**FILES AND**

**DIRECTORIES**

**LAB # 0****8**

**Fall 2023**

**CSE-302L**

**Systems Programming Lab**

Submitted by: **AIMAL KHAN**

Registration No.: **21PWCSE1996**

Class Section: **A**

“On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work.”



Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Submitted to:

**Engr. Abdullah Hamid**

Sunday, January 28, 2024

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

**CSE 302L: SYSTEMS PROGRAMMING LAB**

**LAB ASSESSMENT RUBRICS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Criteria & Point Assigned** | **Outstanding 2** | **Acceptable 1.5** | **Considerable 1** | **Below Expectations 0.5** | **Score** |
| **Attendance and**  **Attentiveness in Lab**  PLO08 | Attended in proper Time and attentive in Lab | Attended in proper Time but not attentive in Lab | Attended late but attentive in Lab | Attended late not attentive in Lab |  |
| **Capability of writing Program/Algorithm/Drawing Flow Chart**  PLO1, PLO2, PLO3, PLO5 | Right attempt/ no errors and well formatted | Right attempt/ no errors but not well formatted | Right attempt/ minor errors and not well formatted | Wrong attempt |  |
| **Result or Output/ Completion of target in Lab**  PLO9 | 100% target has been completed and well formatted. | 75% target has been completed and well formatted. | 50% target has been completed but not well formatted. | None of the outputs are correct. |  |
| **Overall, Knowledge**  PLO10, | Demonstrates excellent knowledge of lab | Demonstrates good knowledge of lab | Has partial idea about the Lab and procedure followed | Has poor idea about the Lab and procedure followed |  |
| **Attention to Lab Report**  PLO4, | Submission of Lab Report in Proper Time i.e., in next day of lab, with proper documentation. | Submission of Lab Report in proper time but not with proper documentation. | Late Submission with proper documentation. | Late Submission very poor documentation |  |

**Instructor:**

|  |  |
| --- | --- |
| Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  |  |

**FILES AND DIRECTORIES**

Objectives:

The objectives of this lab are to gain a practical understanding of key system programming concepts, including

* Directory Access
* Accessing file status information

Tasks:

**Task 1**: Implement ls command

**Code in C:**

#include <stdlib.h>

#include <stdio.h>

#include <string.h>

#include <dirent.h>

#include <sys/stat.h>

#include <time.h>

#include <grp.h>

#include <pwd.h>

int displayFileStatistics(struct dirent \*directoryEntry)

{

struct stat entryStatistics;

struct group \*g;

struct passwd \*p;

char \*ctime\_no\_newline;

if (stat(directoryEntry->d\_name, &entryStatistics) == -1)

{

perror("Error in statistics of the directory contents.\n");

return -1;

}

if (!strcmp(directoryEntry->d\_name, ".") || !strcmp(directoryEntry->d\_name, ".."))

return 0;

printf("\t");

// print if entry is a directory or a file

S\_ISDIR(entryStatistics.st\_mode) ? printf("d ") : printf("- ");

// printing permissions by taking bitwise and of permission bit with mode.

S\_IRUSR & entryStatistics.st\_mode ? printf("r") : printf("-");

S\_IWUSR & entryStatistics.st\_mode ? printf("w") : printf("-");

S\_IXUSR & entryStatistics.st\_mode ? printf("x") : printf("-");

S\_IRGRP & entryStatistics.st\_mode ? printf("r") : printf("-");

S\_IWGRP & entryStatistics.st\_mode ? printf("w") : printf("-");

S\_IXGRP & entryStatistics.st\_mode ? printf("x") : printf("-");

S\_IROTH & entryStatistics.st\_mode ? printf("r") : printf("-");

S\_IWOTH & entryStatistics.st\_mode ? printf("w") : printf("-");

S\_IXOTH & entryStatistics.st\_mode ? printf("x") : printf("-");

// No of links pointing to file or directory

printf(" %ld", entryStatistics.st\_nlink);

// User Name from uid

p = getpwuid(entryStatistics.st\_uid);

printf(" %s", p->pw\_name);

// Group Name from gid

g = getgrgid(entryStatistics.st\_gid);

printf(" %s", g->gr\_name);

// Time and date of last access

ctime\_no\_newline = strtok(ctime(&entryStatistics.st\_ctime), "\n");

printf(" %s", ctime\_no\_newline);

// Entry name

printf(" %s\n", directoryEntry->d\_name);

return 0;

}

int main(int argc, char \*argv[])

{

if (argc > 3)

{

fprintf(stderr, "Need at most three args. Usage:\n%s [OPTIONAL] [-l | FILE\_NAME]\n", argv[0]);

return 1;

}

DIR \*thisDirectory = opendir(".");

struct dirent \*directoryEntries;

// ls

if (argc == 1)

{

printf("Directory Content:\n");

while ((directoryEntries = readdir(thisDirectory)) != NULL)

{

if (!strcmp(directoryEntries->d\_name, ".") || !strcmp(directoryEntries->d\_name, ".."))

continue;

printf("\t%s\n", directoryEntries->d\_name);

}

}

// ls -l

else if ((argc == 2) && (!strcmp(argv[1], "-l")))

{

printf("Directory Content Statistics:\n");

while ((directoryEntries = readdir(thisDirectory)) != NULL)

if (displayFileStatistics(directoryEntries) == -1)

return 1;

}

// ls file.xyz

else if (argc == 2)

{

while ((directoryEntries = readdir(thisDirectory)) != NULL)

if (!strcmp(directoryEntries->d\_name, argv[1]))

{

printf("File Found:\n\t%s\n", directoryEntries->d\_name);

break;

}

}

// ls -l file.xyz

else if ((argc == 3) && (!strcmp(argv[1], "-l")))

{

while ((directoryEntries = readdir(thisDirectory)) != NULL)

if (!strcmp(argv[2], directoryEntries->d\_name))

{

printf("File Found. Statistics:\n");

if (displayFileStatistics(directoryEntries) == -1)

return 1;

break;

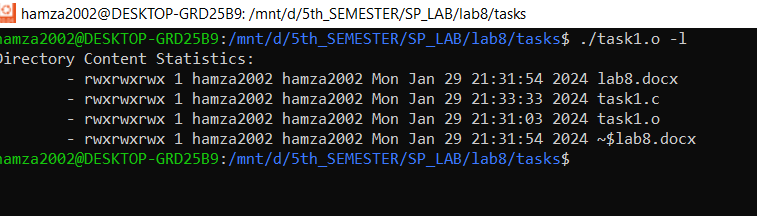
}

}

return 0;

}

**Output:**

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Reference:

To view my codes, please refer to my GitHub account:  [https://github.com/aimalexe/DCSE/tree/main/semester\_5\_(fall-23)/systems\_programming\_lab/lab\_reports](%20https://github.com/aimalexe/DCSE/tree/main/semester_5_(fall-23)/systems_programming_lab/lab_reports) .

Conclusion:

In summary, this laboratory experience has provided a comprehensive exploration of various fundamental system programming concepts, including files in UNIX, file directories and accessing file status information.

The End.