OSDsim – a Simulation and Design Platform of an Object-Based Storage Device

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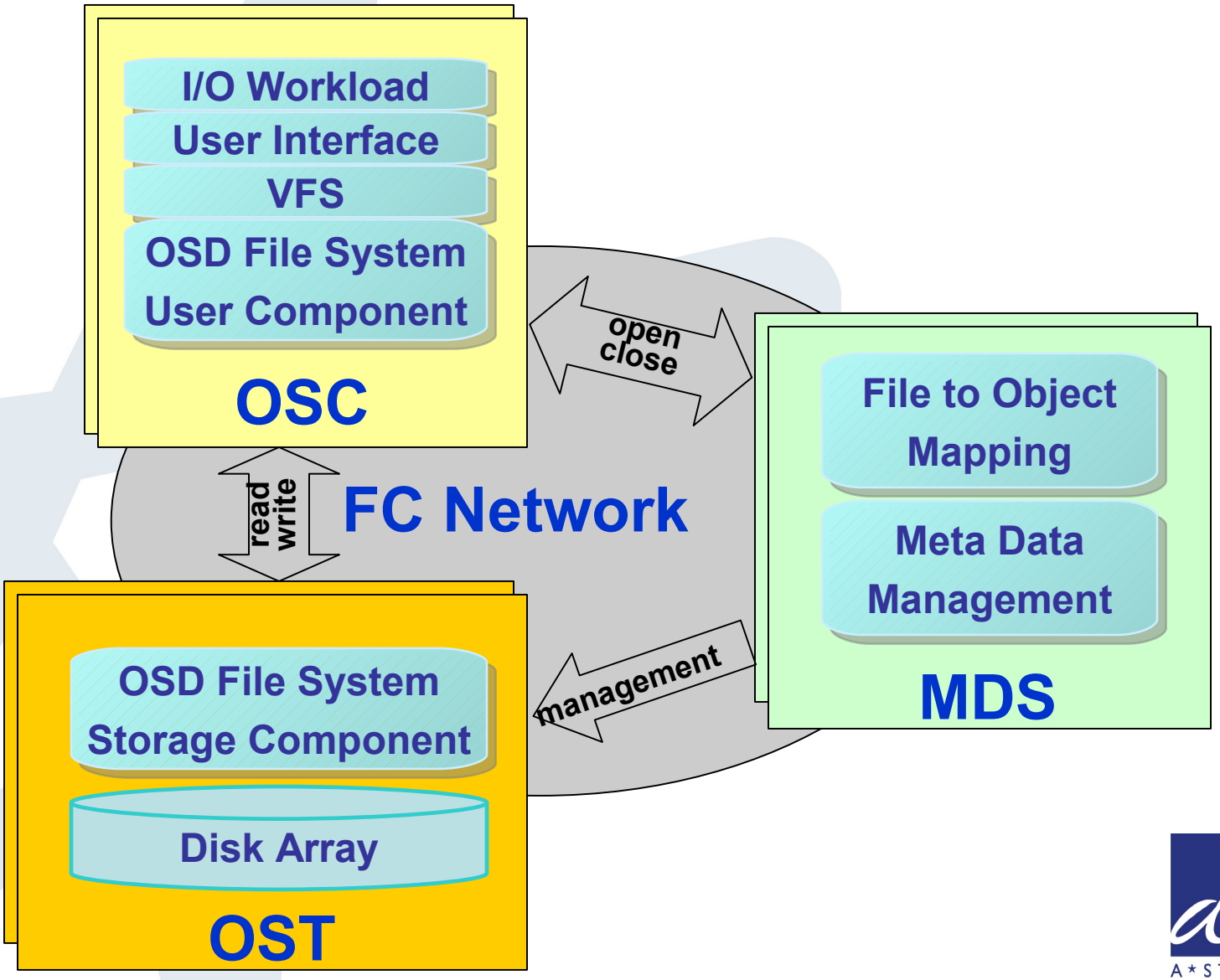
Outline

2. Introduction
3. OSDsim Design, Implementation and Validation
4. Simulation & Analysis

Simulation Structure



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Implementation

- OSDFS Storage Component Sub Module
  - Adaptive Extents-based File System for Object-based Storage
- Disk Drive Sub Module
  - Extract SCSI Disk Drive Parameters experimentally

Disk Drive Sub-module

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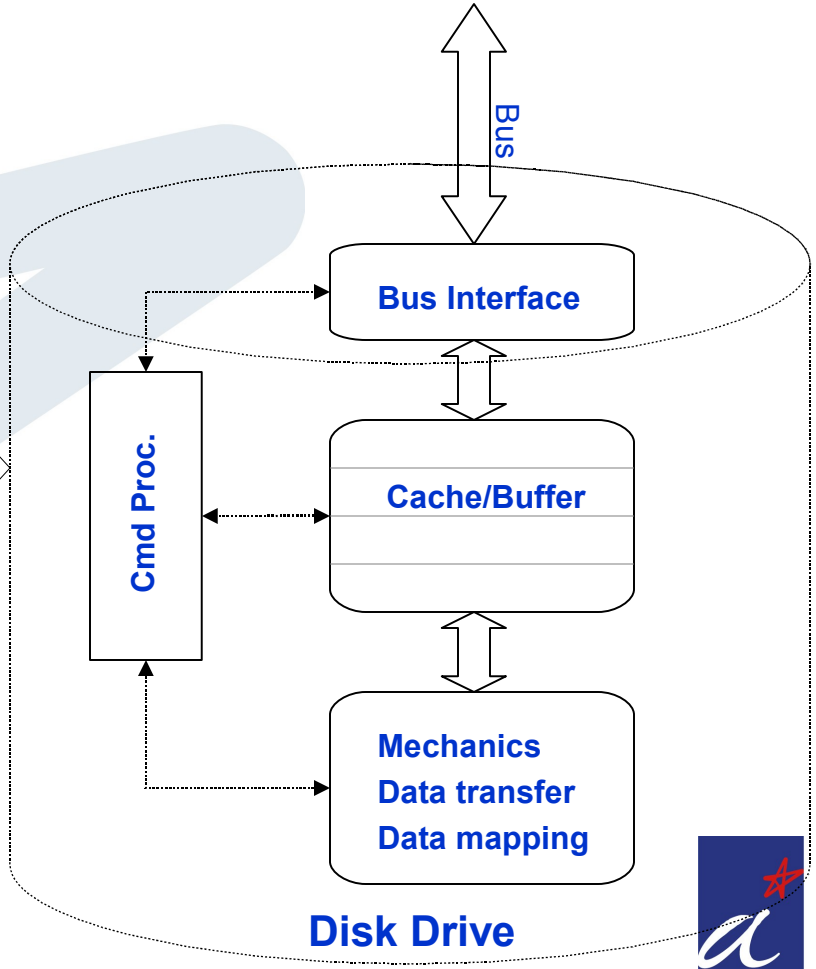
```
Access time (in msecs):          -2.0
Seek time (in msecs):            -5.0
Single cylinder seek time:        0.594584
Full strobe seek time:           16.286
Head switch time:                0.645476
Add. write settling delay:                  0.1
Rotation speed (in rpms):         7200
Number of data surfaces:          2
LBN-to-PBN mapping scheme:             1
Number of bands:                 11
Band #1
First cylinder number:           0
Last cylinder number:             4553
Skew for track switch:           58.000000
.....
```



* This picture is from the web site as follow:
http://www.streetprices.com/Electronics/Computer_Hardware_PC/Disks/SCSI/18GB/SP389763.html

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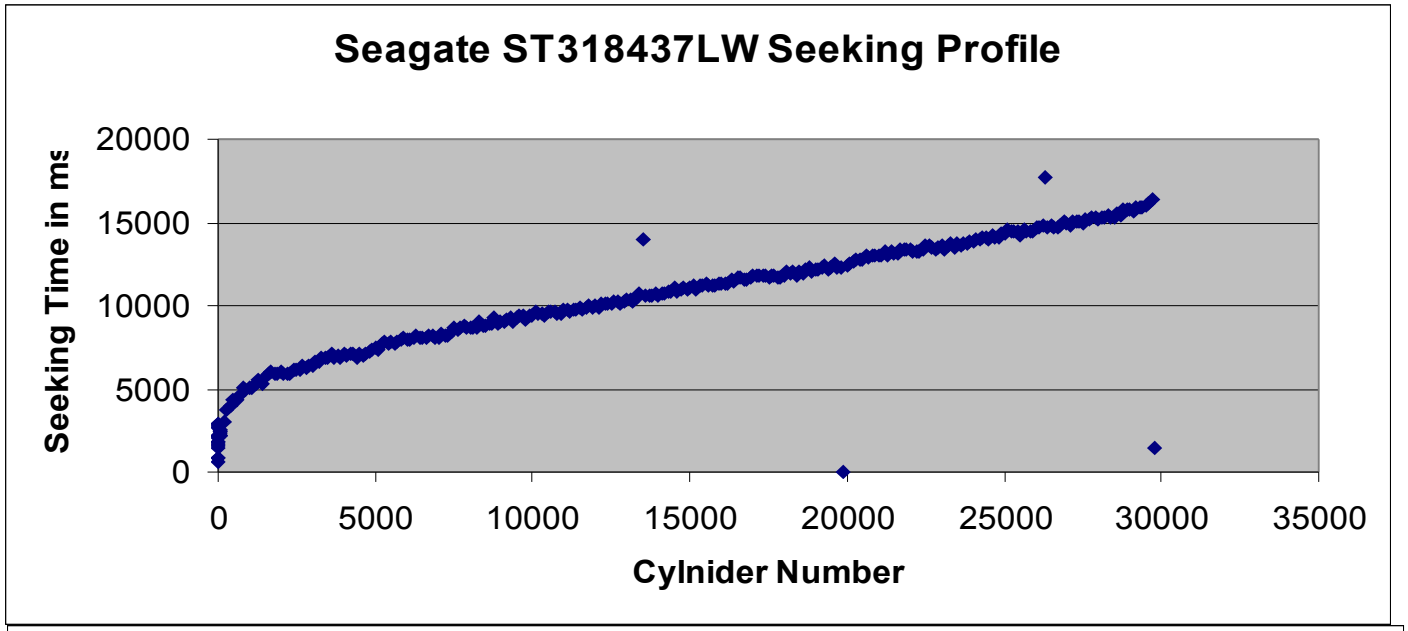
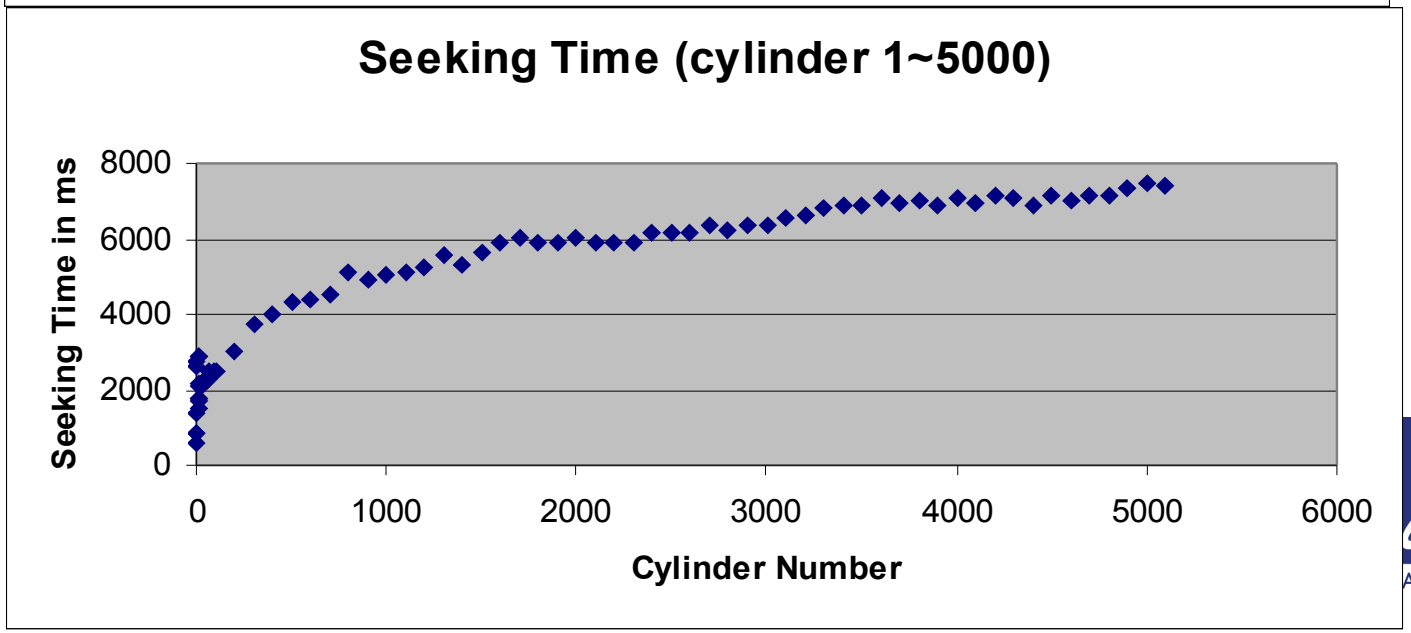
Seek Profile





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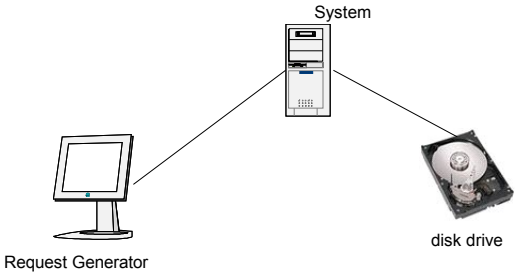
Simulation Validation

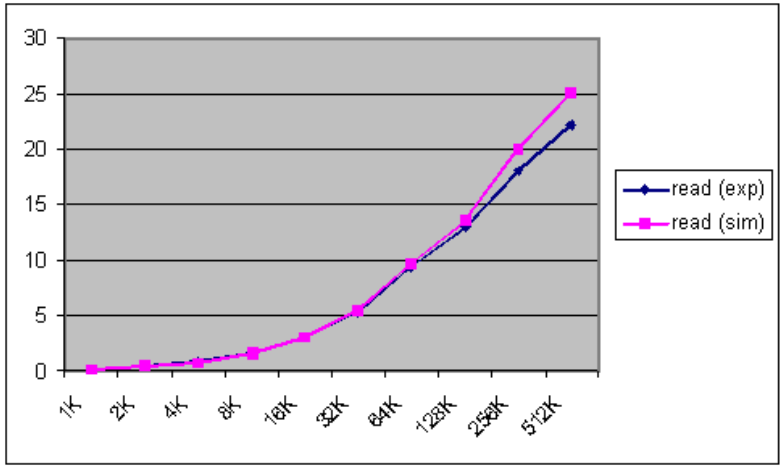


Processor: 1 GHZ PENTIUM III

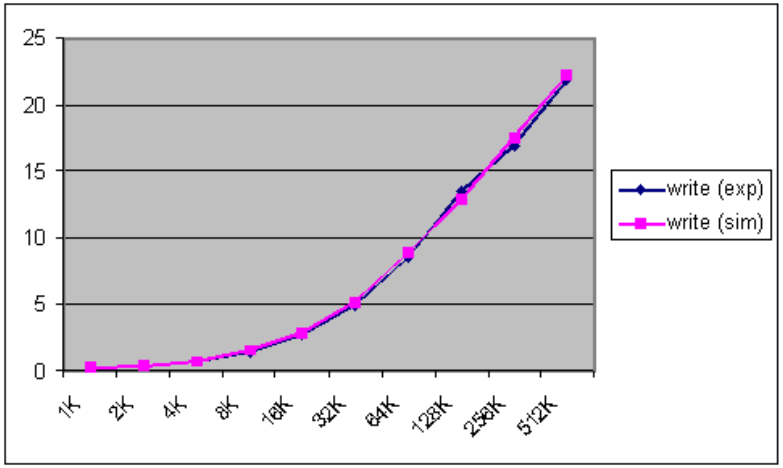
OS Red Hat 9 Linux

Kernel Ver. 2.4.20

Disk drive: Seagate ST318437LW SCSI



Read Performance



Write Performance

Write error within 5%

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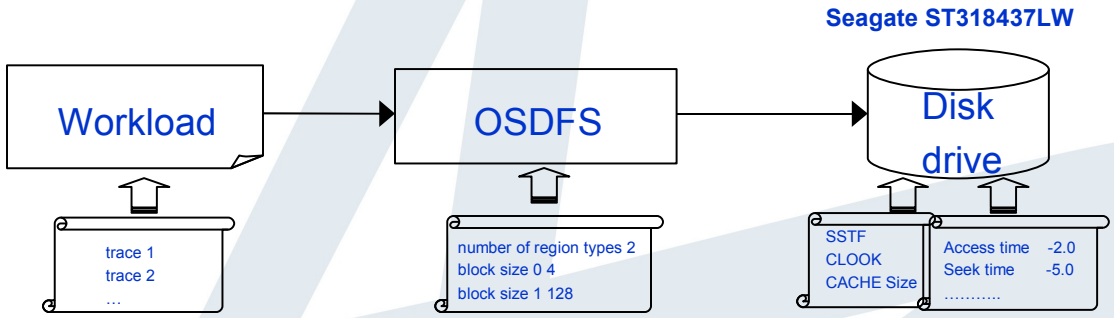
Simulation Analysis

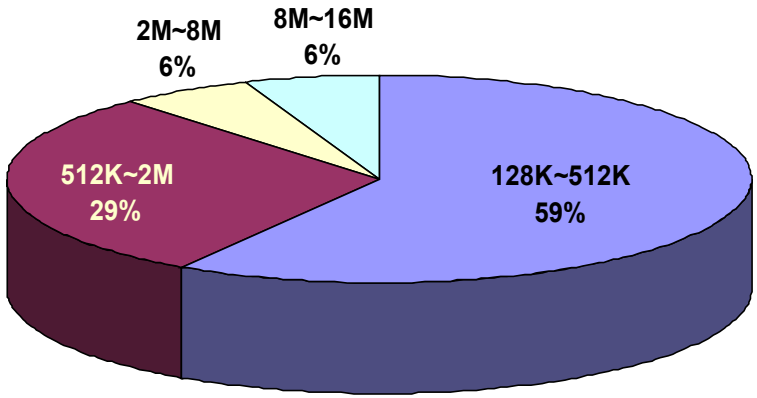
- Simulation Architecture



- Assumption

1. 1 file to 1 object mapping
2. Enough cache for boot sector (56.5K)
3. Enough cache for region head and bit map (128.5K per region type)
4. Performance is only based on write request object data executed on Step 4

- Workload Distribution



Request Size Distribution

- Request Execution Sequence

1. Format disk
2. Write object data (one object occupy one data unit till available disk space is full
3. Delete object data (delete all the even number of data units written)
4. Write request object data (size distribution follow distribution pattern on the left)

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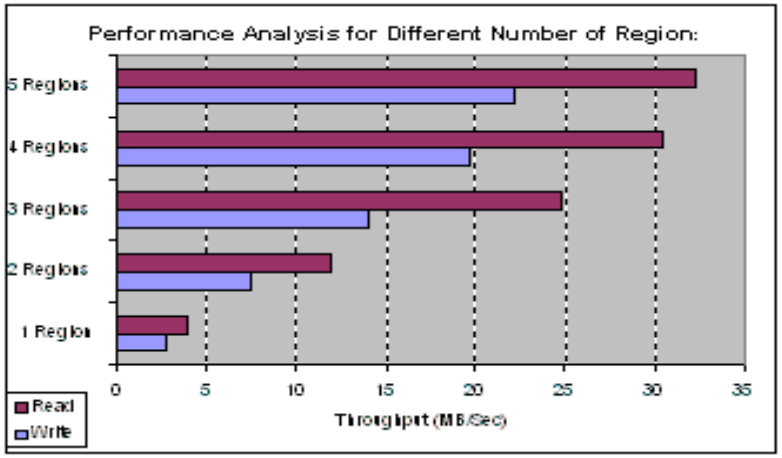
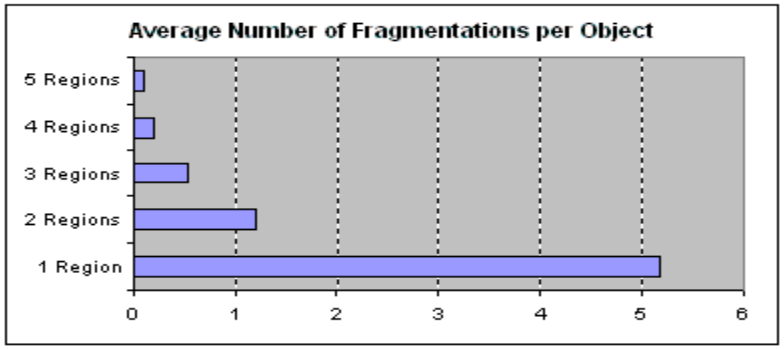
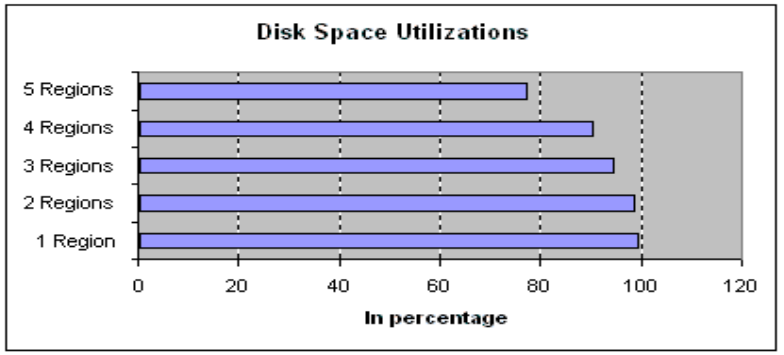
Simulation Analysis



No. of regions	Size of data unit (KB)
1	4
2	4, 128
3	4, 128, 512,
4	4, 128, 512, 2048
5	4, 128, 512, 2048, 8196





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Thank you

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