

# **Supreet Pal Singh**

EVoC Student - Nouveau

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# **EVoC Project**

Implementing a Software Scripting Engine on Fermi architecture based NVIDIA GPUs to achieve safe memory reclocking.

# How did I get to this?

1. Web Developer
2. KDE contributor
3. No clue about X development

# The path

- Onsite internships
  - Mozilla
  - Google
  - Apple
- GSoC deadline crossed

# Two options

1. Android App Development
2. Nouveau

# The Project

- Buying a new GPU - First NVIDIA card
- Fermi and Kepler
- Fermi memory reclocking

# **The problem with Fermi**

# **nv50**

laptops -> reclock memory and engines.

- Save power
- Default clock speed : Medium

## **nva3 :**

- load based reclocking
- Default clock speed : 1/3 to 1/2
- Low performance on Nouveau

# FERMI

- Default clock speed : 10%!!
- Miserable performance

# Process of Reclocking

- nv50 style
- Put card off the bus
- wait and write MMIO registers

# The main issue

- nv50 used HWSQ ( HardWare SeQuencer)
- HWSQ removed on Fermi
- Replaced by PDAEMON

# PDAEMON

- Full access to the registers
- Capable of IRQs
- Used for Hardware monitoring and Reclocking
- ISA: F $\mu$ C (flexible microcode)

# Open-Source PDAEMON

- Work done by Martin Peres ~mupuf
  - Host -> PDAEMON Communication
  - Fan Management
  - Works on nva3 to nvd9
  - Should work on Kepler

# **My Proposed Work**

1. PDAEMON -> Host Communication
2. HWSQ replacement
3. Documentation

# PDAEMON -> Host

- Ring Buffer
  - \*GET / \*PUT
  - \*PUT writes
  - \*GET reads
- Each process sends 4 params
  1. Process Id
  2. Message Id
  3. Payload Size
  4. Payload pointer

# Basic checks

- Stop writing if buffer not read
- Stop reading if buffer empty
- Do not read if writing not complete
- Write if reading not complete
- Wrap around

# Status

- PDAEMON -> HOST
  - TESTED
  - MERGED

# Fermi Scripting Engine (FSE)

- HWSQ replacement
- Capable of memory reclocking

# FSE Implementation Process

1. Understanding HWSQ
2. Designing the ISA
3. Implementing it in F $\mu$ C

# FSE Design

1. Full range Delay
2. Short range Delay
3. MMIO write
4. MMIO mask
5. MMIO wait
6. PDAEMON -> HOST message

# Delay Implementation

- Short range:
  - 16bit Nano seconds
  - 16bit Micro Seconds
- Full range
  - 64bit Nano seconds

- **Write**
  - 8bit and 32bit
- **Mask**
- **Wait**

# Send\_msg

- Hooks up with PDAEMON->Host
- Takes two params
  - SIZE
  - MESSAGE

# Unexpected Hurdle

- Planned demo for XDC
- Unaligned memory access
- Implemented Id\_32 , Id\_16 and Id\_08

# Current Status

- Most of it tested and working
- Send\_msg needs to support "msg\_id"
- Send\_msg needs pass testing

# Documentation

1. Blogpost introducing Nouveau basics
2. Complete EVoC documentation on blog
3. Intro.txt by mwk in envytools
4. **More Documentation for Newbies!**  
// Beginner's Guide to KDE Development

# Wrap Up

1. PDAEMON -> HOST :success
2. FSE : send\_msg testing left
3. Documentation - Intro.txt & blogpost

# EVoC

- Endless Vacation of Code
- Propose a 13 week (3 Month) Project
- \$5000
  - \$1000 upfront
  - \$2000 mid-term
  - \$2000 completion
- Can start anytime

# EVoC suggestions

- Flexibility == Good
- Need more specific rules != Refer GSoC
- Selection completely on Mentor
- PreRequisites on Wiki
- Open Mentors listed on Wiki

# Thoughts on proposition by Martin

- Patch requirement compulsory?
- Limit a student to 2 EVoCs? NO?!
- Limit a student to 1EvoC/year? Yes.
- Upfront payment low? Yes.
- 3 Month engagement before project? No!

1. **Something for Mentors?**
2. **PUBLICIZE!**

# Links

1. <https://gitorious.org/pdaemon>
2. [supreetpal.blogspot.com](http://supreetpal.blogspot.com)
3. IRC nick: supreet
4. Email : supreetpal@gmail.com