Final Project

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Coordinator: Alexander Reysenson
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1. **Objective**

The work includes defining a project and implementing the system in at least one of following fields – OOP, FPGA, DSP or Embedded system. The aim of the project is to demonstrate the ability to design a fully functional working system.

2. **Definition and prior knowledge**

The system is to be based on a PC, FPGA or DSP platform. Advanced projects may combine a number of platforms and/or additional peripheral devices. The work includes the following steps:

1. Meeting with the lab-teacher and getting his approval;
2. Project proposal creating;
3. Project implementation;
4. Final report creating;
5. Project presentation.

The necessary knowledge and skills were acquired during the laboratory experiments. However, this is only the basis and successful project’s completion may demand a deeper understanding.

3. **Meeting with lab instructor (optional) and getting approval**

The goal of meeting is to define the project specifications. The instructor should describe to students projects’ specifications and his requirements for project implementation. The instructor can add additional futures for basic projects. The additional futures could put together up to 30% from initial project. In case of custom project, the project should get principal approvement of AdCompLab coordinator. Then projects’ specifications and requirements are detailed in meeting with lab instructor.

4. **The project proposal creating**

The proposal (PDR – preliminary design review) could be written only after completing of previous paragraph. The proposal must contain the following parts:

- The project concept description with block diagram;
- Algorithm description with block diagram;
- Functional parts definition and their description;
- The design concept should be hierarchical in software projects. The classes and basic functions should be defined;
- The design concept should be structural in hardware projects. The top design should be separated to limited number of functional sub designs. The sub designs should be implemented in behavioral way or with ALTERA’s IP functions. The basic hardware blocks (controllers,
memories, arithmetic blocks; and ports) should be defined and synchronized with global clock.

PDR report requirements:
- Contents should have page numbers;
- Images and tables should be numbered. The caption of an images and tables below the images or tables;
- References;

5. Project implementation

The implementation --TBA

Requirements for software projects:
1. The code must be well commented with explanation of each function
2. Classes must be described in separate files and not mixed with the execution code.
3. User interface must not be entangled with the execution code and be easily separated
4. It is permitted to use external classes and libraries distributed under GNU GPL, LGPL licenses or similar free open source licenses, providing that the student may explain the use of these libraries. The use of commercial or of unknown source libraries is prohibited in order to avoid patents or copyright infringements.
5. The graphical user interface must be coded either with classes/functions bundled with Windows or Visual Studio or with the QT toolkit.

Requirements for hardware projects:
1. The design must be structural in high level. The design should be divided to number big functional blocks (sub designs) and the sub designs should have behavioral and/or state machine implementation.
2. The sub designs (except the test bench) should be synchronized with global clock.

The students must verify that the project can compiled without errors as submitted.

6. Final report creating

Common requirements for the final (CDR) report:
1. The content should be separated to two parts – first which describes operating mode/s (User manual) of the system and second, with detailed system description.
2. The content should contain table of contents, list of tables, list of images and references. The documents should be with page numbers
3. Images and tables will be numbered. The caption of an images and tables below the images or tables
4. Block diagrams for high level and for each sub design that describes the logic behind of the code and algorithm should be added.
5. The each sub design should have image or diagram with inputs/outputs description which concentrate in functional table.
6. The source files (*.c, *.cpp, *.h, *.v, *.vhd and etc.) must have clear comments that help to understand the contents and purpose of code and **NOT** code description.

7. The folder that contains final projects must be zipped with name 12345678_87654321_Final_Project_CDR.rar and include:
   - The full report file in the Microsoft Word format;
   - The "work" directory with the relevant source and resources files;
   - A `readme.txt` with source files list and project definitions.

Requirements for the software projects:

---TBA

Requirements for hardware project reports:

1. The result of Quartus II simulations and/or SignalTab II emulations for top level and sub designs should be added. The simulations/emulations should be functional and clear with relevant signals presentations and short description.

2. Elaborated analysis and wave forms:
   - Remove irrelevant signals.
   - Zoom on regions of interest.
   - Draw clouds on the waveform with explanations of what is happening.

7. **Presentation and defense meeting**

The presentation and defense meeting is designated

8. **Grading policy**

<table>
<thead>
<tr>
<th>Meeting with lab instructor (optional) and getting approval</th>
<th>Passed/Not passed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal report</td>
<td>10%</td>
</tr>
<tr>
<td>Project implementation</td>
<td>60%</td>
</tr>
<tr>
<td>Final report</td>
<td>10%</td>
</tr>
<tr>
<td>Project presentation and defense</td>
<td>10%</td>
</tr>
<tr>
<td>Originality</td>
<td>10%</td>
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<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1: Grading

9. **Project submission, presentation and defense**

<table>
<thead>
<tr>
<th>Proposal report</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Final report submission for first appointment time</td>
<td></td>
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<tr>
<td>The first appointed time</td>
<td></td>
</tr>
<tr>
<td>Final report submission for second appointment time</td>
<td></td>
</tr>
<tr>
<td>The second appointed time</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Submission dates

For early submission the reward is 2*days (up to 3 days).
Please notify the relevant instructor and coordinator by mail after delivery if reward is taken.
10. References