FPGA III: Introduction

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Contact

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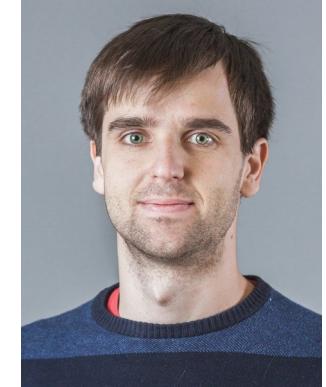
Consulting hours: Please always write me an e-mail in advance.

Office: B401

Safety Instructions

- Please sign the briefing record

- You will work only with Safe Extra Low Voltage (SELV) devices

- Do not eat or drink inside the laboratory

- All injuries are required to be reported

- Do not manipulate with electrical equipment

Semester Plan

W1: Introduction to Zynq platform

W2: Generating BSP for custom board

W3: First Linux on Zynq

W4: PS <> PL communication (AXI Lite)

W5: Custom IP core in PL

W6: PS <> PL communication – DMA (Part 1)

W7: PS <> PL communication – DMA (Part 2)

W8: PS <> PL communication – DMA (Part 3) ?

W9: Individual projects

Scoring

- Scoring:
  - Individual projects presented in Week 13

- Individual projects:
  - Agree on the assignments
  - Specify the milestones and their deadlines
  - Git repository required
  - Presentations of the projects for your colleagues

Recommendations

- All PC lab are recommended

- Active participation in laboratory
  - Will help to solve individual projects

- Home preparation

- Find study materials online

Coarse Goals

- You should know:
  - What is the Zynq platform
  - How to create a Petalinux system for it
  - How to communicate with custom IP cores
  - How to make DMA data transfers
- We will not focus on:
  - How to create custom IP cores (please take PA221)
  - SystemVerilog or Verilog or VHDL
  - Timing and other critical functions of FPGAs (covered by PV200 and PA221)
  - Signal processing

Petalinux Environment

- Petalinux VM on Melampus
  - ssh user@192.168.51.110
  - Contact Ondrej Bleha (493178@mail.muni.cz) if you need access from your home

- Petalinux installation on your machine
  - https://docs.amd.com/r/en-US/ug1144-petalinux-tools-reference-guide
  - Change default /bin/sh to /bin/bash
  - Required packages (see .xlsx below the article) https://adaptivesupport.amd.com/s/article/000037095?language=en_US

Petalinux Environment

- For Ubuntu 24.04

```
# make /bin/sh to point to bash
sudo ln -s bash /bin/sh.bash
sudo mv /bin/sh.bash /bin/sh

# install prerequisities
# see https://adaptivesupport.amd.com/s/article/000037095?language=en_US
# below the article there is an xlsx file which contains required packages
# after some tweaking this command worked on Ubuntu 24.04.1
sudo apt-get install iproute2 gawk python3 build-essential gcc git make net-
tools libncurses5-dev tftpd zlib1g-dev libssl-dev flex bison libselinux1
gnupg wget diffstat chrpath socat xterm autoconf libtool tar unzip texinfo
zlib1g-dev gcc-multilib automake screen pax gzip cpio python3-pip python3-
pexpect xz-utils debianutils iputils-ping python3-git python3-jinja2
libsdl1.2-dev pylint
```

First steps in Vivado

- On Zedboard

- Create a basic system with PS7

Notes:

- PS (Processing System – CPU and its peripherals)

- PL (Programmable Logic = FPGA area)