

# CS39002 OPERATING SYSTEMS LABORATORY

## SPRING 2025

### LAB ASSIGNMENT: 11

DATE: 09-APR-2025

## File system interface in Unix

In this assignment, you write a program `findall.c(pp)` that is a toy version of the Unix command `find`. You run the program with two arguments: a directory name `dname` (relative or absolute) and an extension `ext` (*without* the dot). The program will recursively search the entire directory subtree rooted at `dname`, for *regular* files whose names end with `.ext`. For each such file, print a serial number, the owner of the file, the size of the file (in bytes), and the complete path (absolute or relative) and name of the file. If some non-existent or unreadable directories are encountered during the search, just print error messages, and continue searching. Do not print any non-regular file with the given extension. Make recursive calls to subdirectories. But avoid recursing in to `./` and `../`.

In your code, use the file system interface of the GNU C library. Note that the owners of files are written in the FCB's as unsigned integers (these are unique system-wide user ID's). In order to convert that UID to the user's login ID, you need to read and process the file `/etc/passwd`. Open this file in an editor, and see how it is organized. Write a `UID → LOGINID` converter. Store the information in an array/hash (do not read `/etc/passwd` every time you need to convert a UID to a LOGINID).

Submit a single file `findall.c(pp)`.

### Sample Output

```
$ gcc -o findall -Wall findall.c
$ ./findall ~/os/prog txt
NO      : OWNER      SIZE      NAME
--      : ----      -
1       : foobar      146703    /home/foobar/os/prog/LA8/output2_avoid.txt
2       : foobar      102077    /home/foobar/os/prog/LA8/output2_allow.txt
3       : foobar      136745    /home/foobar/os/prog/LA8/output1_avoid.txt
4       : foobar      374       /home/foobar/os/prog/LA8/input1/thread10.txt
5       : foobar      328       /home/foobar/os/prog/LA8/input1/thread12.txt
6       : foobar      374       /home/foobar/os/prog/LA8/input1/thread11.txt
7       : foobar      36        /home/foobar/os/prog/LA8/input1/system.txt
8       : foobar      282       /home/foobar/os/prog/LA8/input1/thread17.txt
9       : foobar      282       /home/foobar/os/prog/LA8/input1/thread05.txt
10      : foobar      466       /home/foobar/os/prog/LA8/input1/thread04.txt
11      : foobar      512       /home/foobar/os/prog/LA8/input1/thread03.txt
12      : foobar      466       /home/foobar/os/prog/LA8/input1/thread16.txt
13      : foobar      420       /home/foobar/os/prog/LA8/input1/thread01.txt
14      : foobar      512       /home/foobar/os/prog/LA8/input1/thread19.txt
15      : foobar      466       /home/foobar/os/prog/LA8/input1/thread06.txt
16      : foobar      374       /home/foobar/os/prog/LA8/input1/thread09.txt
17      : foobar      282       /home/foobar/os/prog/LA8/input1/thread14.txt
18      : foobar      420       /home/foobar/os/prog/LA8/input1/thread02.txt
19      : foobar      512       /home/foobar/os/prog/LA8/input1/thread07.txt
20      : foobar      282       /home/foobar/os/prog/LA8/input1/thread00.txt
21      : foobar      466       /home/foobar/os/prog/LA8/input1/thread08.txt
22      : foobar      328       /home/foobar/os/prog/LA8/input1/thread18.txt
23      : foobar      420       /home/foobar/os/prog/LA8/input1/thread13.txt
24      : foobar      374       /home/foobar/os/prog/LA8/input1/thread15.txt
25      : foobar      374       /home/foobar/os/prog/LA8/input2/thread10.txt
26      : foobar      374       /home/foobar/os/prog/LA8/input2/thread12.txt
27      : foobar      328       /home/foobar/os/prog/LA8/input2/thread11.txt
28      : foobar      36        /home/foobar/os/prog/LA8/input2/system.txt
29      : foobar      420       /home/foobar/os/prog/LA8/input2/thread17.txt
30      : foobar      282       /home/foobar/os/prog/LA8/input2/thread05.txt
31      : foobar      374       /home/foobar/os/prog/LA8/input2/thread04.txt
32      : foobar      374       /home/foobar/os/prog/LA8/input2/thread03.txt
33      : foobar      466       /home/foobar/os/prog/LA8/input2/thread16.txt
34      : foobar      374       /home/foobar/os/prog/LA8/input2/thread01.txt
35      : foobar      512       /home/foobar/os/prog/LA8/input2/thread19.txt
36      : foobar      328       /home/foobar/os/prog/LA8/input2/thread06.txt
37      : foobar      466       /home/foobar/os/prog/LA8/input2/thread09.txt
38      : foobar      466       /home/foobar/os/prog/LA8/input2/thread14.txt
39      : foobar      328       /home/foobar/os/prog/LA8/input2/thread02.txt
40      : foobar      420       /home/foobar/os/prog/LA8/input2/thread07.txt
41      : foobar      420       /home/foobar/os/prog/LA8/input2/thread00.txt
42      : foobar      466       /home/foobar/os/prog/LA8/input2/thread08.txt
43      : foobar      282       /home/foobar/os/prog/LA8/input2/thread18.txt
44      : foobar      466       /home/foobar/os/prog/LA8/input2/thread13.txt
45      : foobar      374       /home/foobar/os/prog/LA8/input2/thread15.txt
46      : foobar      138489   /home/foobar/os/prog/LA8/output1_allow.txt
47      : foobar      66951     /home/foobar/os/prog/LA9/search.txt
48      : foobar      66951     /home/foobar/os/prog/LA9/sample/search.txt
49      : foobar      9652      /home/foobar/os/prog/LA9/sample/output.txt
```

```

50 : foobar 216676 /home/foobar/os/prog/LA9/sample/verboseoutput.txt
51 : foobar 654 /home/foobar/os/prog/LA6/resources.txt
52 : foobar 23482 /home/foobar/os/prog/LA6/sample/transcript_all.txt
53 : foobar 534 /home/foobar/os/prog/LA6/sample/customers.txt
54 : foobar 6120 /home/foobar/os/prog/LA6/sample/transcript2_waiter.txt
55 : foobar 10597 /home/foobar/os/prog/LA6/sample/transcript3_customer.txt
56 : foobar 6765 /home/foobar/os/prog/LA6/sample/transcript1_cook.txt
57 : foobar 563 /home/foobar/os/prog/LA6/customers.txt
58 : foobar 1763 /home/foobar/os/prog/LA3/input.txt
59 : foobar 160172 /home/foobar/os/prog/LA3/verbose_output.txt
60 : foobar 143 /home/foobar/os/prog/LA3/sample.txt
61 : foobar 5253 /home/foobar/os/prog/LA3/output.txt
62 : foobar 66951 /home/foobar/os/prog/LAA/search.txt
63 : foobar 66951 /home/foobar/os/prog/LAA/sample/search.txt
64 : foobar 15119 /home/foobar/os/prog/LAA/sample/output.txt
65 : foobar 5699948 /home/foobar/os/prog/LAA/sample/verboseoutput.txt
66 : foobar 1703 /home/foobar/os/prog/GL/LA2-GL.txt
67 : foobar 1916 /home/foobar/os/prog/GL/LA5-GL.txt
68 : foobar 8624 /home/foobar/os/prog/GL/LA7/sample.txt
69 : foobar 1244 /home/foobar/os/prog/GL/LA7/LA7-GL.txt
70 : foobar 563 /home/foobar/os/prog/GL/LA6/customers.txt
71 : foobar 22898 /home/foobar/os/prog/GL/LA6/output.txt
72 : foobar 1240 /home/foobar/os/prog/GL/LA6/LA6-GL.txt
73 : foobar 638783 /home/foobar/os/prog/GL/LA3/verbose_output.txt
74 : foobar 1790 /home/foobar/os/prog/GL/LA3/LA3_GL.txt
75 : foobar 24379 /home/foobar/os/prog/GL/LA3/output.txt
76 : foobar 8264 /home/foobar/os/prog/GL/LA3/proc.txt
77 : foobar 1605 /home/foobar/os/prog/GL/LA4-GL.txt
+++ 77 files match the extension txt
$ ./findall .. txt

```

NO	OWNER	SIZE	NAME
1	foobar	146703	../LA8/output2_avoid.txt
2	foobar	102077	../LA8/output2_allow.txt
3	foobar	136745	../LA8/output1_avoid.txt
4	foobar	374	../LA8/input1/thread10.txt
5	foobar	328	../LA8/input1/thread12.txt
6	foobar	374	../LA8/input1/thread11.txt
7	foobar	36	../LA8/input1/system.txt
8	foobar	282	../LA8/input1/thread17.txt
9	foobar	282	../LA8/input1/thread05.txt
10	foobar	466	../LA8/input1/thread04.txt
11	foobar	512	../LA8/input1/thread03.txt
12	foobar	466	../LA8/input1/thread16.txt
13	foobar	420	../LA8/input1/thread01.txt
14	foobar	512	../LA8/input1/thread19.txt
15	foobar	466	../LA8/input1/thread06.txt
16	foobar	374	../LA8/input1/thread09.txt
17	foobar	282	../LA8/input1/thread14.txt
18	foobar	420	../LA8/input1/thread02.txt
19	foobar	512	../LA8/input1/thread07.txt
20	foobar	282	../LA8/input1/thread00.txt
21	foobar	466	../LA8/input1/thread08.txt
22	foobar	328	../LA8/input1/thread18.txt
23	foobar	420	../LA8/input1/thread13.txt
24	foobar	374	../LA8/input1/thread15.txt
25	foobar	374	../LA8/input2/thread10.txt
26	foobar	374	../LA8/input2/thread12.txt
27	foobar	328	../LA8/input2/thread11.txt
28	foobar	36	../LA8/input2/system.txt
29	foobar	420	../LA8/input2/thread17.txt
30	foobar	282	../LA8/input2/thread05.txt
31	foobar	374	../LA8/input2/thread04.txt
32	foobar	374	../LA8/input2/thread03.txt
33	foobar	466	../LA8/input2/thread16.txt
34	foobar	374	../LA8/input2/thread01.txt
35	foobar	512	../LA8/input2/thread19.txt
36	foobar	328	../LA8/input2/thread06.txt
37	foobar	466	../LA8/input2/thread09.txt
38	foobar	466	../LA8/input2/thread14.txt
39	foobar	328	../LA8/input2/thread02.txt
40	foobar	420	../LA8/input2/thread07.txt
41	foobar	420	../LA8/input2/thread00.txt
42	foobar	466	../LA8/input2/thread08.txt
43	foobar	282	../LA8/input2/thread18.txt
44	foobar	466	../LA8/input2/thread13.txt
45	foobar	374	../LA8/input2/thread15.txt
46	foobar	138489	../LA8/output1_allow.txt
47	foobar	66951	../LA9/search.txt
48	foobar	66951	../LA9/sample/search.txt
49	foobar	9652	../LA9/sample/output.txt
50	foobar	216676	../LA9/sample/verboseoutput.txt
51	foobar	654	../LA6/resources.txt
52	foobar	23482	../LA6/sample/transcript_all.txt
53	foobar	534	../LA6/sample/customers.txt
54	foobar	6120	../LA6/sample/transcript2_waiter.txt
55	foobar	10597	../LA6/sample/transcript3_customer.txt
56	foobar	6765	../LA6/sample/transcript1_cook.txt
57	foobar	563	../LA6/customers.txt
58	foobar	1763	../LA3/input.txt
59	foobar	160172	../LA3/verbose_output.txt
60	foobar	143	../LA3/sample.txt
61	foobar	5253	../LA3/output.txt
62	foobar	66951	../LAA/search.txt
63	foobar	66951	../LAA/sample/search.txt
64	foobar	15119	../LAA/sample/output.txt
65	foobar	5699948	../LAA/sample/verboseoutput.txt
66	foobar	1703	../GL/LA2-GL.txt
67	foobar	1916	../GL/LA5-GL.txt
68	foobar	8624	../GL/LA7/sample.txt
69	foobar	1244	../GL/LA7/LA7-GL.txt
70	foobar	563	../GL/LA6/customers.txt
71	foobar	22898	../GL/LA6/output.txt
72	foobar	1240	../GL/LA6/LA6-GL.txt
73	foobar	638783	../GL/LA3/verbose_output.txt
74	foobar	1790	../GL/LA3/LA3_GL.txt
75	foobar	24379	../GL/LA3/output.txt

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76      : foobar                8264      ../GL/LA3/proc.txt
77      : foobar                1605      ../GL/LA4-GL.txt
+++ 77 files match the extension txt
$ ./findall /home/img mov
NO      : OWNER                SIZE      NAME
-----
1       : foobar                184186700 /home/img/KJC/foobar_KJC/mvi_0681.mov
2       : foobar                252912844 /home/img/KJC/foobar_KJC/mvi_0359.mov
3       : foobar                98828288   /home/img/Simlipal/Barfoo/movies/mov/dscn1773.mov
4       : foobar                44466176   /home/img/Simlipal/Barfoo/movies/mov/dscn1829.mov
5       : foobar                53182464   /home/img/Simlipal/Barfoo/movies/mov/dscn1781.mov
6       : foobar                49741824   /home/img/Simlipal/Barfoo/movies/mov/dscn1824.mov
7       : foobar                31162368   /home/img/Simlipal/Barfoo/movies/mov/dscn1767.mov
8       : foobar                831322     /home/img/OLD/GangotriGomukh/FB/movie/p1010606.mov
9       : foobar                7843866    /home/img/OLD/GangotriGomukh/FB/movie/p1010615.mov
10      : foobar                14204598   /home/img/OLD/GangotriGomukh/FB/movie/p1010610.mov
11      : foobar                8452918    /home/img/OLD/GangotriGomukh/FB/movie/p1010614.mov
12      : foobar                10189358   /home/img/OLD/GangotriGomukh/FB/movie/p1010484.mov
13      : foobar                11263670   /home/img/OLD/Paris (IFW 2007)/movies/mov/04 Arc of trunph.mov
14      : foobar                76981536   /home/img/OLD/Paris (IFW 2007)/movies/mov/19 Eiffel2to3.mov
15      : foobar                14111788   /home/img/OLD/Paris (IFW 2007)/movies/mov/08 Eiffel2.mov
16      : foobar                18146276   /home/img/OLD/Paris (IFW 2007)/movies/mov/17 Eiffel2view3.mov
17      : foobar                27987578   /home/img/OLD/Paris (IFW 2007)/movies/mov/01 RER.mov
18      : foobar                10985930   /home/img/OLD/Paris (IFW 2007)/movies/mov/14 Eiffel1to2.mov
19      : foobar                20471276   /home/img/OLD/Paris (IFW 2007)/movies/mov/12 Seine.mov
20      : foobar                14637592   /home/img/OLD/Paris (IFW 2007)/movies/mov/09 Metro.mov
21      : foobar                21205578   /home/img/OLD/Paris (IFW 2007)/movies/mov/18 Eiffel2View4.mov
22      : foobar                6389172    /home/img/OLD/Paris (IFW 2007)/movies/mov/15 Eiffel2view1.mov
23      : foobar                9771110    /home/img/OLD/Paris (IFW 2007)/movies/mov/13 Eiffel0t1.mov
24      : foobar                5699882    /home/img/OLD/Paris (IFW 2007)/movies/mov/05 Arc of trunph fire.mov
25      : foobar                25874506   /home/img/OLD/Paris (IFW 2007)/movies/mov/03 La Defense.mov
26      : foobar                13974646   /home/img/OLD/Paris (IFW 2007)/movies/mov/10 Pyramid.mov
27      : foobar                24469654   /home/img/OLD/Paris (IFW 2007)/movies/mov/06 Notre Dame.mov
28      : foobar                7442066    /home/img/OLD/Paris (IFW 2007)/movies/mov/16 Eiffel2view2.mov
29      : foobar                8424592    /home/img/OLD/Paris (IFW 2007)/movies/mov/11 Tuilleri.mov
30      : foobar                13774578   /home/img/OLD/Paris (IFW 2007)/movies/mov/02 Seine_view.mov
31      : foobar                42712560   /home/img/OLD/Paris (IFW 2007)/movies/mov/07 Eiffel1.mov
32      : foobar                14601200   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/11 Gopalpur Port.mov
33      : foobar                51445910   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/13 Shonkhochil 2.mov
34      : foobar                12476674   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/08 Way to Gopalpur Port 1.mov
35      : foobar                22218124   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/06 Dheu 1.mov
36      : foobar                12407818   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/14 Shonkhochil 3.mov
37      : foobar                17265138   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/04 Confluence 1.mov
38      : foobar                25183640   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/15 Chan.mov
39      : foobar                30294008   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/07 Dheu 2.mov
40      : foobar                19291066   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/03 From Hotel Kalinga 3.mov
41      : foobar                16694644   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/05 Confluence 2.mov
42      : foobar                17966392   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/10 Way to Gopalpur Port 3.mov
43      : foobar                10183438   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/09 Way to Gopalpur Port 2.mov
44      : foobar                50830822   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/01 Chilka.mov
45      : foobar                12518606   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/02 From Hotel Kalinga 1.mov
46      : foobar                35503956   /home/img/OLD/Gopalpur (Oct 06-07, 2007)/movies/mov/12 Shonkhochil 1.mov
47      : foobar                16340140   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2357.mov
48      : foobar                11733078   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2449.mov
49      : foobar                13482236   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2372.mov
50      : foobar                12510876   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2262.mov
51      : foobar                27225618   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2402.mov
52      : foobar                10980998   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2442.mov
53      : foobar                11457962   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2189.mov
54      : foobar                16061436   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2233.mov
55      : foobar                12491780   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2244.mov
56      : foobar                13845328   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2345.mov
57      : foobar                12418596   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2245.mov
58      : foobar                9550880    /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2238.mov
59      : foobar                27831134   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2440.mov
60      : foobar                14035824   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2351.mov
61      : foobar                11743008   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2444.mov
62      : foobar                23188198   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2395.mov
63      : foobar                26987502   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2358.mov
64      : foobar                7258130    /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2239.mov
65      : foobar                10554990   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2416.mov
66      : foobar                33226458   /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2362.mov
67      : foobar                9530992    /home/img/OLD/Mukutmanipur1 (Sep 08-09, 2007)/movies/mov/100_2417.mov
68      : foobar                40140068   /home/img/Spain/Foo/Day1/mvi_1309.mov
69      : foobar                73433088   /home/img/Tajpur/Barfoo/mov/dscn4424.mov
70      : foobar                10682368   /home/img/Tajpur/Barfoo/mov/dscn4468.mov
71      : foobar                13459931   /home/img/People/Bar/2007-06-27/p6230048.mov
72      : foobar                53061680   /home/img/Chandipur/FOOBAR/mvi_9257.mov
73      : foobar                85327752   /home/img/Guwahati/Shillong/foobar/mvi_3278.mov
74      : foobar                50743492   /home/img/Betla/Netarhat/fb/IMG_3208.mov
+++ 74 files match the extension mov
$

```