WRITE-UP FOR QUESTION-2

Steps followed for compiling and adding the system call :-

1. Create a custom SYSCALL that accepts two matrices as input (the source and destination matrices) and copies data from the source matrix to the destination matrix using the __copy from user() and __copy from user() functions.

2. The linux kernel should be duplicated before syscall is added.

3. The system call should be added to the sys.c file in the Linux kernel.

```
SYSCALL_DEFINE2(kernel_2d_memcpy , float *, matrix1, float *, matrix2)
{
        float mat[2][2];

        if(__copy_from_user(mat, matrix1, sizeof(mat))) return -EFAULT;

        if(__copy_to_user(matrix2, mat, sizeof(mat))) return -EFAULT;

        printk(KERN_INFO "kernel_2d_memcpy syscall executed successfully!!");

        return 0;
}
```

4. In the table syscall 64.tbl, which is located at the address /linux-5.19.9/arch/x86/entry/syscalls/, now add the customised SYSCALL.

```
429     common  move_mount              sys_move_mount
430     common  fsopen                  sys_fsopen
431     common  fsconfig                sys_fsconfig
432     common  fsmount                 sys_fsmount
433     common  fspick                  sys_fspick
434     common  pidfd_open              sys_pidfd_open
435     common  clone3                  sys_clone3
436     common  close_range             sys_close_range
437     common  openat2                 sys_openat2
438     common  pidfd_getfd             sys_pidfd_getfd
439     common  faccessat2              sys_faccessat2
440     common  process_madvise         sys_process_madvise
441     common  epoll_pwait2            sys_epoll_pwait2
442     common  mount_setattr           sys_mount_setattr
443     common  quotactl_fd             sys_quotactl_fd
444     common  landlock_create_ruleset sys_landlock_create_ruleset
445     common  landlock_add_rule       sys_landlock_add_rule
446     common  landlock_restrict_self  sys_landlock_restrict_self
447     common  memfd_secret            sys_memfd_secret
448     common  process_mrelease        sys_process_mrelease
449     common  futex_waitv             sys_futex_waitv
450     common  set_mempolicy_home_node sys_set_mempolicy_home_node
451     common  kernel_2d_memcpy        sys_kernel_2d_memcpy
```

5. Compile the kernel by following the commands given below :-

   make mrproper

wget filedownloadlink
cp filename .config
make menuconfig /->esc then escape/
make -j2
make modules_install
cp -v arch/x86_64/boot/bzImage /boot/vmlinuz-linux5198
mkinitcpio -k 5.19.8 -g /boot/initramfs-linux5198.img
cp System.map /boot/System.map-linux5198
cp /boot/System.map-linux5198 System.map
grub-mkconfig -o /boot/grub/grubmkmin.cfg

6. Now reboot the system

7. Create a driver code to call our custom syscall with source matrix which is the matrix to be copied and destination matrix which is matrix where data has to be copied.

8. Now compile and run the driver code to test the working of SYSCALL