Data Classification Hardware Acceleration

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Speed
Speed?
Speed?
Speed?
Speed?
Hardware
Cores

Who has access to 1000+ cores?

Google

you
Purpose of GPU

General Purpose computation on GPU
How to use GPGPU

OpenCL

- Cross platform
- Multi vendor
- C kernel
- Languages:
  - C/C++
  - .NET
  - Java
  - Ruby
  - Python

Direct Compute

- Cross platform
- NVIDIA
- C/C++ kernel
- Languages:
  - C/C++
  - .NET
  - Java
  - Fortran
  - Perl
  - Python

- Windows
- Multi vendor
- HLSL kernel
- Languages:
  - C++
  - C++ AMP
  - .NET
# Kernel code

```c
__kernel void CalculateKGramms(
    unsigned int kFactor,
    unsigned int wFactor,
    unsigned int overlappingSize,
    __global unsigned char* data,
    unsigned int dataSize,
    __global unsigned int* outHashes)
{
    size_t globalIndex = get_group_id(0) * (get_local_size(0) - overlappingSize) + get_local_id(0);
    size_t localId = get_local_id(0);

    __local unsigned int buffer1[SHARED_BUFFER_SIZE];
    __local unsigned int buffer2[SHARED_BUFFER_SIZE];
    if (globalIndex < dataSize)
    {
        buffer1[localId] = data[globalIndex];
    }
    barrier(CLK_LOCAL_MEM_FENCE);

    if (globalIndex < (dataSize - kFactor + 1) && localId < (SHARED_BUFFER_SIZE - kFactor + 1))
    {
        unsigned int crc32 = \0;
        for (int i = \0; i < kFactor; ++i)
        {
            unsigned char idx = (unsigned char)crc32 ^ (unsigned char)buffer1[localId + i];
            int c = g_deviceCrcPolynomialMap[idx];
            crc32 = crc32 >> 8;
            crc32 = crc32 ^ c;
        }
        buffer2[localId] = crc32;
    }
    barrier(CLK_LOCAL_MEM_FENCE);
}
```
Using of Hardware Acceleration
Using of Hardware Acceleration
Research
Hardware

CPU

- Intel Core i5 – 750
- 2.66 GHz
- 4 cores
- DDR3:
  - 667 MHz
  - 12 Gb/s

GPU

- NVIDIA GeForce GTS 450
- 1.6 GHz
- 192 cores
- GDDR5:
  - 1.8 GHz
  - 58 Gb/s
Fingerprinting
D.4.14 Glossary

Most of the coastal engineering terms in this glossary are from the Shore Protection Manual (USACE, 1984) and Coastal Engineering Manual (USACE, 2002) and are supplemented with additional terms relevant to hazard mapping. FEMA has an extensive glossary posted on the FEMA website at <http://www.fema.gov/fhmi/dl_cshim> Glossary.

ACCENSION May be either natural or artificial. Natural accretion is the buildup of land, solely by the action of the forces of nature, on a beach by deposition of water- or airborne material. Artificial accretion is a similar buildup of land by reason of an act of man, such as the accretion formed by a GROIN, BREAKWATER, or beach fill deposited by mechanical means. Also AGGRADATION.

ADJUSTABLE A GROIN whose permeability can be changed, usually with gates or removable sections.

ADVANCE (of a beach) (1) A continuing seaward movement of the shoreline. (2) A net seaward movement of the shoreline over a specified time. Also PROGRESSION.

AEOLIAN See EOLIAN.

ALIGNMENT The course along which the center line of a channel, canal, or drain is located.

ALLUVIAL DEPOSITS Detrital material which is transported by a river and deposited B usually temporarily B at points along the flood plain of a river. Commonly composed of sands and gravels.

ALLUVIAL PLANE A plain bordering a river, formed by the deposition of material eroded from areas of higher elevation.

ALLUVIUM Soil (sand, mud, or similar detrital material) deposited by streams, or the deposits formed.

ALONGSHORE Parallel to and near the shoreline: LONGSHORE.
Fingerprinting

100 Kb

100 000 hashes
Fingerprinting

2x faster
Fingerprinting

CPU is better

GPU is better

2x
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What is the performance boost?
What is the performance boost?

10+ times
GPU is better

10X
Epilogue
Summary

Fingerprints search 2x

Keywords search 10x
We can do it!
Data Classification Hardware Acceleration

Thank you!

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