

ZYNQ



TOPIC Embedded Systems & Xilinx

Dypl0: seamless software and FPGA integration (Linux API, FPGA infrastructure and partial reconfiguration management)

By leveraging the Zynq[®]-7000 All Programmable SoC, TOPIC Embedded Products created a high-level electronic design environment called DYPLO (Dynamic Process Loader). DYPLO helps engineers produce products faster for customers. This also gave Topic an additional revenue stream, as it can now license DYPLO IP, hardware, and expansion cards to an expanding customer base.

“We have gained a lot of attention from our DYPLO platform. Not only is it making our engineers more productive, but companies are asking us if they can use this platform to kick start their own projects.”

René Zenden, Embedded System Architect at TOPIC

Executive Summary

Challenges

- High bandwidth requirements between CPU & FPGA causing performance/power issues
- Need shorter development cycles for faster TTM
- Software-controlled, run-time reconfiguration of FPGA
- Need seamless integration of FPGA acceleration in software apps

Xilinx Solutions

- 3000+ links between CPU and FPGA Logic
- Partial reconfiguration allowed on-the-fly CPU & FPGA partitioning
- Vivado HLS C-to-FPGA compilation
- I/O and IP expand end-product offerings

Results

- Customer development cycles improved up to 30% by using Topic's Dypl0
- Increased ease of use by integrating software and FPGA design in a single flow
- Seamless reconfiguration use for dynamic acceleration and re-use of FPGA logic (time multiplex)
- IP offering enables lower development costs and new revenue stream
- System on Modules reduce integration complexity of Zynq System on Chip

Challenges

TOPIC was constantly looking for ways to automate processes and complete in-house projects faster for customers. In 2011, TOPIC began developing an embedded system development platform that would allow its software and algorithm developers, even those who aren't familiar with the intricacies of hardware design, to perform hardware-software co-design of real-time embedded systems and troubleshoot system problems early in the design cycle. TOPIC's goal - to allow its services business to be more efficient and possibly open doors to expand its business model into IP and EDA licensing.

Topic was charmed by the Zynq solution as they preferred an integrated processor/FPGA solution. TOPIC's plan was to implement a partial reconfiguration IP core they developed. That core and TOPIC software would allow users/customers to mix and match hardware and software functions, to quickly create an optimal system. The project required:

- Fastest possible communication between processor & FPGA
- Partial Runtime Reconfiguration capable device
- C-to-FPGA compiler to hide hardware design complexity from user
- Flexible I/O for new daughter cards & applications



Topic Embedded compact, Zynq-based Miami SOM measures only 65x68.4mm

Xilinx Solutions

The company chose the Zynq-7000 All Programmable SoC as the central processing system of its DYPLO middleware solution, enabling users to perform software-based hardware/software co-design which improved time to market. The Zynq-7000 AP SoC's 3000+ links between the ARM processor and programmable logic enables real-time performance. Meanwhile the Zynq-7000 AP SoC on-chip logic enables TOPIC to easily implement its partial reconfiguration IP in the device to allow on-the-fly partitioning of algorithms between the CPU and FPGA.

TOPIC's DDE (Dypl Development Environment) automatically accesses Xilinx's Vivado HLS (High Level Synthesis) tool to compile software into FPGA logic, abstracting this step from users. Zynq-7000 All Programmable SoC's I/O and interfaces allowed TOPIC to make DYPLO a modular/upgradable hardware platform for off-the-shelf embedded solutions.

Results

Leveraging the Zynq-7000 AP SoC, TOPIC's engineers were able to deliver a highly innovative prototyping platform that consists of the DYPLO middleware IP, the Miami System on Module (SoM), and Florida line of I/O carrier cards. This platform allows TOPIC's design services to drastically reduce development cycles by as much as 30% and has enabled the company to expand beyond design services by generating a new revenue stream via IP licensing and platform sales. "We have gained a lot of attention from our DYPLO platform. Not only is it making our engineers more productive, but companies are asking us if they can use this platform to kick start their own projects," said Rene Zenden, embedded system architect for TOPIC.

More about TOPIC

TOPIC Embedded Products is an 19-year-old design services company based Eindhoven, the Netherlands. With over 150 engineers on its staff, the company has developed a strong reputation as a premier provider of embedded design services. But very recently, the company expanded its business horizons by offering its DYPLO (Dynamic Process Loader) based on Zynq[®]-7000 All Programmable SoC. The company offers DYPLO IP, hardware and expansion boards and is a Premier Xilinx Alliance Member.

"Zynq made it easier to implement DYPLO," said Zenden. "It was an enabler because now we have everything in the same package. The integration of the CPU, the FPGA, and the software made it easier for us to implement DYPLO."

René Zenden, Embedded System Architect at TOPIC



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