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CS 205 - HW 5
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Problem 1

Below is a breakdown of the GPU computation time into specific operations/kernels. The results are for reducing the given test image width by 30% (1200 pixels).
Energy Kernel Time: 1.928 s
Cumulative Energy Kernel Time: 133.965 s
Backtracing Kernel Time: 133.766 s
Cropping Kernel Time: 1.439 s
Data Transfer Time: 2.285 s
Total GPU Time: 273.383 s

The main performance bottlenecks are the cumulative energy map and backtracing kernels. These take about 100 times longer than any other step.

We implement the third step on the GPU rather than the CPU because it would take longer to transfer the data to the CPU than to just do the computation on the GPU. I have actually combined the kernels from the third and fourth steps.

Figure 1: 30% stretched-down image.

I decided to do a master-slave implementation for the video carving problem. The master passes to the slave the index of the frame that is to be carved, and the slave reads the image data directly from the video file. Of course, this means that we are wasting the GPU connected to the master. Since the location of the carved pixels change from frame to frame, the carved video looks funny. As a customer, I would be happier if Warner Bros. just cropped the sides :) I haven't been able to get my program to run on 12 GPU's since the cluster was so busy. The most I got was 8 GPU's, and the runtime for that was 957 seconds to reduce the video 30% (322 pixels).