

- The interconnect is critical to deliver system performance
  - Key backplane connecting processors, caches, memory system
  - Must enable MHz timing closure and low power envelope

- AMBA Designer enables designers to:
  - Create ports to connect all masters and slaves
  - Generate a customised transaction level model
  - Output configured Verilog RTL and IP-XACT views
Integrate AMBA IP through IP-XACT

- As HW and SW complexity increase, system integration, test and verification is one of the main issue for the industry
  - Major factor delay in project
  - Area where more effort will be invested within the next 2 years.

- IP-XACT is used by AMBA Designer to make easier AMBA based IP integration
  - Stitching of AMBA IP through IP-XACT
  - Export of RTL and IP-XACT at the AMBA sub-system level
IP-XACT in an ARM Based design flow

- System Architecture Exploration
- IP Deployment & Implementation
- Software Development
System Level Design inter-operability with IP-XACT

- System-level architecture is expressed in SystemC (ESL)
- Fabric IP is configured in AMBA Designer
- System and Fabric IP are integrated in AMBA Designer

Designs architecture information can be exported at RTL level to 3rd party DEs.

ARM Developers’ Conference & Design Pavilion 2007
IP-XACT in an ARM Based design flow

System Architecture Exploration → IP Deployment & Implementation → Software Development
Debugging Software on Complex Systems

- CoreSight™ technology solves the debug hardware problem
- But there is still a software problem
  - How does the debugger know what components exist in the system?
  - How does the debugger know how the components are connected together?
  - How does the debugger know how to access the components?
  - *Having lots of debug components in the system just magnifies this problem*
IP-XACT used to solve the Software Problem

A IP-XACT system description can contain the information the debugger needs:
- Component list
- Component interconnection
- Physical address maps

Key benefits in using IP-XACT for HW target description
- **Time to market** when integrating SW and HW on HW target
- Faster **adoption** and support for HW providers
- **Debug Tool Independence**: A tool neutral description enable HW targets to be supported by a larger tool ecosystem.
- **Unifying** System Level Design from ESL up to SW / HW integration
- Standard largely accepted and used in the SoC design flow
- All of this at **no additional cost**!

ARM leading the standardization process
- ARM has been working with the IP-XACT Consortium and the Eclipse Foundation to get IP-XACT accepted for Debug.
- ARM is chairing the Debug Technical Working Group
- Eclipse DSDP working group have agreed to use IP-XACT for debug target descriptions

**ARM Developers’ Conference & Design Pavilion 2007**
need revision

Poubian, 9/11/2007
Using IP-XACT to describe HW targets

- ARM leads the market and introduce IP-XACT at production quality in the Debug market.
  - Increasing tool support for HW platforms: IP-XACT description for ARM1176JZF-S Platform Baseboard available with board deliverables.
  - Integrating the technology: Production IP-XACT support in RealView ICE Tempest for ARM1176JZF-S Platform Baseboard

ARM Developers’ Conference & Design Pavilion 2007
IP-XACT Integrates the Complete SoC Flow

- **Today**
  - TLM (ESL)
  - RTL
  - Implementation

  AMBA Designer uses IP-XACT as its internal data-base format for RTL configuration and system creation.

  By packaging ARM IP with IP-XACT, ARM enables our partners to automate IP integration into design-flow for better time to market and lower risk developments.

- **IP-XACT 1.2 support in SoC Designer links CA SystemC to RTL.** IP-XACT design files exported from SoC Designer link the tool into 3rd party Design Environments.

- **Tomorrow**
  - Complete SoC are described in a machine readable format. IP-XACT format enabling faster targeting of SW development tools.

  ARM is driving adoption of IP-XACT for **Debug** within the Eclipse Community. Our **CoreSight** technology is fully supported by IP-XACT.

**ARM Developers’ Conference & Design Pavilion 2007**
Linking ESL to RTL using IP-XACT v1.2: TODAY

ESL Design Environments

RealView SoC Designer

ESL Models

IP-XACT v1.2

RTL Designs

Export / Import
IP-XACT v1.2
Design File

Direct import
of IP with
IP-XACT description

RTL Design Environments

IP configuration and
integration data exchange

ARM Developers’ Conference
& Design Pavilion 2007
Design Exchange using IP-XACT v1.4: FUTURE

ESL Design Environments

Direct import of IP with IP-XACT description

RTL Design Environments

Export / Import IP-XACT v1.4 Design File

IP configuration and integration data exchange

ARM Developers’ Conference & Design Pavilion 2007