Final Project Submission

1 Expectations and Deadlines

This document provides the guidelines for the submission of your final project, which consists of your presentation (recorded talk + slides), report, and source code. Each group is expected to complete these three items of the project. The deadlines are as follows:

- **Tuesday, December 10, 11:59pm**: Strict deadline to submit your recorded presentation and slides.
- **Friday, December 13, 11:59pm**: Strict deadline to submit your report and source code.

We encourage all teams to open source your HLS designs. If you choose to do so, please include the link to the GitHub repository in your presentation and the report.

2 Project Presentation

Your presentation should be no more than 12 minutes. Please submit to CMS the recorded video (preferably in .mp4 format). **The file size limit is 40MB.** Slides should also be submitted in pdf to CMS. To increase the visibility and impact of your 6775 project, **we plan to later make your talk publicly available on YouTube.** If it helps simplify the logistics of the recording, you can choose one or two students to be the presenter(s). Of course, you can also have each team member cover a portion of the slides.

This presentation should be a condensed version of your report (see next section). It should start with an overview, followed by the description of the application/algorithm, key optimizations, and evaluation results (e.g., speedup over baseline). Preferably, for an application project, you should include a short demo (up to one minute) which shows that your prototype design runs on the FPGA.

The contents in your slides should be intuitive and easy-to-follow for other students in the class. Please avoid relying on a large amount of text as textual details should be reserved for the report. Instead, make an effort to include visualizations and animations to help the audience better understand the flow of your design and the intuition behind your techniques. At the same time, avoid unnecessary visualizations that do not supplement your points. Please focus on describing the key technical contributions of your project and avoid superficial contents.

3 Project Report

The report should be written assuming the reader is familiar with the lecture materials but has no prior knowledge of the topics of your project. Therefore, the report should have a cohesive flow from beginning to end to tell a story of how you progressed through the project. After reading the report, the reader should have a high-level understanding of the problem you are trying to solve, the algorithms used, how you implemented your design, what are the results, and any key insights from doing the project.

All project reports should include a title, the names of the students in the group, and the NetIDs of the students in the group at the top of the first page. The report should be in single-column and single-space format with 10 point font size. Page limit is 10. You may

include citations and appendices at the end of your report beyond the 10-page limit. However, the report should be complete and comprehensible without the need to read these extra materials.

The report should, at a minimum, contain the following sections:

1. **Introduction**: The introduction should include a summary of the objective of the project and what you are able to achieve.

2. **Problem Description**: This section should provide a detailed description of the applications or automation algorithms/tools realized in this project. Think critically about the important items to mention in order for the reader to understand how your design works without having to look into any code. For example, what are the inputs and outputs of the application (or architecture), what are the major steps (or modules), and what are the key characteristics (e.g., sources of parallelism and operational intensity) of these steps? It would be useful to include small examples, block diagrams, formulas, or other visualizations to help explain your techniques. Please do not include detailed information about your source code as your report should be at a high level.

3. **Implementation**: This section should describe how you implemented and optimized your designs. For example, did you take advantage of any third-party libraries? Which software and/or hardware blocks are included in your design, and what hardware device (if any) did you target? Please also describe how you optimize the design. If you use more than one optimization methods, please summarize them in this section and later compare their impacts in the evaluation section regarding different aspect (e.g., performance, resource usage, accuracy). In most cases, it would be helpful to include block diagrams of your implementation illustrating the flow of data through your design, the interconnection between different hardware blocks, and whether certain blocks are pipelined or parallelized. As in the previous section, providing meaningful visualizations would help the reader better appreciate your work.

4. **Evaluation**: Students should describe the experimental setup used to evaluate their design. Students should describe the data inputs used to evaluate their design and provide an analysis of the achieved results. The results should be clearly summarized in terms of tables, text, and/or plots. Please provide qualitative and quantitative analysis of the results and discuss insights from these results. Results may include (but are not limited to) the execution time of an algorithm, hardware resource usage, achievable throughput, and error rate. It would be interesting, for example, to discuss why one design is better than another, why one design achieves a higher metric than another, or how you trade-off one metric for another. Consider going into detail for one particular instance of your experiment and analyze how it achieves the given results.

5. **Project Management**: This section should clearly identify the work division among the students in the group using a project timeline that lists the tasks and milestones of the project, the member(s) of the group responsible for each task, and the actual completion date of each task. This section should contain a description of how the overall project progressed and any successes and/or challenges during the course of the project.

6. **Conclusion and Acknowledgements**: This section should provide a concise summary of the algorithms, implementation, and results. Please also summarize the lessons you learned in the course of the project and acknowledge the additional help you received from the course staff or other students.

4 Source Code

Please submit your source code and associated data files in a single zip file. **Your zip file should include a README file with instructions describing how the code should be run.** If you plan to open source the design, please also include the GitHub link in the README file.