Multi-GPU Graph Analytics

Yuechao Pan, Yangzihao Wang, Yuduo Wu, Carl Yang and John D. Owens, University of California, Davis
{ychpan, yzhwang, yudwu, ctcyang, jowens}@ucdavis.edu

Introduction - about Gunrock

Gunrock is a multi-GPU graph processing library, which targets at:

- **High performance** analytics of large graphs
- **Low programming complexity** in implementing parallel graph algorithms on GPUs

Homepage: [http://gunrock.github.io](http://gunrock.github.io)
The copyright of Gunrock is owned by The Regents of the University of California, 2015. All source code are released under Apache 2.0.

Programming Model

Graph algorithm as a data-centric process
Frontier: compact queue of nodes or edges

**Generation**
- `Advance`: visit neighbor lists
- `Filter`: select and reorganize

**Operation**
- `Compute`: per-element computation kernels in parallel
  - can be combined with advance or filter

**Samples**
- `Graph traversal`
- `Graph partition`

Future Work

- **performance analysis and optimization**
- **extending Gunrock onto multiple nodes**
- **asynchronized graph algorithms**
- **2D partitioning**
- **Fixed partitioning**
- **more algorithms**

Multi-GPU Framework

**Input graph**

**Partition**

**Decomposed table**

**Sub-grahs**

**Output sub-frontier**

**Full-subfrontier**

**GPU**

**Yuechao Gunrock yychpan**

Remote V

2-id

Remote -id

Legend:

- `•`
- `•`
- `•`
- `•`

Acknowledgements

The GPU hardware and cluster access was provided by NVIDIA. This work was funded by the DARPA XDATA program under AFRL Contract FA8750-12-C-0082 and by NSF awards CCF-1017969 and OCI-10163.

References


This work was funded by the DARPA XDATA program under AFRL Contract FA8750-12-C-0082 and by NSF awards CCF-1017969 and OCI-10163.