COE3DQ5 – Project Report

Student names

Group number

Date

The document must use letter-size page format with a 10 to 12-pt font size, single spacing, and minimum margins of 1.75 cm. The length depends on how many milestones you have attempted (i.e., the milestones that were completed plus the single milestone you were working on at the time of project submission), with a maximum limit of 4 pages. If your report is longer than 4 pages (including a cover page, figures and tables, references, etc), only the first 4 pages will be read.

Your final project repo must be pushed to GitHub before 11 p.m. on Monday, November 25. The report should be in **pdf** format and placed in the *doc* subfolder from your GitHub repo. Note that the test image files are not required. The project report should be formatted as described below.

1 Introduction

In a short but concise paragraph, summarize the project's objectives by emphasizing the big picture.

2 Implementation Details

For each milestone, discuss **only** what is requested in the subsections below.

2.1 Upsampling and Colour Space Conversion (Milestone 1)

- Use a simple figure to highlight how you have organized the calculations for the interpolation and colour space conversion (in the common case only);
- Use a table to describe the purpose of every register used. Follow the format for the register description example from the appendix from lab 5. Note also, groups of registers can be bundled together in a single entry in the table; for example, the six U/V shift registers should be in the same entry in the table - the size of this group of registers is 6x8 bits and in the description for this group of registers you can explain how their purpose is to hold six consecutive values of the even U/V values that are used to interpolate the odd U/V values;
- Provide a latency analysis that captures how many clock cycles it takes for milestone 1 to complete and relate this analysis to the utilization of multipliers for the entire milestone 1.

2.2 Inverse Discrete Cosine Transform (Milestone 2)

- Use a simple figure to capture how you have placed matrices in the embedded RAMs and how the three multipliers are used for each of the two matrix multiplications (for a single 8x8 block of data);
- Use a table to describe the purpose of every register used in milestone 2 (follow the same line of reasoning as for milestone 1);
- Provide a latency analysis in terms of clock cycles for milestone 2 (follow the same line of reasoning as for milestone 1).

2.3 Lossless Decoding and Dequantization (Milestone 3)

- Use a simple figure to summarize how you have approached milestone 3;
- Use a table to capture the purpose of every register you have used in milestone 3 (follow the same line of reasoning as for milestones 1 and 2);
- Provide a latency analysis in terms of clock cycles for milestone 3 (it is sufficient to focus only on the worst-case analysis).

2.4 Resource Usage and Critical Path

- In a paragraph, discuss the resource usage (in terms of logic elements, as reported by Quartus) of your project and contrast it against the starting point for your project (lab 5 experiment 4);
- After progressing throughout the project, it is not uncommon that one can identify parts of the design that are inefficient or that can be improved; for example, some registers can be removed. If you have identified resource inefficiencies or potential improvements (for the work that was done) that are worth undertaking in future revisions of the project, explain them in this section;
- Inspect the critical path in the Timing Analyzer from Quartus, as shown in the videos on circuit implementation and timing from lab 3 and making sense of the design implementation from lab 5. You should also provide a reasonable explanation for this critical path.

3 Weekly Activity and Progress

Use a table with five rows (labelled week 1 to week 5) to explain the following:

- The project progress in each of the five weeks of the project; for example, in week 1, we were only reading the project document, in week 2, we conceptualized and designed the state table for milestone 1 and ... in week 3 ...;
- The contributions of individual group members during each project week. While facts need to be agreed on (someone has either worked or not on a particular task), opinions/viewpoints/... can differ (individuals can perceive their own contribution or the contribution of others in different ways). As the assessment process runs its due course, the discrepancy in viewpoints is expected to be resolved. Each individual group member has the right **and** the responsibility to provide their own contribution statement.

It is important to note that if you have "interacted" with anyone other than your group member, the teaching assistants (TAs) or the instructor, you should state the nature of this activity explicitly. Also, if there were any problems between the group members throughout the project, describe the problem and how you addressed it, if applicable.

4 Conclusion

In a short paragraph, summarize your learning experience.

If you have a project version other than the one from the last commit pushed to GitHub before the deadline that needs to be checked (see next page for further details), make sure you state explicitly at the end of this section what is the date and commit message for the respective version.

5 References

Provide a list of all your references (project spec, notes, web resources, ...).

VERY IMPORTANT NOTES

- The project has 36 marks, which carry a weight of 36% of the total grade, and they are divided as follows:
  - 16 marks for the first milestone;
  - 13 marks for the second milestone;
  - 7 marks for the third milestone.
- If not all the milestones have been completed, then the situation must be dealt with as follows:
  - In a workflow based on Git, fortunately, all the previous commits can be inspected. By default, the last commit from the main branch will be checked. However, assuming the last commit is for an incomplete milestone, all you need to do is provide (at the end of the conclusion section in your report) the date and the commit message for the most recently completed milestone. Note, however, that it is still requested that all the commits be done on the main branch when pushing your repos to GitHub;
  - If, for example, milestone 1 has been completed, however, the last commit is for the incomplete milestone 2, then you should provide the date and the commit message for the committed version (and pushed to GitHub) when milestone 1 was completed; note that a completed milestone must work on the board, which implies it also passed the testbench with zero mismatches. The same reasoning should be followed if milestone 3 has not been completed; however, on this occasion, it is sufficient to provide the date and the commit message when milestone 2 was completed.
  - It is essential to note that the onus is on the students to prove how much work has been done on the incomplete milestone by providing "sufficient" working source code (i.e., the particular part of the design that is claimed to work correctly must be demonstrated when running the testbench for the incomplete milestone).
  - It is also critical to note that two "half-milestones" will not be accepted, i.e., for an assessment of an incomplete milestone, the previous milestone must be completed.
- Late submissions will be penalized as follows:
  - If your submission arrives 15 minutes to 12 hours after the deadline, you will lose half of the marks you will obtain for the project;
  - If your submission arrives more than 12 hours after the deadline, you will receive 0 (zero) for the project component of your final grade;
  - It is the responsibility of each group to ensure that the version that was committed and pushed to GitHub was uploaded correctly.
- Not showing up for the project cross-examinations will be dealt with as follows:
  - As part of the project assessment, you must show up in the lab during your scheduled lab hours in the week of November 25 to assess the individual contributions of each group member;
  - Not showing up without a valid excuse will make the project grade of the concerned party equal to 0 (zero). If there is a documented valid excuse (e.g., medical emergency), the concerned party will be rescheduled for the project cross-examination on another day before December 5.