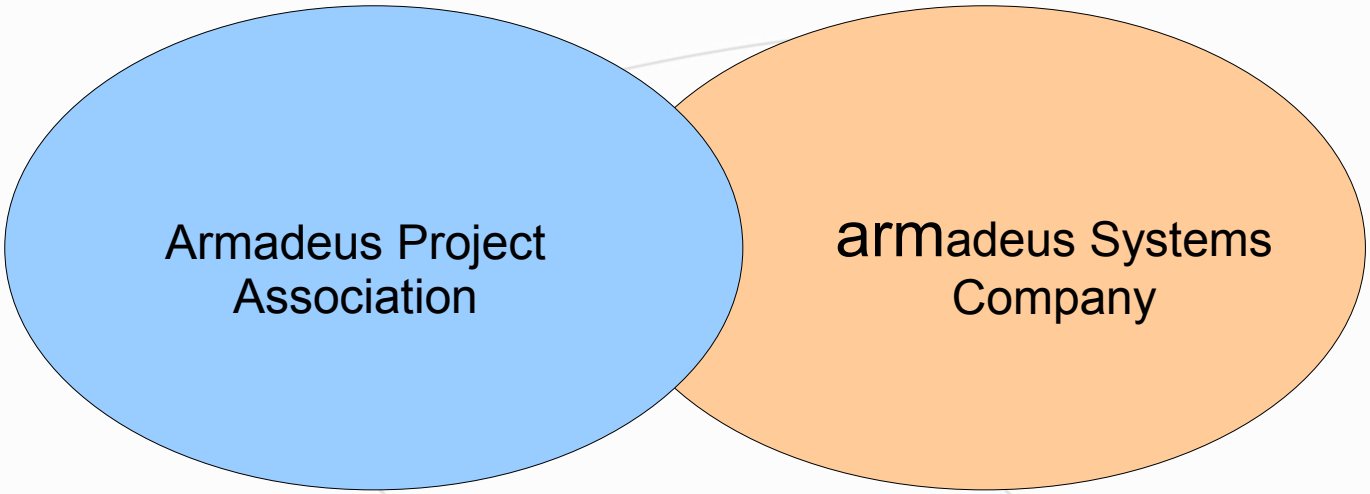
Armadeus



ArmadeuS
Project

armadeus
systems

Presentation plan

1) Association and company (by Julien Boibessot)

2) FPGA in embedded systems (by Nicolas Colombain)

3) Peripheral On Demand (by Fabien Marteau)

Armadeus

1) Association and company

Julien Boibessot

Armadeus Project

- Non profit association for embedded Linux promotion
- Free technical support (mailing/IRC)
- Promotes member devts (contest)
- Reduce prices on Armadeus Systems products
- www.armadeus.org

armadeus Systems

- R&D Company
- Produces base boards and provides development kits
- ARM / Linux embedded systems
- Open Source
- www.armadeus.com

Products

Mainboards:

- based on Freescale i.MX family (ARM9 core with integrated peripherals)
- with Xilinx Spartan 3 FPGA directly connected to the processor busses

Products

Development boards:

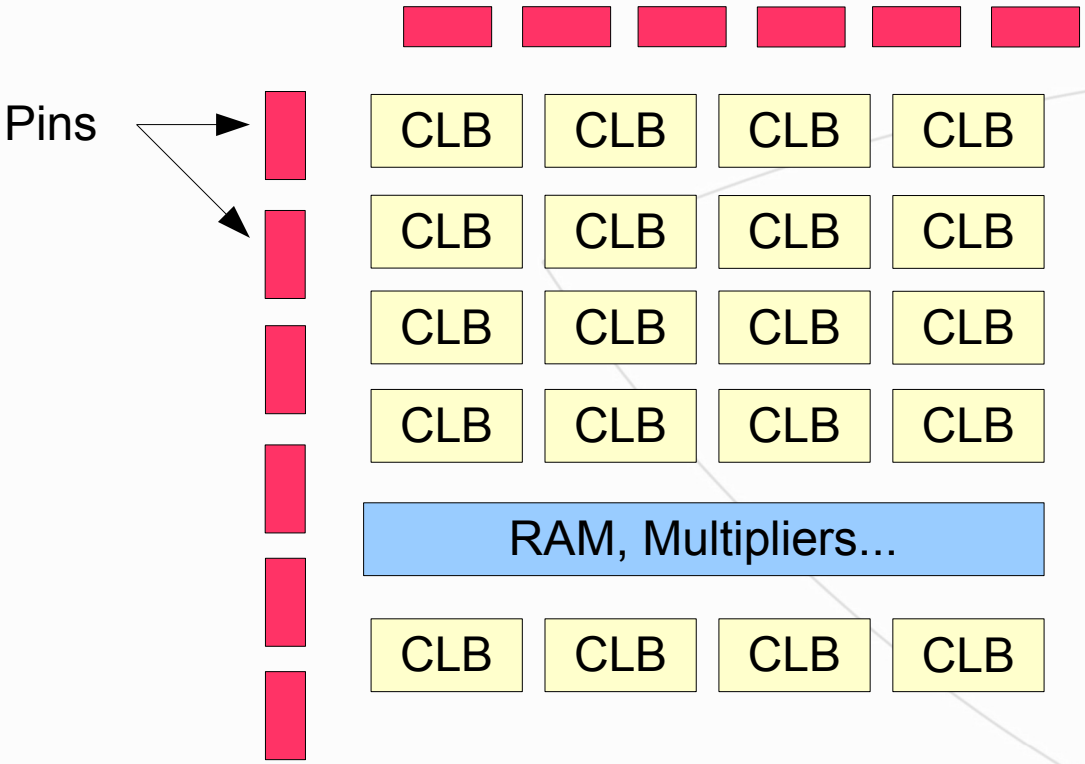
- connectors + power supply
- additionnal functionnalities
- schematics freely available

Armadeus

2) FPGA in embedded systems

Nicolas Colombain

What's a FPGA* ?



CLB: Configurable Logical Blocks (ALU, Combinatorial functions, registers...)

Each block can be freely connected to the others by means of different paths

*FPGA: Field Programable Gate Array

Advantages

- Reconfigurable
- Powerful for parallel processing
- Design reuse (IPs*)
- Free tools available

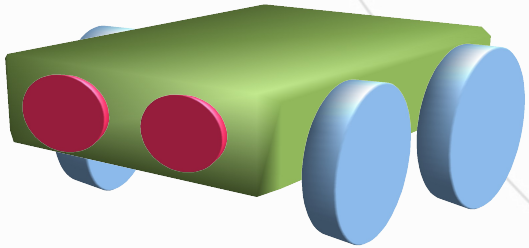
* IP: Intellectual property

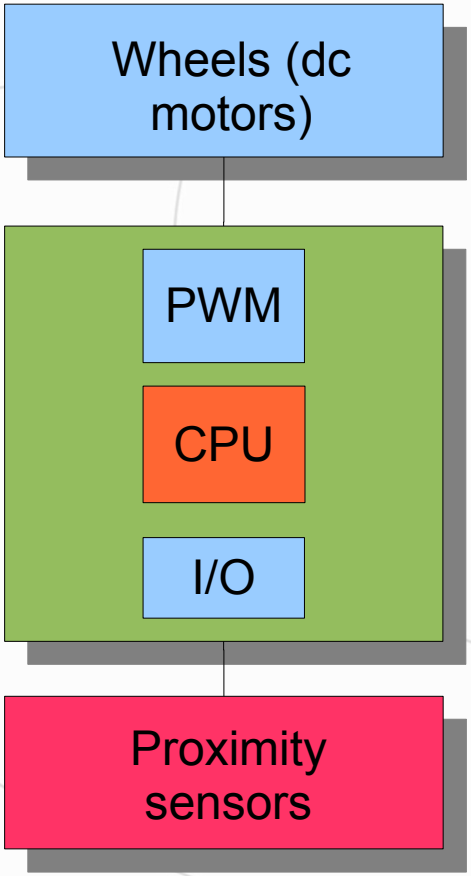
Disadvantages

- Power consumption*
- Price*
- New languages (VHDL/Verilog) for software developers with timing constraints

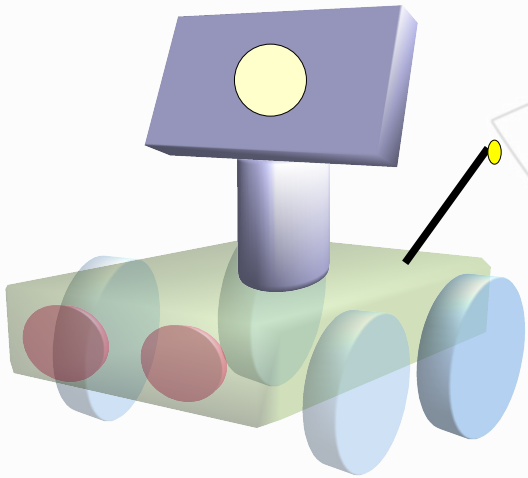
*Compared with a specific component with the same features

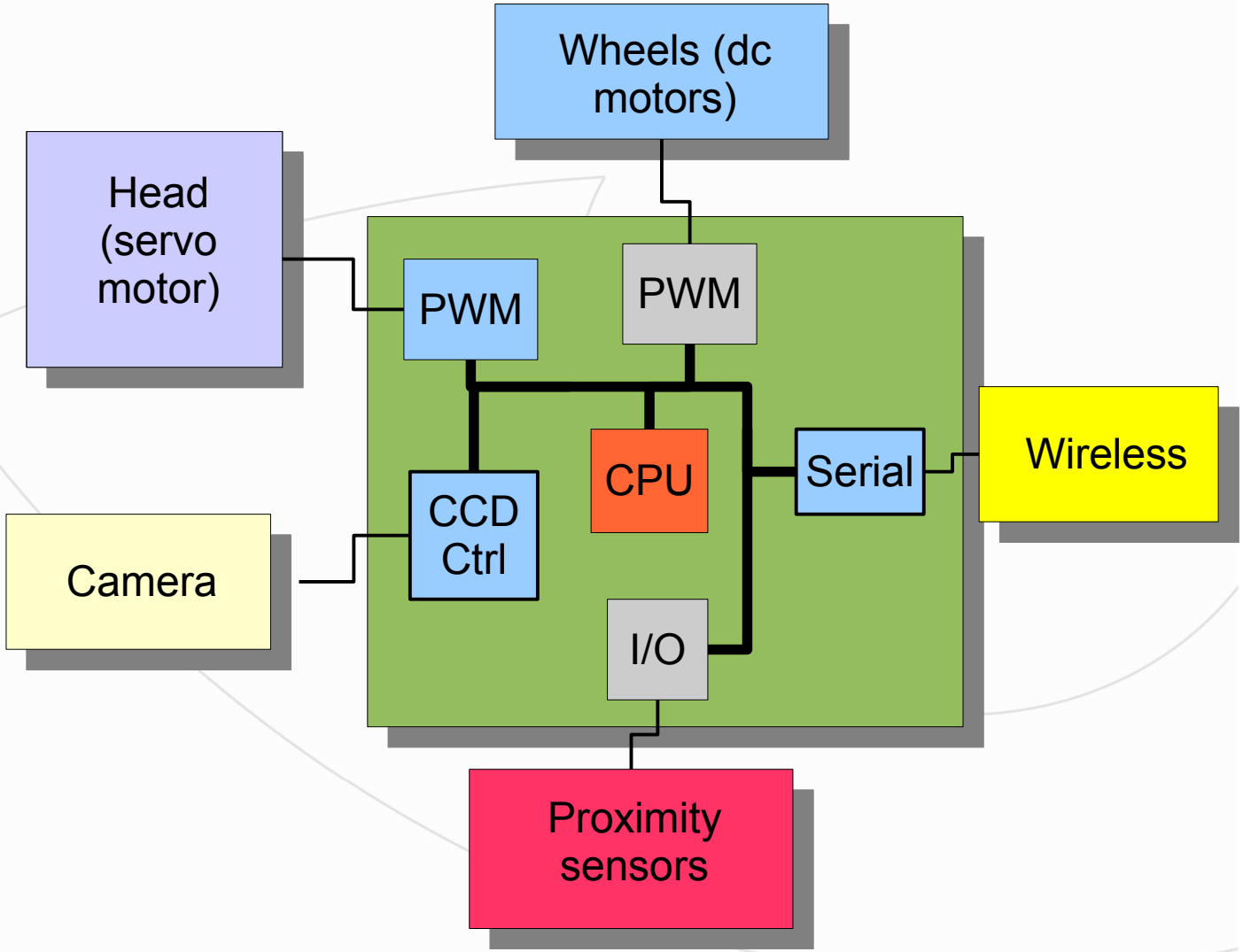
Example: a simple robot





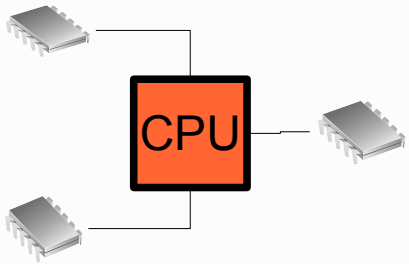
New features...



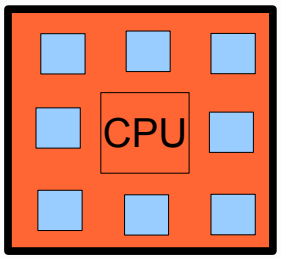


Solutions

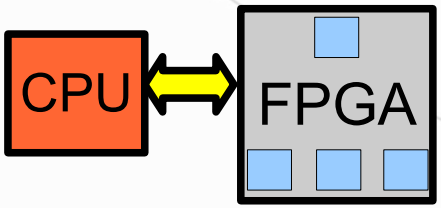
- Add some specific chips.



- Use µC with all peripherals needed.



- Use a FPGA with virtual peripherals

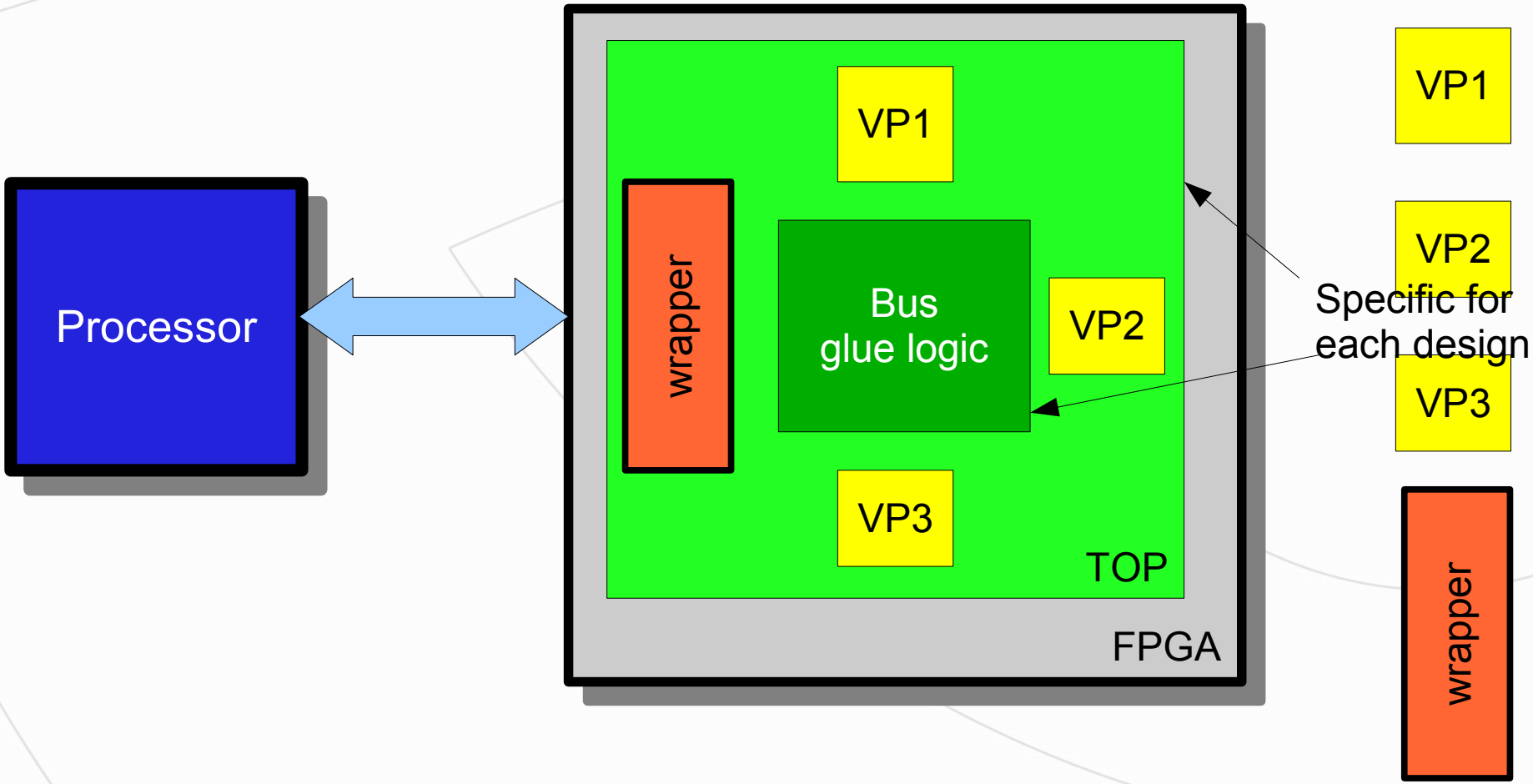


Virtual peripherals

Definition: hardware functionality connected to a bus which does not exist when creating the system

Idea: have a more versatile embedded system

Adding peripherals in FPGA



Problems

- Adding or deleting VP is painful.
- Knowledge in FPGA design is required.
- Each little modification cost lot of time.

A tool is required to automatize this

Existing tools

- Altera (NIOS)/ Xilinx(Microblaze) tools
  - Pros:
    - processor is inside the FPGA
    - mature tools, performances
  - Cons:
    - proprietary tools
    - processor inside the FPGA
    - FPGA knowledges recommended. Operating system integration

Armadeus

3) Peripheral On Demand

Fabien Marteau

Peripherals **O**n **D**emand*

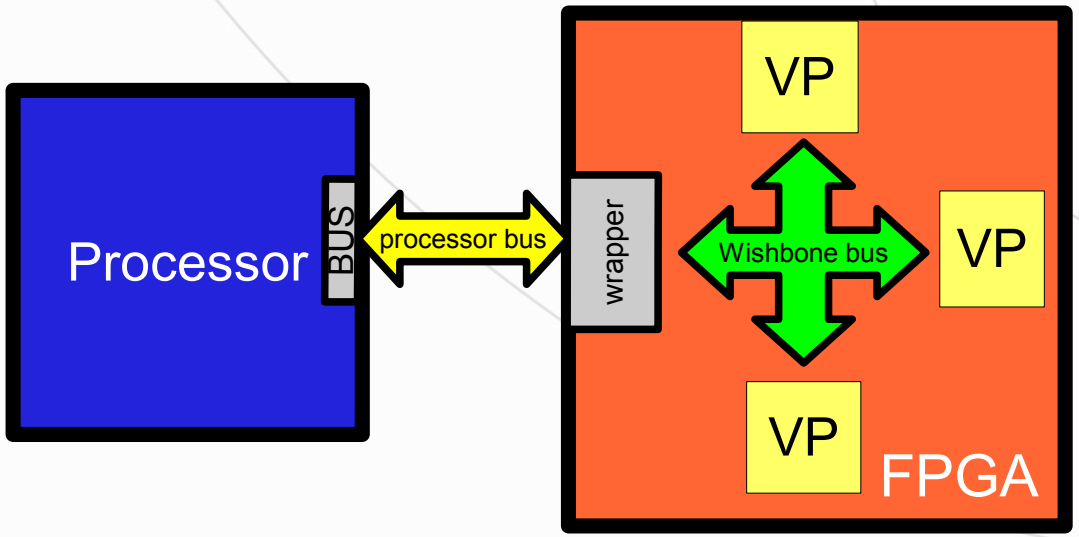
- Open source and public specification
- Designed to be used by non FPGA developers
- Operating system integration facility (automated driver modifications)
- Versatility and ease of use prior to optimization

*POD

POD Technical

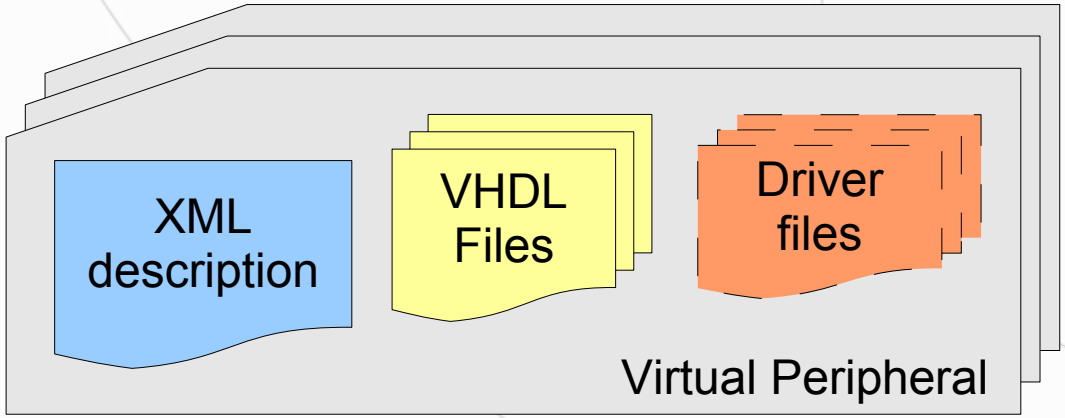
- Based on an open source bus

  Wishbone (www.opencores.org)
- Processor / FPGA duo

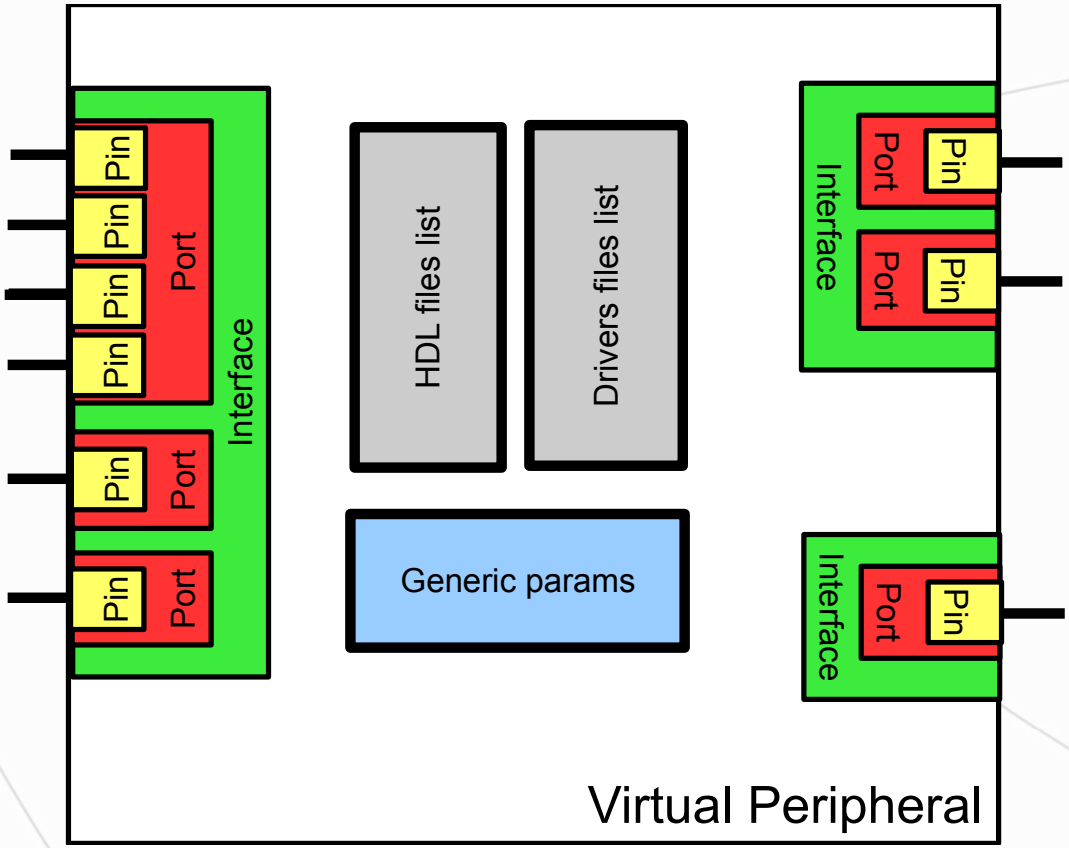


Principle

- Virtual Peripheral described in XML file

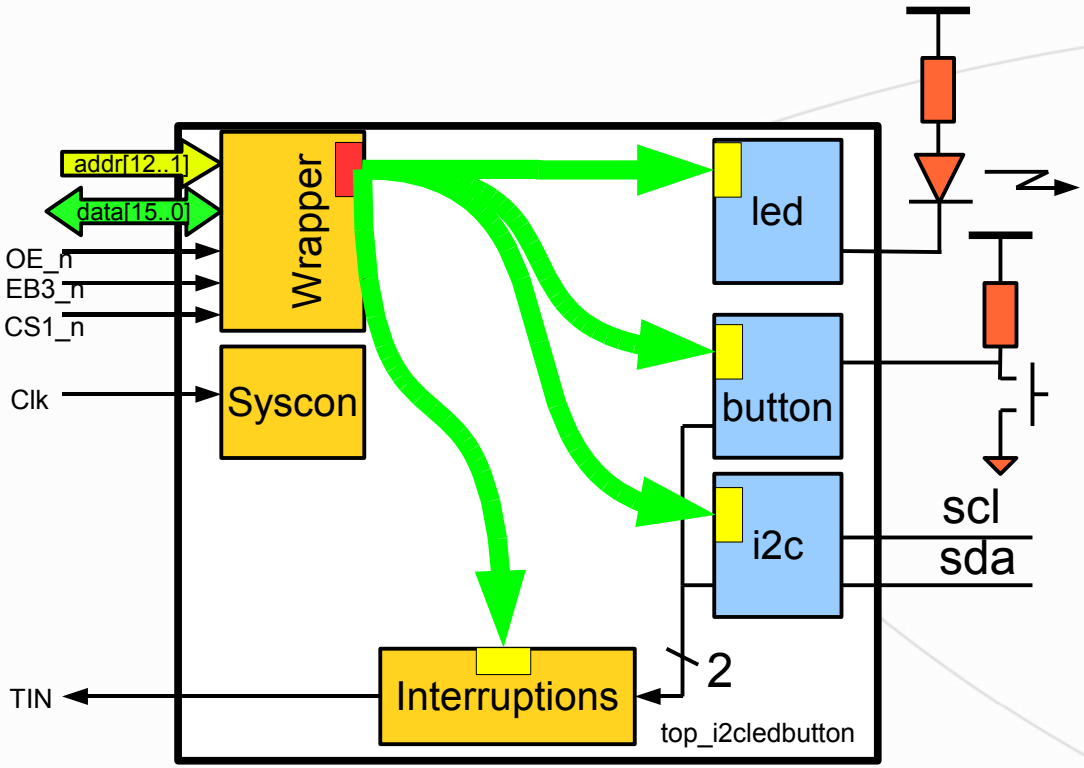


XML description



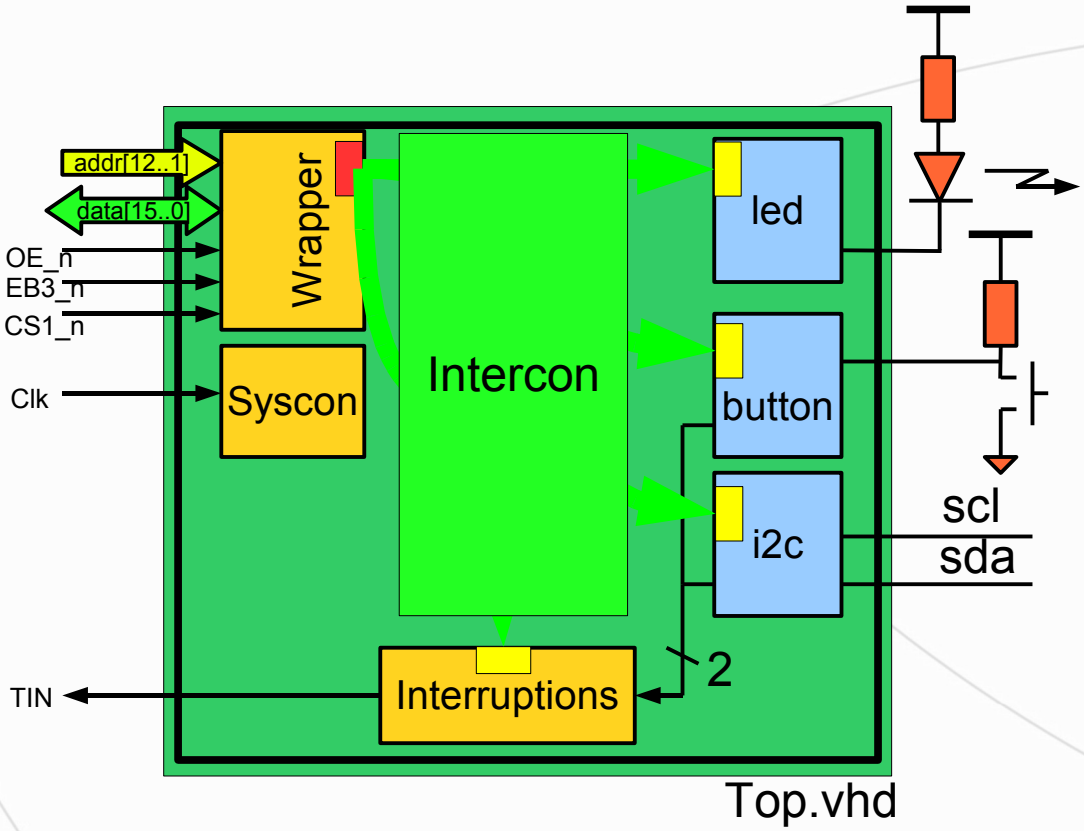
- Interface
  - Port
    - Pin
- Generic parameters
- Files list

User action



- Select platform
- Add components
- Connect pins
- Connect bus

Generating files



- Bus interconnection
- Top
- Scripts and constraints

Conclusion

- Running prototype using OpenCores IPs
- Driver generation to be done
- GUI in progress
- First specifications published mid July

Questions

- something to ask ??