Parabench DKRZ-Workload

DKRZ

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The executed pattern "system-load" of Parabench is designed to simulate concurrent access to small files. This pattern aims to create a deterministic pattern able to overwhelm existing caches. It consists of three phases: precreation, load and cleanup. During the precreation phase the directory structure is created, each process generates its own directory labeled with its rank with D subdirectories, each leaf directory is populated with P files. The directory structure is illustrated in Fig. 1. In the load phase each process reads a number of N files in D directories created by other ranks in FIFO order and creates N new files (the rank offset is set by parameter O). In detail, during each iteration information about a file is queried with `stat()`, then the file is read and deleted, finally a new file is created. The execution order of a single run and Rank 0 is illustrated in Fig. 2a. This pattern leads to a situation in which files of each directory created by Rank 0 are shared between two processes – ranks accessing files are shown in Fig. 2b).

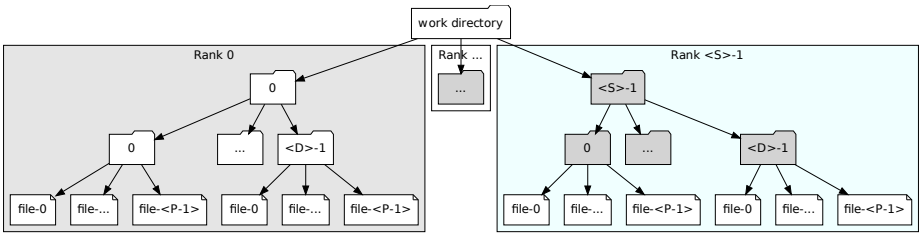
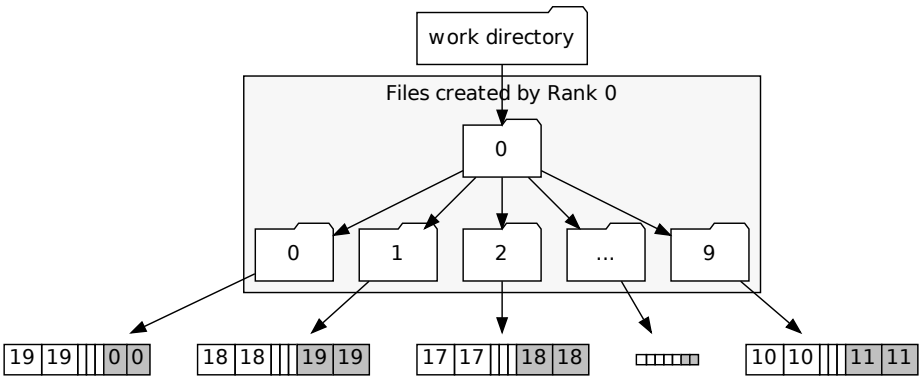


Figure 1: Directory structure and precreated files

Iteration	Accessed	Created
0	1/0/file-0	0/0/file-5
1	2/1/file-0	1/1/file-5
2	3/2/file-0	2/2/file-5
3	4/3/file-0	3/3/file-5
4	5/4/file-0	4/4/file-5
5	6/5/file-0	5/5/file-5
6	7/6/file-0	6/6/file-5
7	8/7/file-0	7/7/file-5
8	9/8/file-0	8/8/file-5
9	10/9/file-0	9/9/file-5
10	1/0/file-1	0/0/file-6
11	2/1/file-1	1/1/file-6
12	3/2/file-1	2/2/file-6
13	4/3/file-1	3/3/file-6
14	5/4/file-1	4/4/file-6
15	6/5/file-1	5/5/file-6
16	7/6/file-1	6/6/file-6
17	8/7/file-1	7/7/file-6
18	9/8/file-1	8/8/file-6
19	10/9/file-1	9/9/file-6

(a) Folders and files accessed by Rank 0 during execution (P=5, N=2, S=20, D=10, O=1)



(b) Ranks accessing files of the directory structured created by Rank 0 (P=5, N=2, S=20, D=10, O=1). Grey files are created during load

Figure 2: Parabench access pattern "system-load"