Homework for Week 13
(Due Date: Check Canvas)

1. Consider a very simple file system for a tiny disk. Each sector on the disk holds 2 integers, and all data blocks, indirect blocks, and inodes are 1 disk sector in size (each contains 2 integers). All Files stored on disk are interpreted as directories by the file system (there are no "data files"). The file system defines the layout for the following data types on disk:

   - inode = 1 pointer to a data block + 1 pointer to indirect block
   - indirect block = 2 pointers to data blocks
   - directory = a regular file containing zero or more pairs of integers; the first integer of each pair is a file name and the second is the file's inode number.

   The value "99" signifies a null pointer when referring to a disk block address or directory name. An empty directory has one disk block with the contents "99 99". The inode number for root directory "/" is 0.

   The following data is stored on the disk:

   inode array:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	7		8			3									
6	99		99			99									

   disk blocks:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	32		96			1	99	99		57					
	3		1			99	99	99		6					

   (a) How many entries can appear in a maximum-sized directory? (Each entry is a pair of integers)

   (b) List all directories stored on this disk (full path names) along with the names of the files stored in each directory)

   (c) Modify the above data structures to add an empty directory called "87" to directory "/".

2. [1] Describe the modifications to a <u>FFS</u> file system that would happen when a process requests the creation of a new file `/tmp/foo` and writes to that file sequentially until the file size reaches 20 KB. (This question is vague. Try the best you can.)

References

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[2] Deitel, Deitel, and Choffnes, *Operating Systems*, Pearson / Prentice Hall, 2004.

[3] A. S. Tanenbaum, *Modern Operating Systems*, Pearson / Prentice Hall, 2008.

[4] L. F. Bic, A. C. Shaw, *Operating Systems Principles*, Prentice Hall 2003.

[5] C. Crowley, *Operating Systems, A Design-Oriented Approach*, Irwin 1997.

[6] M. Herlihy, N. Shavit, *The Art of Multiprocessor Programming*, Elsevier, 2008