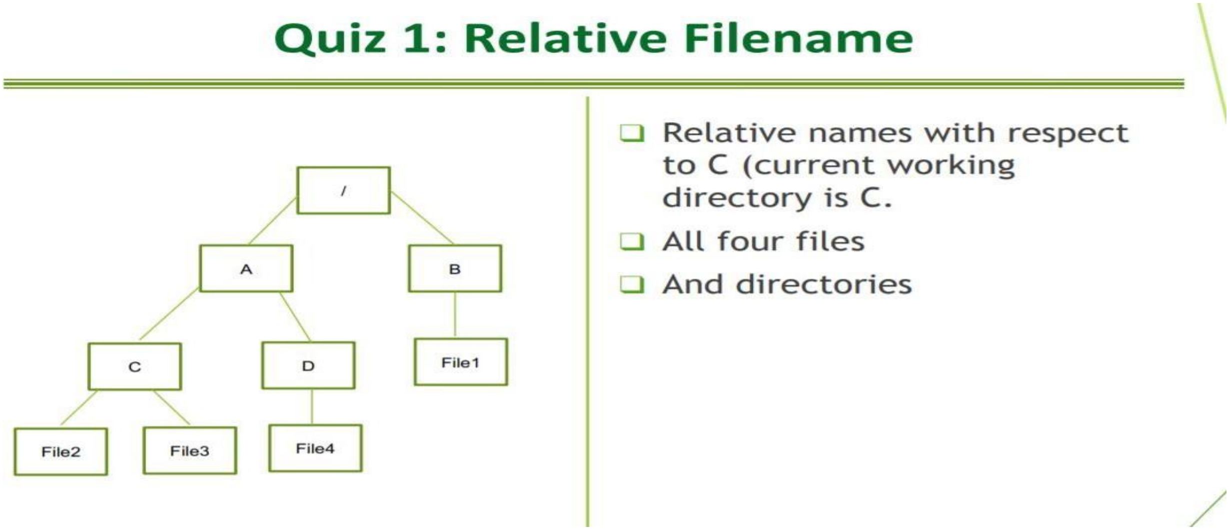
ASSIGNMENT – 8

Name – Ashutosh Soni
Id – 2018ucp1505

1.



Quiz 1: Relative Filename

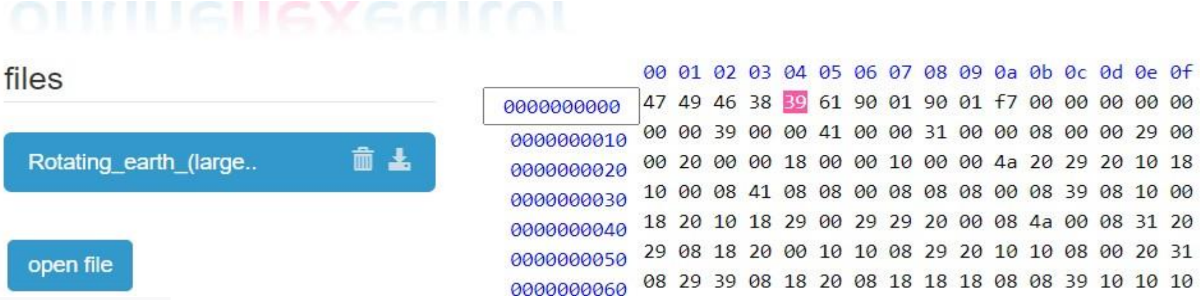
- ❑ Relative names with respect to C (current working directory is C.
- ❑ All four files
- ❑ And directories

i. **All four files**
   ../A/B/file1 file2
   file3
   ../A/D/file4

ii. **All four directories**
   . (for C itself)
   ../A
   ../A/B
   ../A/D

2. What are magic numbers of most popular file types? Check against https://en.wikipedia.org/wiki/List_of_file_signatures

gif : 47 49 46 38 39 61 / 47 49 46 38 37 61



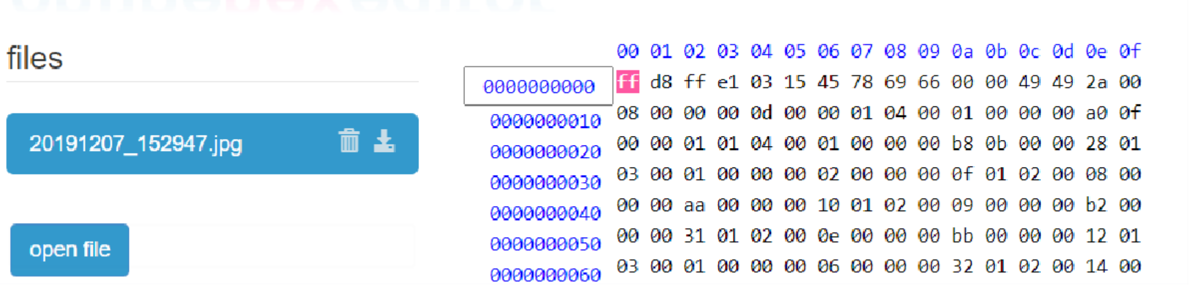
```
            00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
0000000000  47 49 46 38 39 61 90 01 90 01 f7 00 00 00 00 00
0000000010  00 00 39 00 00 41 00 00 31 00 00 08 00 00 29 00
0000000020  00 20 00 00 18 00 00 10 00 00 4a 20 29 20 10 18
0000000030  10 00 08 41 08 08 00 08 08 08 00 08 39 08 10 00
0000000040  18 20 10 18 29 00 29 29 20 00 08 4a 00 08 31 20
0000000050  29 08 18 20 00 10 10 08 29 20 10 10 08 00 20 31
0000000060  08 29 39 08 18 20 08 18 18 18 08 08 39 10 10 10
```

jpg/jpeg :FF D8 FF DB

FF D8 FF E0 00 10 4A 46 49 46 00 01

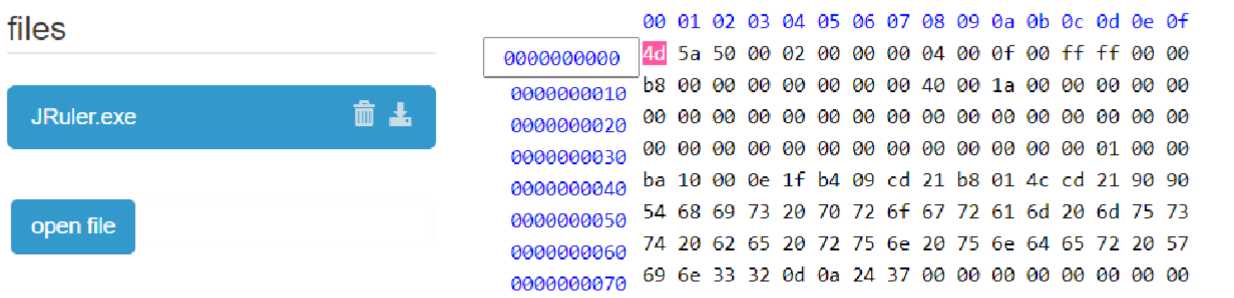
FF D8 FF EE

FF D8 FF E1 ?? ?? 45 78 69 66 00 00



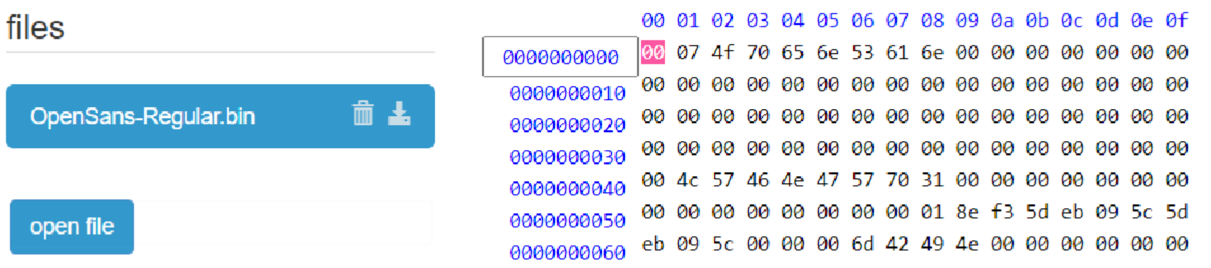
```
            00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
0000000000  ff d8 ff e1 03 15 45 78 69 66 00 00 49 49 2a 00
0000000010  08 00 00 00 0d 00 00 01 04 00 01 00 00 00 a0 0f
0000000020  00 00 01 01 04 00 01 00 00 00 b8 0b 00 00 28 01
0000000030  03 00 01 00 00 00 02 00 00 00 0f 01 02 00 08 00
0000000040  00 00 aa 00 00 00 10 01 02 00 09 00 00 00 b2 00
0000000050  00 00 31 01 02 00 0e 00 00 00 bb 00 00 00 12 01
0000000060  03 00 01 00 00 00 06 00 00 00 32 01 02 00 14 00
```

exe :4D 5A



```
            00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
0000000000  4d 5a 50 00 02 00 00 00 04 00 0f 00 ff ff 00 00
0000000010  b8 00 00 00 00 00 00 00 40 00 1a 00 00 00 00 00
0000000020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0000000030  00 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00
0000000040  ba 10 00 0e 1f b4 09 cd 21 b8 01 4c cd 21 90 90
0000000050  54 68 69 73 20 70 72 6f 67 72 61 6d 20 6d 75 73
0000000060  74 20 62 65 20 72 75 6e 20 75 6e 64 65 72 20 57
0000000070  69 6e 33 32 0d 0a 24 37 00 00 00 00 00 00 00 00
```

bin : 53 50 30 31



```
            00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
0000000000  00 07 4f 70 65 6e 53 61 6e 00 00 00 00 00 00 00
0000000010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0000000020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0000000030  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0000000040  00 4c 57 46 4e 47 57 70 31 00 00 00 00 00 00 00
0000000050  00 00 00 00 00 00 00 00 01 8e f3 5d eb 09 5c 5d
0000000060  eb 09 5c 00 00 00 6d 42 49 4e 00 00 00 00 00 00
```

3. Identify what fields related to a file are stored in a *directory entry*. Write a small program to read and list a directory entry related to each file.

Not everything about the file, most of the metadata about the file is stored within the file inode, not the directory entry. The directory entry is just a struct of inode and filename - just enough information to translate from a filename to an inode and get to the actual file. Each *directory entry* contains a filename along with a structure of information describing the attributes of the file. The attributes of a file are such things as the type of file (regular file, directory), the size of the file, the owner of the file, permissions for the file (whether other users may access this file), and when the file was last modified.

4. What are linux commands related to identifying/modifying (where applicable)

▪ **Name of the file :-**
:- ls (list all the files in a directory)

▪ **Type of the file**
:- file filename

▪ **Size of the file**
:- ls -lh

▪ **Owner of the file**
:- ls -l /path/to/file

▪ **Date and time when a file was created**
:- stat filename

▪ **Date and time when a file was last accessed/modified**
:- stat filename

▪ **Permissions of the file**
:- ls –l file_name

5. What shall be chmod command for setting following permissions

▪ the owner has read and execute access; group has read access only; others have no access.
chmod u=r-x,g=r fileName
▪ owner and group have all permissions; other have read and execute permissions only.
chmod u=rwx,g=rwx,o=r-x fileName
▪ Current permissions are: owner has read, write and execute access; group has read and execute access only; others can only read. How to drop write permission for the owner also. **chmod u=rwx,g=r-x,o=r—fileName**

Q.(6). Compute maximum file size that can be stored in a linux system where 15 direct, 1 single indirect, 1 double indirect and 1 triple indirect pointers are stored per i-node. Block size = 512 bytes and disk has 32-bit address.
Ans :

Block Size = 512 bytes
32-bit disk address i.e. pointer = 4 bytes Number of
pointers per block = 512/4 =128

Number of direct pointers = 15
Number of data block per direct pointer = 1
Number of data block per single indirect pointer = 128 = 2^7 Number of data block per double indirect pointer = 128*128 = 2^14
Number of data block per triple indirect pointer = 128*128*128 = 2^21 Size of file = (15+2^7+2^14+2^21)*512 bytes
= 3.75KB+32KB+4MB+0.5GB

6. How is stat command used to gain information on i-node of a file?

stat is a command-line utility that displays detailed information about given files or file systems. The syntax for the stat command is as follows:

stat [OPTION]... FILE...

stat displays the following file information:

- **File** - The name of the file.
- **Size** - The size of the file in bytes.
- **Blocks** - The number of allocated blocks the file takes.
- **IO Block** - The size in bytes of every block.
- **File type** - (ex. regular file, directory, symbolic link.)
- **Device** - Device number in hex and decimal.
- **Inode** - Inode number.
- **Links** - Number of hard links.
- **Access** - File permissions in the numeric and symbolic methods.
- **Uid** - User ID and name of the owner.
- **Gid** - Group ID and name of the owner.
- **Context** - The SELinux security context.
- **Access** - The last time the file was accessed.
- **Modify** - The last time the file’s content was modified.
- **Change** - The last time the file’s attribute or content was changed.
- **Birth** - File creation time (not supported in Linux).

7. Explanatory notes on

1. Network File System

The Network File System (NFS) is a client/server application that lets a computer user view and optionally store and update files on a remote computer as though they were on the user's own computer. The NFS protocol is one of several distributed file system standards for network-attached storage (NAS). NFS allows the user or system administrator to mount (designate as accessible) all or a portion of a file system on a server. The portion of the file system that is mounted can be accessed by clients with whatever privileges are assigned to each file (read-only or read-write). NFS uses Remote Procedure Calls (RPCs) to route requests between clients and servers.

2. ELF (executable linkable format) file format

ELF is widely used for executable files, relocatable object files, shared libraries, and core dumps. an ELF file consists of two sections – an ELF header, and file data. The file data section can consist of a program header table describing zero or more segments, a section header table describing zero or more sections, that is followed by data referred to by entries from the program header table, and the section header table. Each segment contains information that is necessary for run-time execution of the file, while sections contain important data for linking and relocation

3. PE (portable executable) file format

Portable Executable (PE) file format is a file format for executable / dll files introduced in Windows NT. It's based on COFF (Common Object File Format) specification.

To remain compatible with previous versions of the MS-DOS and Windows, the PE file format retains the old MZ header from MS-DOS.

The PE file format is organized as a linear stream of data. It begins with an MS-DOS header, a real-mode program stub, and a PE file signature. Immediately following is a PE file header and optional header. Beyond that, all the section headers appear, followed by all of the section bodies. Closing out the file are a few other regions of miscellaneous information, including relocation information, symbol table information, line number information, and string table data. All of this is more easily absorbed by looking at it graphically.

8. Compute cylinder skew

1. **Disk speed= 6,000 rpm, 200 sectors per track, seek time = 1000 μ sec** Time to move over 200 sectors = time for one revolution = 60/6000 = 10000 μ sec Time to move over 1 sectors = 10000/200 = 50 μ sec
Sectors moved in 1000 μ sec = 1000/50 = 20 Cylinder
skew = 20 sectors
2. **Disk speed= 7,500 rpm, 240 sectors per track, seek time = 800 μ sec** Time to move over 240 sectors = time for one revolution = 60/7500 = 8000 μ sec Time to move over 1 sectors = 8000/240 = 33.33 μ sec
Sectors moved in 800 μ sec = 800/33.33 = 24 Cylinder
skew = 24 sectors
3. **Disk speed= 8,000 rpm, 320 sectors per track, seek time = 600 μ sec** Time to move over 320 sectors = time for one revolution = 60/8000 = 7500 μ sec Time to move over 1 sectors = 7500/320 = 23.4375 μ sec
Sectors moved in 600 μ sec = 600/23.4375 = 25 Cylinder
skew = 25 sectors

9. Write notes on

1. **Swap space management.**

Swap-Swap management is another low-level task of the operating system. Disk space is used as an extension of main memory by the virtual memory. As we know the fact that disk access is much slower than memory access, In the swap-space management we are using disk space, so it will significantly decreases system performance. Basically, in all our systems we require the best throughput, so the goal of this swap-space implementation is to provide the virtual memory the best throughput. In these article, we are going to discuss how swap space is used, where swap space is located on disk, and how swap space is managed.

2. RAID

RAID, or “Redundant Arrays of Independent Disks” is a technique which makes use of a combination of multiple disks instead of using a single disk for increased performance, data redundancy or both.

Key evaluation points for a RAID System

Reliability: How many disk faults can the system tolerate?

Availability: What fraction of the total session time is a system in uptime mode, i.e. how available is the system for actual use?

Performance: How good is the response time? How high is the throughput (rate of processing work)? Note that performance contains a lot of parameters and not just the two. Capacity: Given a set of N disks each with B blocks, how much useful capacity is available to the user?

RAID is very transparent to the underlying system. This means, to the host system, it appears as a single big disk presenting itself as a linear array of blocks. This allows older technologies to be replaced by RAID without making too many changes in the existing code