**LAB 1 PLAN AND RUBRIC**

**Date:** 16 April 2020

**Subject:** Computer Systems Design

**Topic:** Introduction to FPGA-based design flow

**Objectives:**

* Students understand the design flow of FPGA-based design
* Students can use Xilinx Vivado Design Suite to implement hardware projects based on FPGA devices
* Students understand the project structure of FPGA project
* Students can manage design files, testbenches, and constraint files

**PLANNING**

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| timing | activities | resources | aim of activity |
| 10 min | **Introduction.** Outline the lab. | Study guide  (The section with Lab1 Task and Lab 1 Guide) | Prepare the students to the lab |
| 5 min | **Practice.** Understanding the task variant | Study guide  (The section with Lab1 Task and Lab 1 Guide) | Understand the lab variant and discuss it with the instructors. |
| 20 min | **Practice.** Synthesis, implementation, and bitstream generation for baseline FPGA project | Study guide  (The section with Lab1 Task and Lab 1 Guide) | Developing the skill of using Vivado Design Suite synthesis and implementation utilities |
| 10 min | **Practice.** Uploading the bitstream to FPGA device and executing test script to check baseline functionality | Study guide  (The section with Lab1 Task and Lab 1 Guide) | Developing the skill uploading bitstreams to FPGA and performing hardware debug |
| According to the schedule | **Break** | | |
| 20 min | **Practice.** Simulation of baseline FPGA project | Study guide  (The section with Lab1 Task and Lab 1 Guide) | Developing the skill using Vivado simulation utility |
| 5 min | **Practice.** Comparison of simulation and hardware testing results | Study guide  (The section with Lab1 Task and Lab 1 Guide) | Understand how to compare simulation and hardware testing results |
| 20 min | **Practice.** Checking the results   1. Demonstration of the results to the instructors 2. Getting questions from the instructors | - | Checking the students results and grading.  Giving the questions and the practical task for understanding. It is needed to evaluate the students results. |
| According to the schedule | **Break** | | |
| 45 min | **Evaluation.** Discussing questions with the students and performing the auxiliary task for adding new functionality according to the given variant | - | Discussing the given questions, refining the obtained skills and grading |
| According to the schedule | **Break** | | |
| 30 min | **Evaluation.** Checking the auxiliary task for understanding | - | Checking the auxiliary task for understanding and grading |
| 15 min | **Conclusion part.** Summarization of the lab | Study guide  (The section with Lab 1) | Summarize the main points of the lab. Structuring of the given knowledge and trained skills. |

**RUBRIC**

The rubric of the lab is focused on the overall performance, and it enables overall judgement of the student work. The result grade is depended on the result of practice part, the answers on the questions about the obtained results and the results of the task for understanding given after practical part. For the lab the students can get maximum 10 points.

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| Grade, points | Description |
| 0-5 | Students have partially completed the practical task |
| 6 | Students have successfully completed the practical task |
| 8 | Students have successfully completed the practical task and correctly answered the questions |
| 10 | Students have successfully completed the practical task, correctly answered the questions and done the auxiliary task |