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Statement of Work

Introduction/Background

Our group has decided to take on the task of implementing LZW compression in hardware and implementing LZW decompression in software. In order to focus on getting high performance compression, the decompression will be done in software, as opposed to both compression and decompression being done in hardware. Our implementation will be done on a ZedBoard, which is a System-on-Chip (SoC) with both a Zynq processor and a Virtex FPGA.

Both of us in the group have experience using VHDL from the classes we took at the University of Florida. These classes include Digital Logic, Digital Design, and Reconfigurable computing. In addition, Travis' research is focused on the performance analysis of FPGAs.

Scope of Work

The scope of work for our project includes all of the planning, designing, execution, and implementation of the LZW compression/decompression algorithm, where the LZW compression is done in hardware and the decompression is done in software. We will be responsible for adjusting our project per the feedback we receive. Each stage of our project will require approval to ensure we are fulfilling the requirements as we progress through our project.

Period of Performance

The period of performance for this LZW compression/decompression project is one semester, beginning on 1/30/17 when we gave our initial presentation, and ending on 4/17/17 when we give our final demo and presentation.

Place of Performance

Our group will perform the majority of our work at our own facility or at our respective homes. All of the presentations and demonstrations will be conducted in class.

Work Requirements

As part of our project, we will be responsible for performing tasks throughout various stages of this project. The following is a list of these tasks which will result in the successful completion of this project:

Software Development phase

- Fully implement LZW compression in software using C as a standalone program
    - Read in a text file of uncompressed data and output a text file of compressed data
- Fully implement LZW decompression in software using C as a standalone program
    - Read in a text file of compressed data and output a text file of decompressed data
- Present this software fully functioning in a software demo presented in class

Hardware Development Phase

- Draw up functional block diagrams based on the implemented software
- Implement the LZW compressor in hardware on the ZedBoard's FPGA
    - Gets uncompressed data from a BRAM and outputs compressed data to a BRAM

Hardware/Software Integration Phase

- Implement the LZW decompressor in software on the ZedBoard's processor
    - Gets compressed data from a BRAM and outputs decompressed data to a BRAM
- Implement communication between the compressed data in BRAM from the hardware implementation of the LZW compression and the LZW decompression algorithm in software
- Present the final project with LZW compression performing in hardware on the ZedBoard and the LZW decompression performing in software on the ZedBoard in class in the form of a final presentation and demo

Presentations

- We will be responsible for five different presentations to demonstrate the work we have conducted:
    - Project overview
    - Software demo
    - Hardware/software partition and test plan
    - Baseline demo
    - Final presentation and demo

Schedule/Milestones

Below is a list of initial milestones identified for our project:

2/26 – Completed standalone software implementation of LZW compression and decompression
2/27 – Software demo in class
3/20 – HW/SW partition and test plan presentation
3/27 – Completed hardware implementation of LZW compression
4/2 – Completed software implementation of LZW decompression

4/3 – Baseline demo presentation
4/16 – Added additional features if time permits
4/17 – Final presentation and demo

Acceptance Criteria

Our project will be acceptable if it meets the requirement of the LZW compressor being fully implemented in hardware and the LZW compressor being fully implemented in software on the ZedBoard. During each stage of our project, the professor will provide feedback on how different aspects should be changed or improved. This feedback can alter the final acceptance criteria of our project but must be presented in a timely manner as to give us ample time to achieve it.