Parallel Graph Reduce Algorithm for Scalable Filesystem Structure Determination

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Overview

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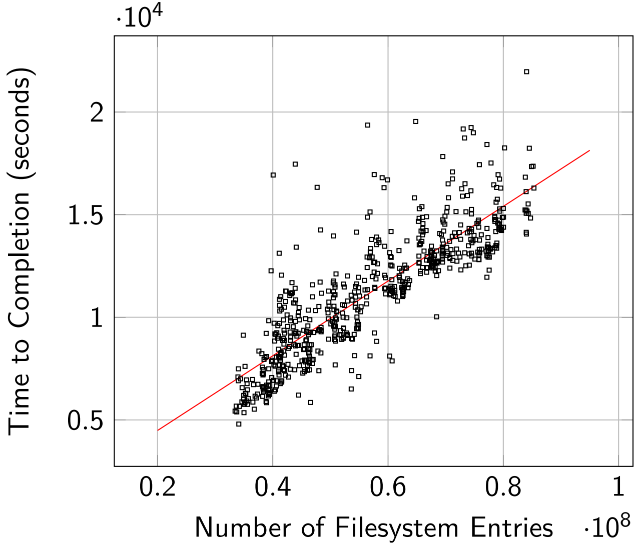
    - Build filesystem paths
    - Substantial filesystem I/O
- **Project objective–design scalable algorithm**
    - Reduce filesystem access
    - Utilize Hadoop parallel framework

Project Motivation



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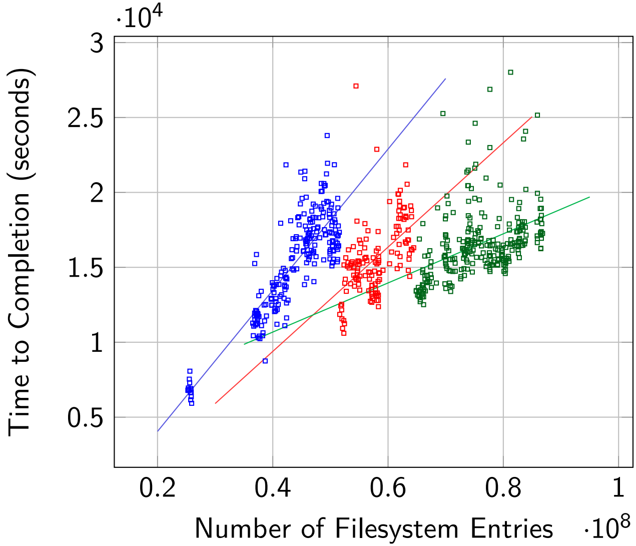

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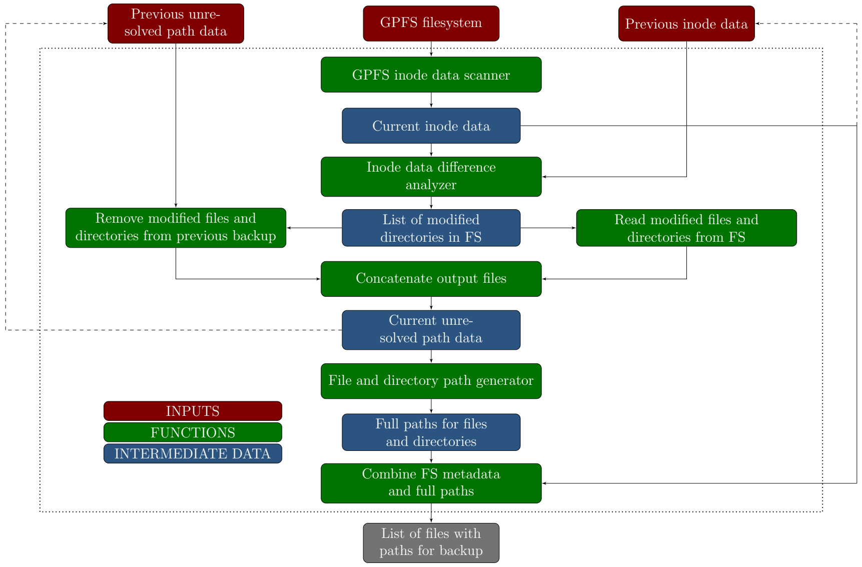
Algorithm Overview



Previous unresolved path data
GPFS filesystem
Previous inode data
GPFS inode data scanner
Current inode data
Inode data difference analyzer
Remove modified files and directories from previous backup
List of modified directories in FS
Read modified files and directories from FS
Concatenate output files
Current unresolved path data
File and directory path generator
INPUTS
FUNCTIONS
INTERMEDIATE DATA
Full paths for files and directories
Combine FS metadata and full paths
List of files with paths for backup

Algorithm Design

Algorithm 1 Path Generator Reducer

```
input: partitioned_mapper_output, filesystem_mount
 1: children_parent ← null
 2: for inode in partitioned_mapper_output do
 3:     if inode_flag is true then
 4:         children_parent ← inode_parent
 5:     else
 6:         inode_parent ← children_parent
 7:         write inode
 8:         if children_parent is not filesystem_mount then
 9:             report iterated_algorithm
10:         end if
11:     end if
12: end for
```

Algorithm Example

root/
parent/
child.txt

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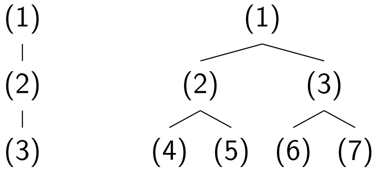
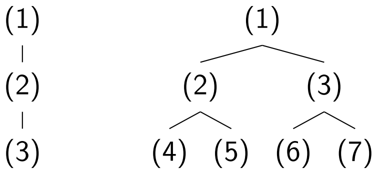
Performance Metrics



Performance Metrics

- Measuring success



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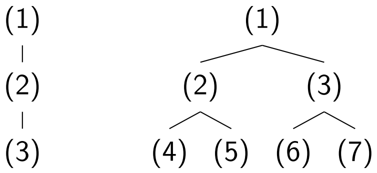

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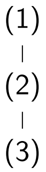

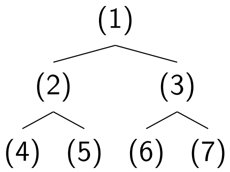

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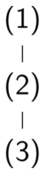

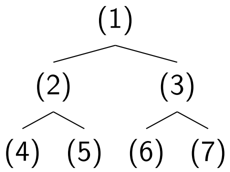

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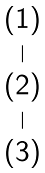

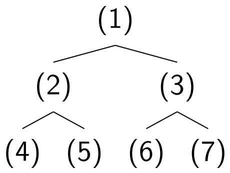

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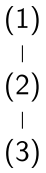

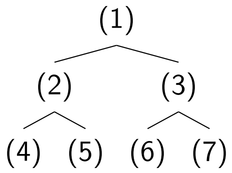

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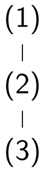

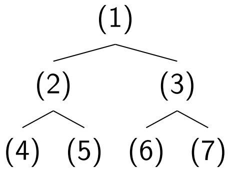

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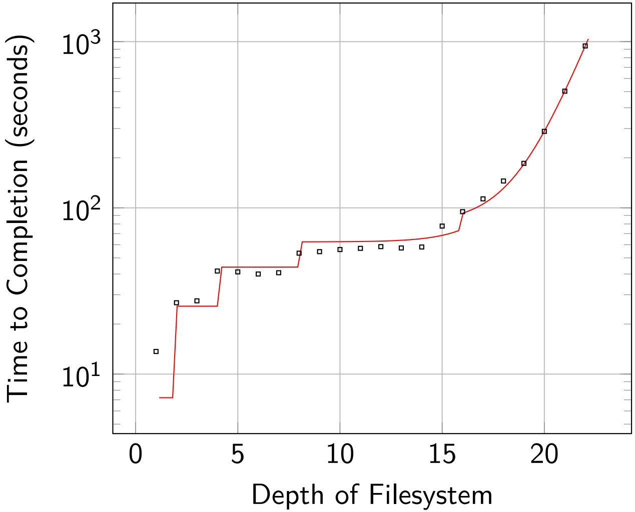

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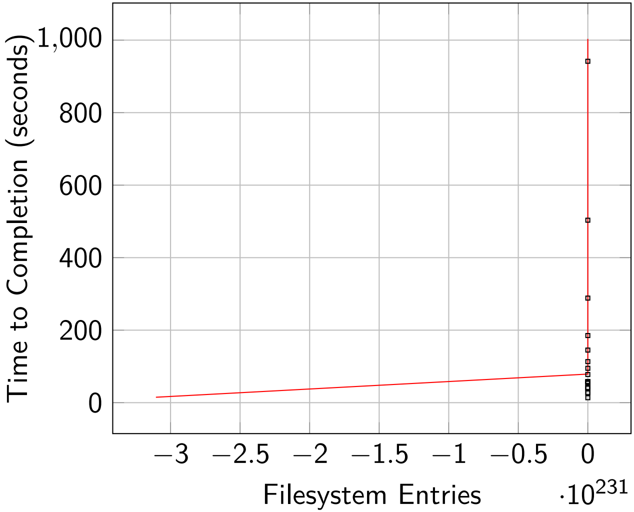
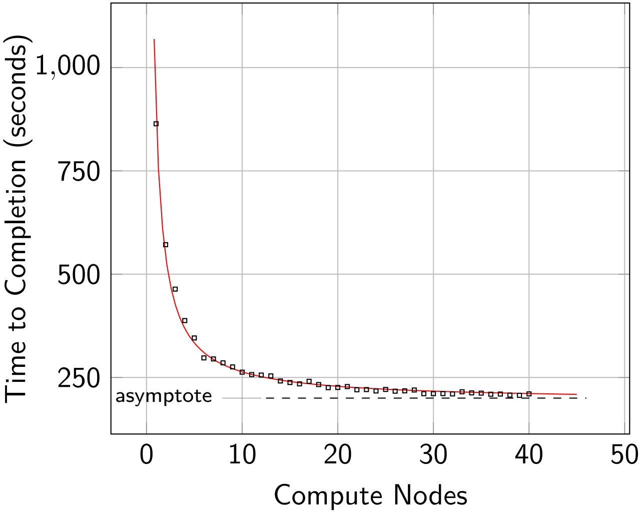


Algorithm Scaling



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- User interference
  - Minimal filesystem access

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- Hama implementation of File Path Generator

Acknowledgements

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