

Homework 1: Java Pathfinder

<http://d3s.mff.cuni.cz>

Department of
Distributed and
Dependable
Systems



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faculty of mathematics and physics

Daisy file system

- Simple **concurrent** file system written in Java
- http://d3s.mff.cuni.cz/teaching/program_analysis_verification/files/daisyfs.zip
- Content
 - File `daisy.txt`
 - Very short description
 - Relevant operations
 - Source code
 - `DaisyTest.java`: a sequential test driver

Task 1

- Implement custom properties for Daisy FS
 - Precondition for `DaisyDir.creat` should hold on every invocation of the method

```
// dir != fh && dir != null && fh != null
int creat(FileHandler dir, byte[] name, FileHandle fh)
```
 - Correct lock order
 - acquire: `LockManager.acq(lockno)`
 - release: `LockManager.rel(lockno)`
 - For each `lockno`, the calls to methods `acq` and `rel` should strictly alternate in each thread

Task 2

- Create artificial environment for Daisy FS
 - Goal: find as many bugs in the code as possible with reasonable effort
 - Look for concurrency errors (races, deadlocks)
 - Make sure that all important use cases are tested
 - creating a new directory, reading from a file, writing to a file, removing files, etc
 - The class `DaisyTest` uses only a single thread

Concurrency benchmarks

- Elevator

- http://d3s.mff.cuni.cz/teaching/program_analysis_verification/files/elevator.zip

- Replicated Workers

- http://d3s.mff.cuni.cz/teaching/program_analysis_verification/files/repworkers.zip

Task 3

- Detecting concurrency errors in Elevator and Replicated Workers
- Find the best possible configuration of JPF
 - Criteria: explored thread choices, speed, memory

Task 4

- Document your solution
 - **What** you did and **why** you did it
 - Which approaches did not work

- Listeners

- `gov.nasa.jpfd.listener.CallMonitor`
- `gov.nasa.jpfd.listener.VarTracker`

- Configuration

- `jpfd.properties`

- Do not forget to set the available memory to a reasonable value (512 MB, 1 GB)

- Command-line argument: `java -Xmx1024m`

Organization

- Deadline: **4.4.2019**
- Submission
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