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Lab 2

1) Write a C program to emulate the ls -l UNIX command that prints all files in a current directory and lists access privileges, etc. DO NOT simply exec ls -l from the program.

```
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/stat.h>
#include <sys/types.h>
#include <dirent.h>

int main(){
    DIR * dp;

    struct dirent * entry;

    struct stat statbuf;
    if((dp = opendir(".")) == NULL){
        printf("Cannot open directory \n");
        exit(1);
    }

    chdir(".");

    while((entry = readdir(dp)) != NULL){

        lstat(entry->d_name,&statbuf);

        if(!S_ISDIR(statbuf.st_mode)){
            printf("%s \t \t",entry->d_name);
            printf((S_ISDIR(statbuf.st_mode)) ? "d" : "-");
            printf((statbuf.st_mode & S_IRUSR) ? "r" : "-");
            printf((statbuf.st_mode & S_IWUSR) ? "w" : "-");
            printf((statbuf.st_mode & S_IXUSR) ? "x" : "-");
            printf((statbuf.st_mode & S_IRGRP) ? "r" : "-");
            printf((statbuf.st_mode & S_IWGRP) ? "w" : "-");
            printf((statbuf.st_mode & S_IXGRP) ? "x" : "-");
            printf((statbuf.st_mode & S_IROTH) ? "r" : "-");
            printf((statbuf.st_mode & S_IWOTH) ? "w" : "-");
            printf((statbuf.st_mode & S_IXOTH) ? "x" : "-");
            printf("\n");
        }
    }
}
```

```

Student@project-lab:~/190905104_OS/Lab2$ ./q1
q2                -rwxrwxr-x
q2.png            -rw-rw-r--
q2.c              -rw-rw-r--
q1.c              -rw-rw-r--
q1                -rwxrwxr-x

```

2) Write a program that will list all files in a current directory and all files in subsequent subdirectories.

```

#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/stat.h>
#include <sys/types.h>
#include <dirent.h>
#include <string.h>

```

```

void printdir(char* path, int depth){
    DIR * dp;
    struct dirent * entry;
    struct stat statbuf;

    if((dp = opendir(path)) == NULL){
        printf("Could not open directory\n");
        exit(1);
    }

    chdir(path);

    while((entry = readdir(dp)) != NULL){
        lstat(entry->d_name, &statbuf);
        if(S_ISDIR(statbuf.st_mode)){
            // found sub directory
            if(strcmp(".", entry->d_name)==0 || strcmp("..", entry->d_name) == 0){
                continue;
            }

            printf("%s%s\n",depth,"",entry->d_name);
            printdir(entry->d_name, depth+4);
        }
    }
}

```

```

        else{
            printf("%*s%s\n",depth,"",entry->d_name);
        }
    }

    chdir("..");

    closedir(dp);
}
int main(){
    printdir(".", 0);
    return 0;
}

```



```

Student@project-lab:~/190905104_OS$ ./q2
q2
Lab1/
    q1.png
    q3.c
    file2.txt
    a.out
    q4.c
    q2.png
    q3.png
    q2.c
    190905104_lab1.odt
    190905104_lab1.pdf
    file1.txt
    q1.c
    q4.png
Lab2/
    q2
    q2.c
    q1.c
    q1
Student@project-lab:~/190905104_OS$

```

3) How do you list all installed programs in Linux?

`dpkg -l`

```

Student@project-lab: ~
File Edit View Search Terminal Help
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name Version Architecture Description
+++=-----+-----+-----+-----+
ii accountsservice 0.6.45-1ubuntu1.3 amd64 query and manipulate user account information
ii acl 2.2.52-3build1 amd64 Access control list utilities
ii acpi-support 0.142 amd64 scripts for handling many ACPI events
ii acpid 1:2.0.28-1ubuntu1 amd64 Advanced Configuration and Power Interface event daemon
ii adduser 3.116ubuntu1 all add and remove users and groups
ii adium-theme-ubuntu 0.3.4-0ubuntu4 all Adium message style for Ubuntu
ii adwaita-icon-theme 3.28.0-1ubuntu1 all default icon theme of GNOME (small subset)
ii aisleriot 1:3.22.5-1 amd64 GNOME solitaire card game collection
ii alsa-base 1.0.25+dfsg-0ubuntu5 all ALSA driver configuration files
ii alsa-utils 1.1.3-1ubuntu1 amd64 Utilities for configuring and using ALSA
ii amd64-microcode 3.20191021.1+really3 amd64 Processor microcode firmware for AMD CPUs
ii anacron 2.3-24 amd64 cron-like program that doesn't go by time
ii apg 2.2.3.dfsg.1-5 amd64 Automated Password Generator - Standalone version
ii app-install-data-partner 16.04 all Application Installer (data files for partner applications/repositor
ii apparmor 2.12-4ubuntu5.1 amd64 user-space parser utility for AppArmor
ii apport 2.20.9-0ubuntu7.26 all automatically generate crash reports for debugging
ii apport-gtk 2.20.9-0ubuntu7.26 all GTK+ frontend for the apport crash report system
ii apport-symptoms 0.20 all symptom scripts for apport
ii appstream 0.12.0-3ubuntu1 amd64 Software component metadata management
ii apt 1.6.14 amd64 commandline package manager
ii apt-config-icons 0.12.0-3ubuntu1 all APT configuration snippet to enable icon downloads
ii apt-utils 1.6.14 amd64 package management related utility programs
ii aptdaemon 1.1.1+bzr982-0ubuntu all transaction based package management service
ii aptdaemon-data 1.1.1+bzr982-0ubuntu all data files for clients
ii apturl 0.5.2ubuntu14.2 amd64 install packages using the apt protocol - GTK+ frontend
ii apturl-common 0.5.2ubuntu14.2 amd64 install packages using the apt protocol - common data
ii aspell 0.60.7-20110707-4ubu amd64 GNU Aspell spell-checker
ii aspell-en 2017.08.24-0-0.1 all English dictionary for GNU Aspell
ii at-spi2-core 2.28.0-1 amd64 Assistive Technology Service Provider Interface (dbus core)
ii Augeas-lenses 1.10.1-2 all Set of lenses needed by libaugeas0 to parse config files
ii avahi-autoipd 0.7-3.1ubuntu1.3 amd64 Avahi IPv4LL network address configuration daemon
ii avahi-daemon 0.7-3.1ubuntu1.3 amd64 Avahi mDNS/DNS-SD daemon
ii avahi-utils 0.7-3.1ubuntu1.3 amd64 Avahi browsing, publishing and discovery utilities
ii baobab 3.28.0-1 amd64 GNOME disk usage analyzer
ii base-files 10.1ubuntu2.11 amd64 Debian base system miscellaneous files
ii base-passwd 3.5.44 amd64 Debian base system master password and group files
ii bash 4.4.18-2ubuntu1.2 amd64 GNU Bourne Again SHell
ii bash-completion 1:2.8-1ubuntu1 all programmable completion for the bash shell
ii bc 1.07.1-2 amd64 GNU bc arbitrary precision calculator language
ii bind9-host 1:9.11.3+dfsg-1ubuntu amd64 DNS lookup utility (deprecated)

```

4) How do you find what RPM packages are installed?

Installed RPM using `sudo apt install rpm`

After that,

`rpm -qa`

```

+dfsg1-2 [119 KB]
Fetched 119 kB in 0s (339 kB/s)
Selecting previously unselected package rpm.
(Reading database ... 257892 files and directories currently installed.)
Preparing to unpack .../rpm_4.14.1+dfsg1-2_amd64.deb ...
Unpacking rpm (4.14.1+dfsg1-2) ...
Setting up rpm (4.14.1+dfsg1-2) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Student@project-lab:~$ rpm -qa
Student@project-lab:~$

```