Processing Unit

next-Generation Googol Giga-hz
General Graphics Processing Unit

Feiyu Ren
Lichen Liu
Lin Sun

Motivation

- Alice likes video editing.
- Bob likes machine learning.
- They need a graphics card to be productive.

- Only need to share one graphics card.
  - Plug and Unplug? (Inconvenient)
  - External Graphics Card Dock? (Expansive)
  - What can we do for them?

Our Solution

GGGGG Processing Unit

- next-Generation Googol Giga-hz General Graphics Processing Unit
- Consumer-oriented Cloud computation service
  - But!
  - Not located in service provider’s data center.
  - Located close to the user, in household or in the apartment building.
  - “Fog” computation service.

Overview

- Cloud Computing Services Provider
  - General Graphics Processor
  - Vertex Shader, Pixel Shader
- Cloud Computing Services Client
  - VGA Output

Internet of Things (IoT)

- Host board and Client board

- Host
  - Computational Power
- Client
  - Terminal for User Interaction
  - Multiple Clients Support

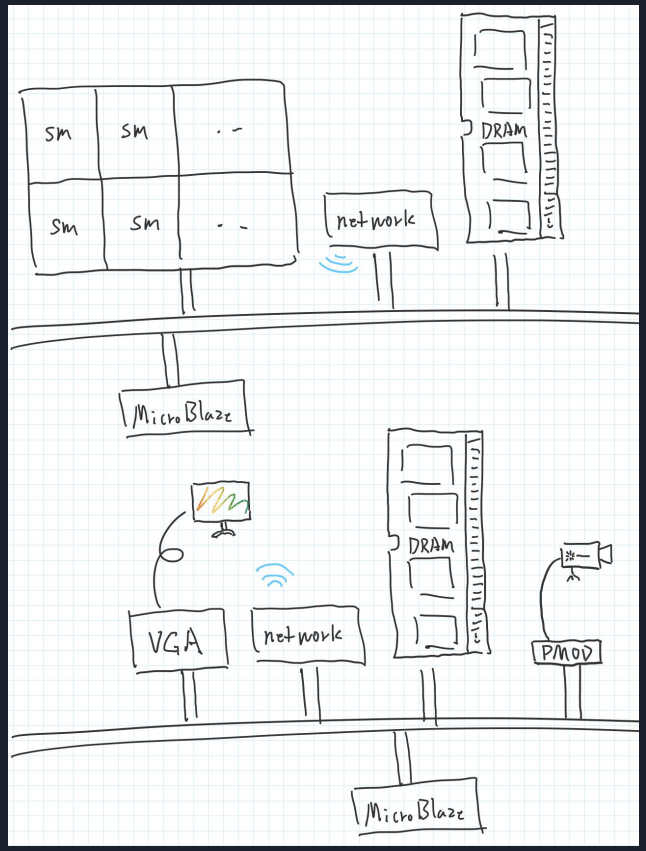
GGGGG Processing Unit

Host

- DRAM
- General Purpose Graphics Processor
- Ethernet

Client

- Ethernet
- Display



Functional Block Diagram

How to Implement GGGGG Processing Unit?

Functional Specifications

- Integer ALU
- Floating Point Calculation
- Special Operations Lookup (e.g. trigonometry)

Major Milestones

1. Networking Layer
2. VGA
3. General Purpose Processor
4. Vertex Shader
5. Pixel Shader
6. Host/Client Integration
7. Final Demo

Testing Plan - Path to Success

Hardware

- Testbench
- MyHDL Simulation

Software

- Python Functionality Prototype

Obstacles Ahead - Uncertainties

Resource

- How many General Purpose Processor can we fit

Hardware

- Ethernet Bandwidth
- Display Resolution

Obstacles Ahead - Risks

Resource

- Limited on-board Resource
  - Aiming for slower computation
  - Leverage multiple boards (decentralized computing)

Hardware

- Limited Network Bandwidth
  - Lower frame rate or resolution

Questions?