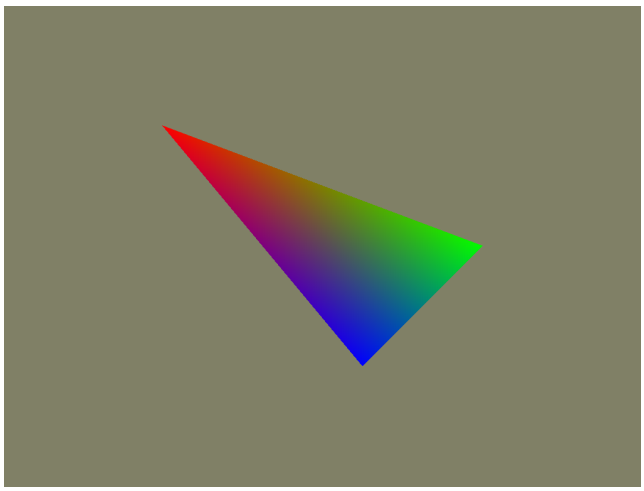
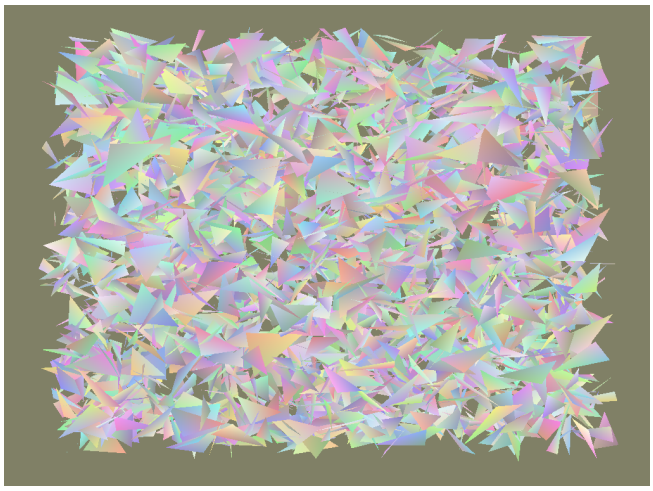
# CPSC 8220 Project 1 - Device Driver - January 31, 2017

You are to write a device driver for the Kyouko3 PCIe graphics card that resides in each of the virtual Linux machines on the corsi and epyon systems. The device driver should be built as a kernel module and should be structured so that the card appears as a character device (major 500, minor 127) accessible through system calls open(), close(), mmap() and ioctl(). The driver must deliver sufficient capability to the user level to enable the user to draw smooth-shaded triangles. Further, the driver must provide this capability in two ways:

1. It must enable drawing of single triangles directly, through the FIFO facility, using memory-mapped control registers, where the memory-mapping is invoked by a user-level system call to mmap(). Here is example output:



2. It must enable drawing of large numbers of triangles indirectly, through the DMA facility, using driver-allocated DMA buffers that have been memory-mapped to user space. Here is example output:



For the latter, DMA completion interrupt handling must be included (no polling), and the driver must be SMP safe.

The driver may contain at most one .c file and one .h file. Complete card specifications are available on the web page: http://www.cs.clemson.edu/ geist/classdata.html

Team Structure

This is a team project with five teams. The team captains are as follows:

- team 1 - captain Shiqi Ai
- team A - captain Prateeksreedhar Bharadwaj
- team eXtreme - captain Matthew Pfister
- team gold medal - Ashrit Shetty
- team blue ribbon - captain ZongMing Yang

Non-captains: you may join any team you like. Give the captain your contact information today. If you do not request to join any team, you will be assigned to a randomly selected team.

Captains: team lists, are due (to me) February 2 by 5:00pm. Email team lists to geist@g.clemson.edu. There is a natural division of labor between kernel code and user code. Both parts are challenging. Decide who is responsible for each on your team. A binary driver will be available so that development of user code can proceed in parallel with development of kernel code.

NO INFORMATION IS TO BE SHARED BETWEEN OR AMONG TEAMS. Do not solicit information on this project from anyone. Do not discuss the project with anyone except your teammates, and your lab TA, Aubrey Lawson. The project is due March 2. Turn in hard copy of your source code, signed by all team members, and email an electronic version, as a single .tar file attachment, to geist@g.clemson.edu.