



Laboratorij za načrtovanje integriranih vezij

Univerza v Ljubljani
Fakulteta za elektrotehniko



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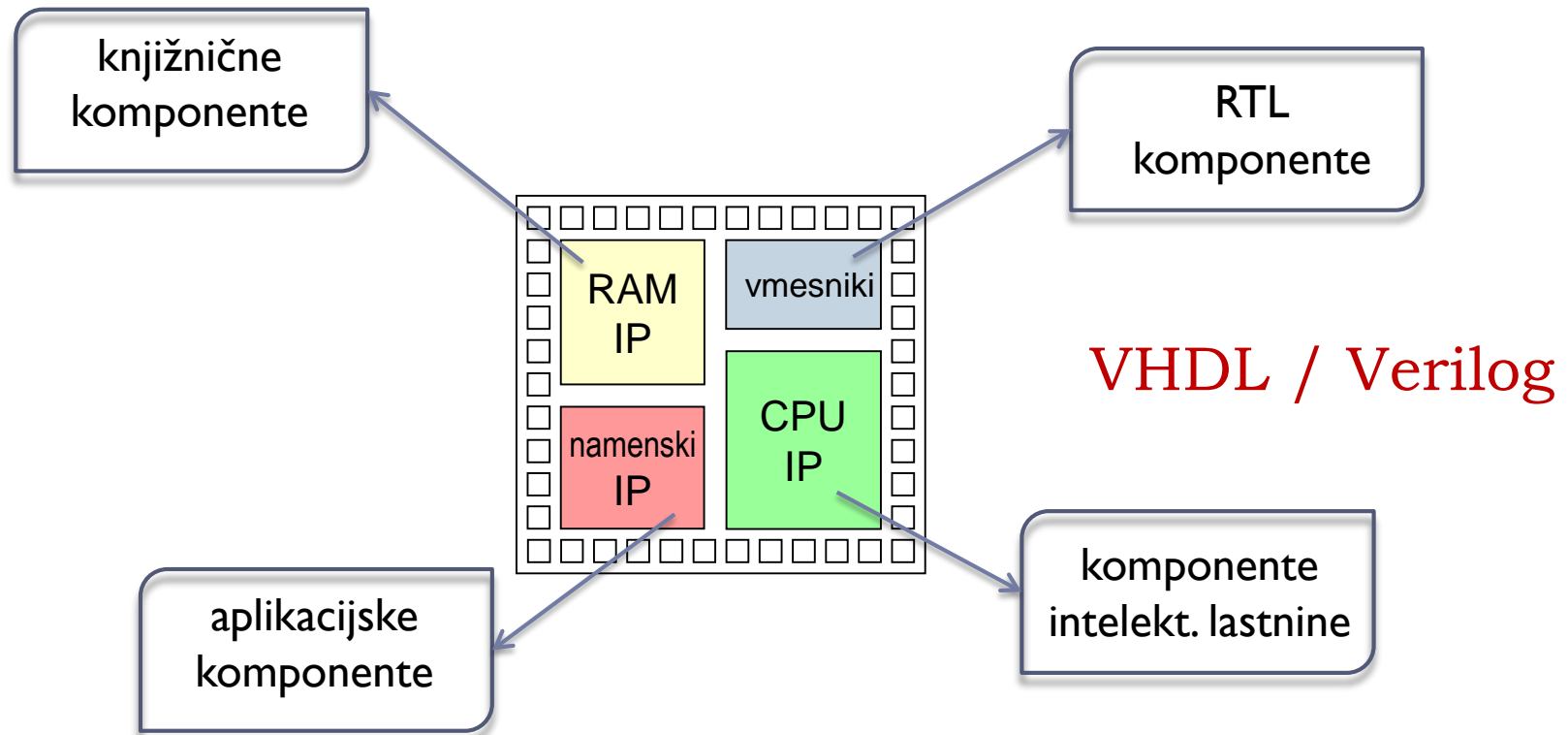
Uvod v laboratorijske vaje

Digitalna integrirana vezja in sistemi

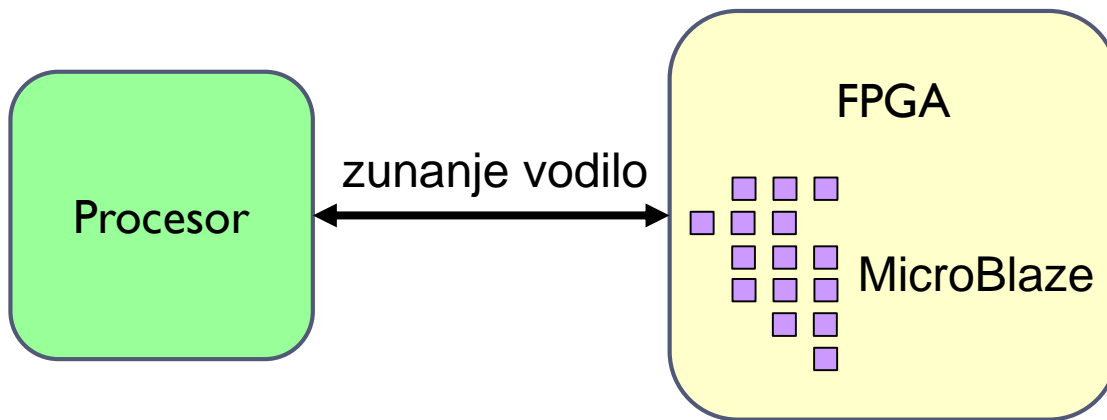
Literatura: Programirljiva vezja in razvojna orodja Xilinx, <http://lniv.fe.uni-lj.si/xilinx/>
The Zynq Book, <http://www.zynqbook.com/>

Digitalni sistemi na integriranem vezju

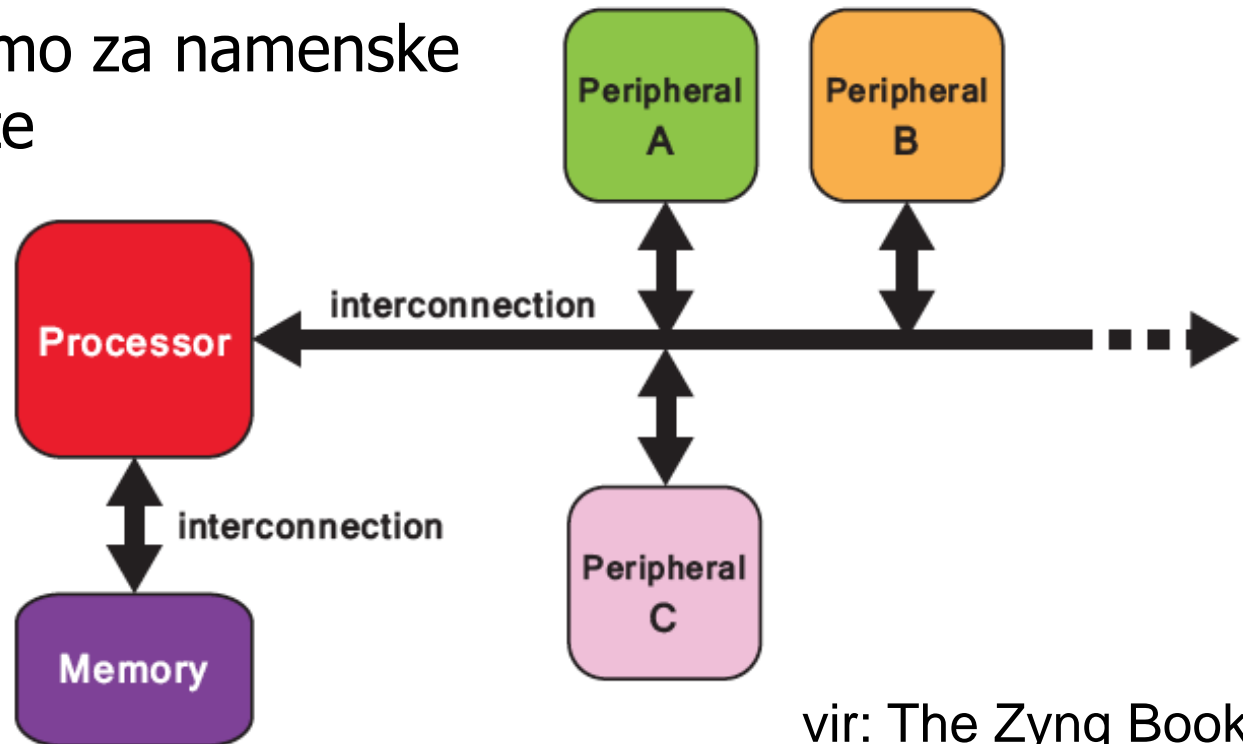
- ▶ sistemi iz vnaprej pripravljenih komponent (knjižnica, IP) in specifičnih vezij
- ▶ vezja z natančnimi časovnimi parametri in omejitvami sintetiziramo iz opisa VHDL ali Verilog



Digitalni sistemi in SoC



- ▶ FPGA uporabimo za namenske periferne enote



Proizvajalci in programirljiva vezja SoC

Xilinx

- ▶ Zynq: ARM Cortex-A9, TSMC 28 nm
- ▶ Ultrascale: 4x Cortex-A53 (1.5 GHz), 2x Cortex-R5, 16-20 nm TSMC FinFET+



Altera

- ▶ Cyclone V, Arria V: 2x Cortex-A9 (1 GHz), 300 MHz logic, TSMC 28 nm

Intel FPGA (Altera)

- ▶ Stratix 10: 4x Cortex-A53 (2.5 GHz), 1 GHz logic, 14 nm Intel Tri-Gate



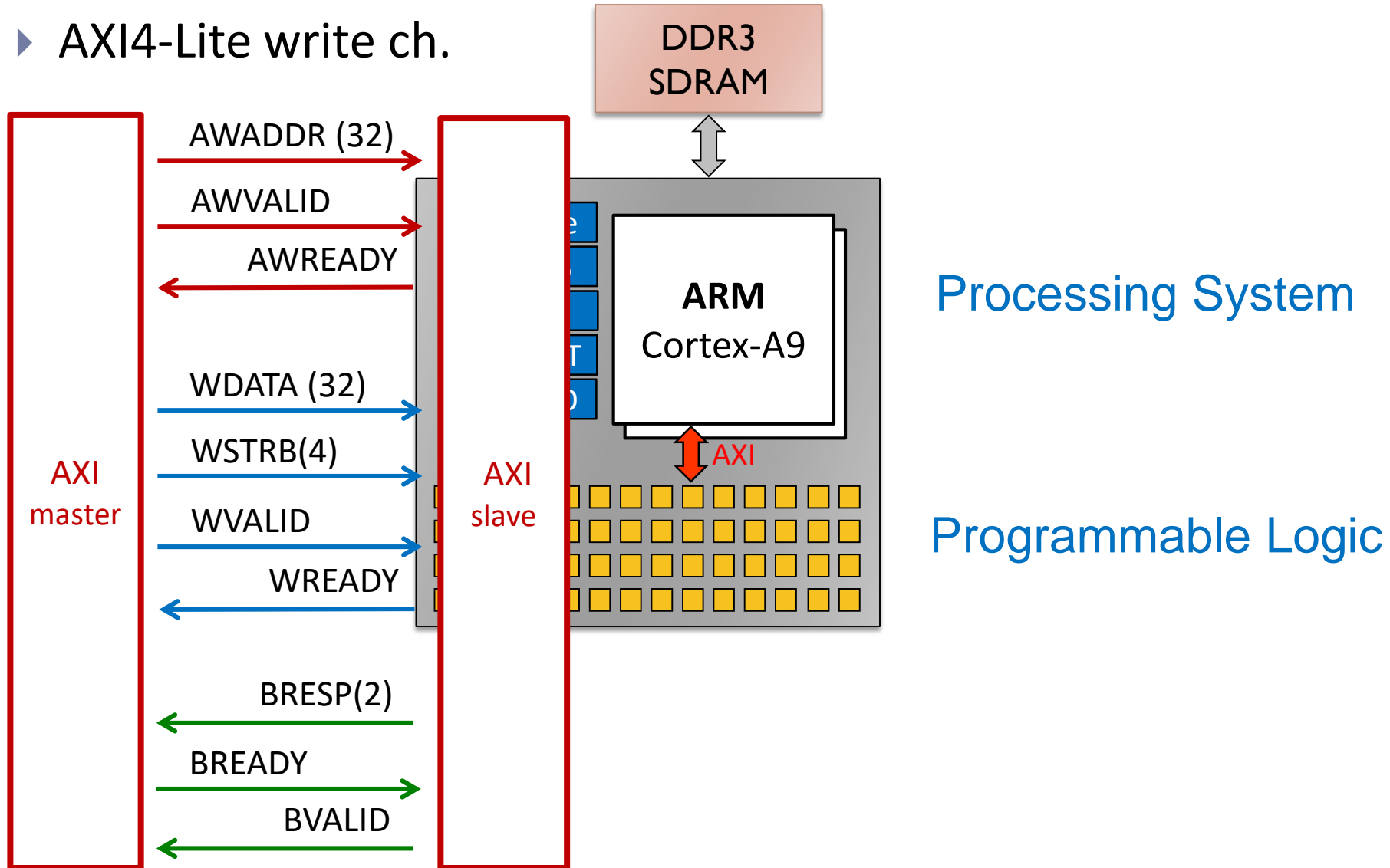
Microsemi (Actel)

- ▶ Smartfusion2: Cortex M3 (166 MHz), 65 nm UMC Flash



Programirljivi sistem na čipu Zynq-7000

▶ AXI4-Lite write ch.



Razvojne plošče v laboratoriju

▶ XC7Z010

Artix-7 + 2xARM Cortex-A9

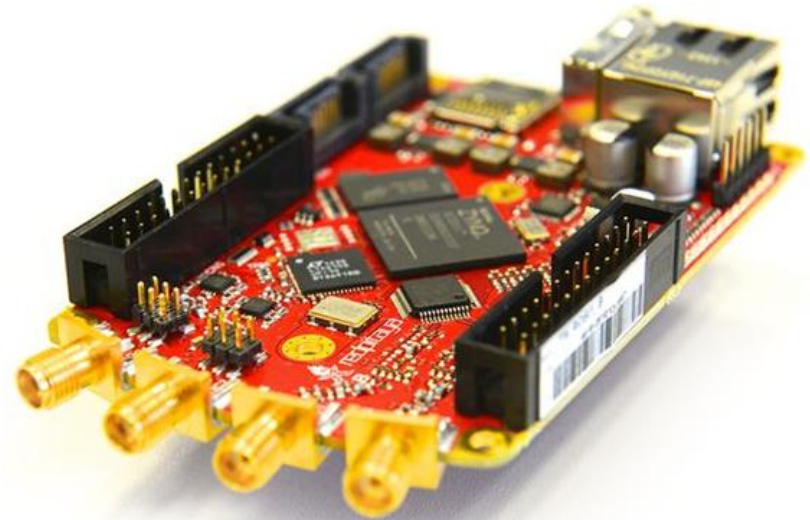
17k LUT / 35k FF

80 blokov DSP48

60 blokov BRAM (36k)

XADC

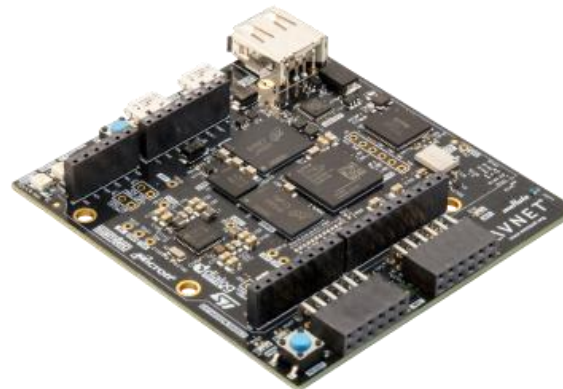
Red Pitaya



ZedBoard



MiniZed



MicroZed



Študent bo znal:

- ▶ uporabljati orodja za SoC
- ▶ vlogo HW in SW komponent
- ▶ izdelati model namenskega vezja na ravni RTL
- ▶ narediti vmesnik in testni program (HW in SW)
- ▶ razviti manjši sistem na integriranem vezju

Laboratorijske vaje

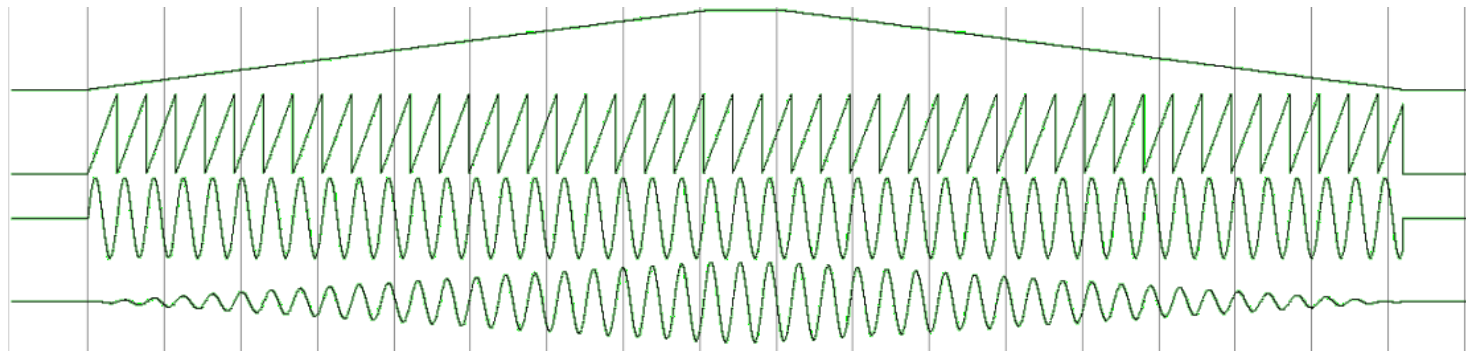
- ▶ izdelava modela vezja z računskimi operacijami
- ▶ povezava na AXI, izdelava IP

Mini-projekt:

- ▶ SoC za računanje konvolucije
- ▶ sistem na RedPitayi
- ▶ digitalni sintetizator

Projekt:

- ▶ funkcijski generator



Programska oprema: Xilinx Vivado 2019.1

- ▶ na FE uporabljamo brezplačno Vivado WebPACK Edition
- ▶ deluje v okolju Windows ali Linux
- ▶ **Namestitev:**
 - ▶ <https://www.xilinx.com/support/download.html>
 - ▶ pod Version izberite Vivado Archive, nato se pomaknite navzdol do Vivado Design Suite - HLx Editions - 2019.1 Full Product Installation

Version

We strongly recommend using the latest releases available.

2020.1

2019.2

Vivado Archive

2019

2019.1

Vivado Design Suite - HLx Editions - 2019.1 Full Product Installation

Important

We **strongly recommend** to use the web installers as it reduces download time and saves significant disk space.

Please see **Installer Information** for details.

Note: Download verification is only supported with Google Chrome and Microsoft Internet Explorer web browsers.

Download Includes: Vivado Design Suite HLx Editions (All Editions)

Download Type: Full Product Installation

Last Updated: May 29, 2019

Answers: [2019.x - Vivado Known Issues](#)

Documentation: [Release Notes](#), [What's New in Vivado](#)

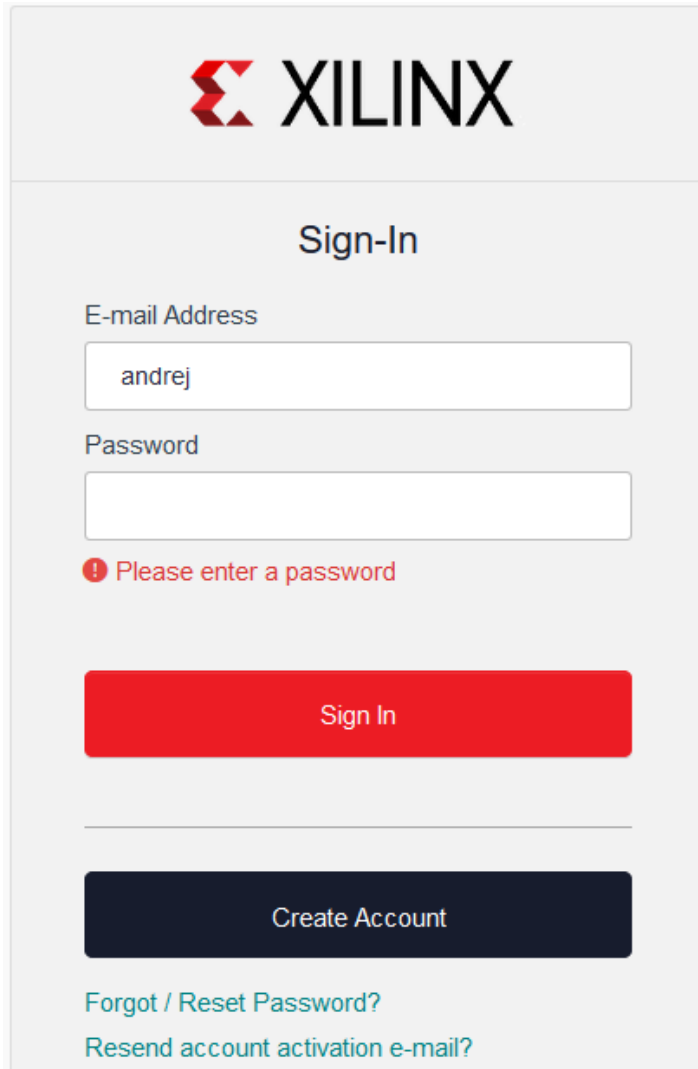
Support Forums: [Installation and Licensing](#)

Vivado HLx 2019.1: WebPACK and Editions - Windows Self Extracting Web Installer

[Vivado HLx 2019.1: WebPACK and Editions - Windows Self Extracting Web Installer](#) (EXE - 64.62 MB)

Prijava

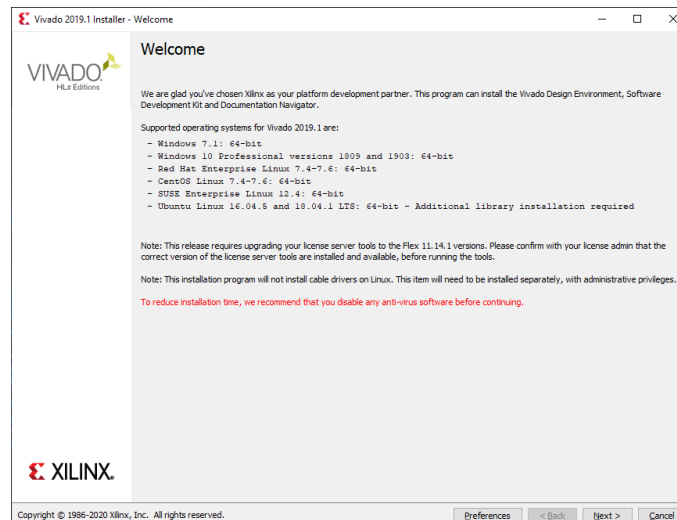
za prenos je potrebna brezplačna registracija



The image shows the Xilinx Sign-In page. At the top is the Xilinx logo. Below it is the heading "Sign-In". There are two input fields: "E-mail Address" with the text "andrej" and "Password" which is empty. A red error message below the password field says "Please enter a password". At the bottom of the form are two buttons: a red "Sign In" button and a dark blue "Create Account" button. Below the buttons are two links: "Forgot / Reset Password?" and "Resend account activation e-mail?".

- ▶ Vivado sodoben paket za SoC, ki vsebuje ogromno programov in knjižnic
 - ▶ potrebujemo vsaj 30 GB prostega diska!
- ▶ po prijavi naložimo namestitveni program in ga poženemo


Xilinx_Vivado_SDK_Web_2019.1_0524_1430_Win64.exe



Namestitev

V namestitvenem programu ponovno vnesemo User ID (e-pošto) in izbrano geslo

- ▶ izberemo Download and Install Now
- ▶ izberemo namestitev Vivado HL WebPACK
- ▶ izberemo komponente:
 - ▶ za vaje potrebujemo družino vezij Zynq-7000, ostale lahko odstranimo

 Vivado 2019.1 Installer - Select Edition to Install


Select Edition to Install

Select an edition to continue installation. You will be able to customize the o

Vivado HL WebPACK

Vivado HL WebPACK is the no cost, device limited version of Vivado HL installation.

Vivado HL Design Edition

 Vivado 2019.1 Installer - Vivado HL WebPACK

Vivado HL WebPACK

Customize your installation by (de)selecting items in the tree below. Moving cursor over selections below provide additional information.

Vivado HL WebPACK is the no cost, device limited version of Vivado HL Design Edition. Users can optionally add Model Composer and System Generator for DSP to this installation.

- Design Tools
 - Vivado Design Suite
 - Software Development Kit (SDK)
 - DocNav
- Devices
 - Production Devices
 - SoCs
 - Zynq-7000 (limited support)
 - Zynq UltraScale+ MPSoC (limited support)
 - Zynq UltraScale+ RFSoc
 - 7 Series (limited support)
 - UltraScale (limited support)
 - UltraScale+ (limited support)
 - Engineering Sample Devices
- Installation Options
 - Install Cable Drivers (You MUST disconnect all Xilinx Platform Cable USB II cables before proceeding)
 - Enable WebTalk for Vivado to send usage statistics to Xilinx (Always enabled for WebPACK license)
 - Install WinPCap for Ethernet Hardware Co-simulation
 - Launch configuration manager to associate System Generator for DSP with MATLAB
 - Enable WebTalk for SDK to send usage statistics to Xilinx

Download Size: 7.22 GB
Disk Space Required: 32.03 GB

Reset to Defaults

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