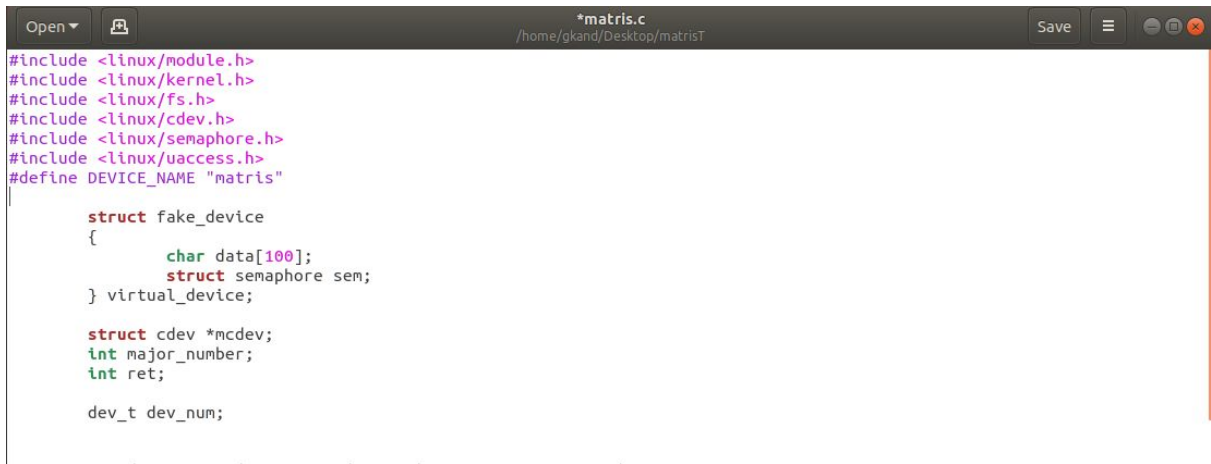


Kernel Modül Programlama ile Matrisin Transpozunu Bulma

matris.c ile sahte bir device üretiliyor.



```
*matris.c
/home/gkand/Desktop/matrisT

#include <linux/module.h>
#include <linux/kernel.h>
#include <linux/fs.h>
#include <linux/cdev.h>
#include <linux/semaphore.h>
#include <linux/uaccess.h>
#define DEVICE_NAME "matris"





struct fake_device
{
    char data[100];
    struct semaphore sem;
} virtual_device;

struct cdev *mcdev;
int major_number;
int ret;

dev_t dev_num;
```

Kütüphane tanımları ve değişken tanımlamaları

```

Open ▾  *matris.c /home/gkand/Desktop/matrisT Save   
int device_open(struct inode *inode, struct file *filp)
{
    if(down_interruptible(&virtual_device.sem) !=0)
    {
        printk(KERN_ALERT "Surucu olusturulamadi.");
        return -1;
    }
    printk(KERN_INFO "Olusturulan surucu baslatildi.");
    return 0;
}

ssize_t device_read(struct file* filp, char* bufStoreData, size_t bufCount, loff_t* curOffset)
{
    printk(KERN_INFO "Surucuden okunuyor..");
    ret = copy_to_user(bufStoreData, virtual_device.data, bufCount);

    //int i=bufCount;
    //int a= 0, b = 0;
    //while(i!=0){
    printk(KERN_INFO " ");
    printk(KERN_INFO "%c\t%c\t%c", virtual_device.data[0], virtual_device.data[1], virtual_device.data[2]);
    printk(KERN_INFO "%c\t%c\t%c", virtual_device.data[3], virtual_device.data[4], virtual_device.data[5]);
    printk(KERN_INFO "%c\t%c\t%c", virtual_device.data[6], virtual_device.data[7], virtual_device.data[8]);
    //i--;
    //}

    printk(KERN_INFO " ");
    return ret;
}

ssize_t device_write(struct file* filp, const char* bufSourceData, size_t bufCount, loff_t* curOffset)
{
    printk(KERN_INFO "Surucuye yaziliyor..");
    ret = copy_from_user(virtual_device.data, bufSourceData, bufCount);
    return ret;
}

int device_close(struct inode *inode, struct file *filp)
{
    up(&virtual_device.sem);
    printk(KERN_INFO "surucu kapaniyor..");
    return 0;
}

static int driver_entry(void)
{
    ret = alloc_chrdev_region(&dev_num, 0, 1, DEVICE_NAME);

    major_number = MAJOR(dev_num);
    printk(KERN_INFO "Major number : %d \tuse \"mknod /dev/%s c %d 0\" komudu girilmeli.",major_number,
DEVICE_NAME, major_number);
    printk(KERN_INFO " ");

    mcdev = cdev_alloc();
    mcdev->ops = &fops;
    mcdev->owner = THIS_MODULE;

    ret = cdev_add(mcdev, dev_num, 1);
    if(ret<0)
    {
        printk(KERN_ALERT "kernel cdev'e ulasamadi.");
        return ret;
    }

    sema_init(&virtual_device.sem, 1);

    return 0;
}






static void driver_exit(void){

    cdev_del(mcdev);

    unregister_chrdev_region(dev_num, 1);
    printk(KERN_ALERT "Modul kaldirildi.");
    printk(KERN_ALERT " ");
}

module_init(driver_entry);
module_exit(driver_exit);

```

```
Open ▾  Makefile /home/gkand/Desktop/matrixT Save    

obj-m := matrix.o

KERNEL_DIR = /usr/src/linux-headers-$(shell uname -r)

all:
    $(MAKE) -C $(KERNEL_DIR) SUBDIRS=$(PWD) modules

clean:
    rm -rf *.o *.ko *.mod.* *.symvers *.order *~

Makefile ▾ Tab Width: 8 ▾ Ln 1, Col 1 ▾ INS
```

make komutuyla dosyamızı derliyoruz.

```
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT# make
make -C /usr/src/linux-headers-4.19.0-041900-generic SUBDIRS=/home/gkand/Desktop/matrixT modules
make[1]: Entering directory '/usr/src/linux-headers-4.19.0-041900-generic'
Building modules, stage 2.
MODPOST 1 modules
WARNING: modpost: missing MODULE_LICENSE() in /home/gkand/Desktop/matrixT/matrix.o
see include/linux/module.h for more information
make[1]: Leaving directory '/usr/src/linux-headers-4.19.0-041900-generic'
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT#
```

```
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT
File Edit View Search Terminal Help
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT# insmod matrix.ko
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT#
```

insmod matrix.ko ile module çalıştırılıyor.

```
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT
File Edit View Search Terminal Help
[ 21.798249] audit: type=1400 audit(1544378168.284:34): apparmor="STATUS" operation="profile_load" profile="unconf
ined" name="snap.gnome-system-monitor.gnome-system-monitor" pid=561 comm="apparmor_parser"
[ 21.802563] audit: type=1400 audit(1544378168.288:35): apparmor="STATUS" operation="profile_load" profile="unconf
ined" name="snap-update-ns.core" pid=562 comm="apparmor_parser"
[ 21.839516] audit: type=1400 audit(1544378168.324:36): apparmor="STATUS" operation="profile_load" profile="unconf
ined" name="snap-update-ns.gnome-calculator" pid=563 comm="apparmor_parser"
[ 21.877933] audit: type=1400 audit(1544378168.364:37): apparmor="STATUS" operation="profile_load" profile="unconf
ined" name="snap-update-ns.gnome-characters" pid=564 comm="apparmor_parser"
[ 21.944257] audit: type=1400 audit(1544378168.428:38): apparmor="STATUS" operation="profile_load" profile="unconf
ined" name="snap-update-ns.gnome-logs" pid=565 comm="apparmor_parser"
[ 21.983072] audit: type=1400 audit(1544378168.468:39): apparmor="STATUS" operation="profile_load" profile="unconf
ined" name="snap-update-ns.gnome-system-monitor" pid=566 comm="apparmor_parser"
[ 27.806436] IPv6: ADDRCONF(NETDEV_UP): enp0s3: link is not ready
[ 27.815476] e1000: enp0s3 NIC Link is Up 1000 Mbps Full Duplex, Flow Control: RX
[ 27.822999] IPv6: ADDRCONF(NETDEV_UP): enp0s3: link is not ready
[ 27.823025] IPv6: ADDRCONF(NETDEV_CHANGE): enp0s3: link becomes ready
[ 114.789289] rfkill: input handler disabled
[ 1187.045939] matrix: loading out-of-tree module taints kernel.
[ 1187.045947] matrix: module license 'unspecified' taints kernel.
[ 1187.045949] Disabling lock debugging due to kernel taint
[ 1187.046056] matrix: module verification failed: signature and/or required key missing - tainting kernel
[ 1187.052888] Major number : 239 use "mknod /dev/matrix c 239 0" komudu girilmeli.
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT# mknod /dev/matrix c 239 0
root@gkand-VirtualBox:/home/gkand/Desktop/matrixT#
```

mknod /dev/matrix c 239 0

(Farklı olabilir. dmesg de major numarası yazıyor)

```
matrisProgram.c
/home/gkand/Desktop/matrisT

#include <stdio.h>
#include <stdlib.h>
#include <fcntl.h>

#define DEVICE "/dev/matris"

int main(){
    int i, j, fd, a, b;
    fd = open(DEVICE, O_RDWR);

    if(fd == -1){
        printf("Dosya acilamadi %s", DEVICE);
        exit(-1);
    }
    printf("Matris Satir Sayisi Giriniz: ");
    scanf("%d", &a);
    printf("Matris Sutun Sayisi Giriniz: ");
    scanf("%d", &b);

    char matris[a][b], matrisT[b][a];

    for(i=0; i<a; i++){
        for(j=0; j<b; j++){
            printf("dx%d elemanini giriniz: ", i+1, j+1);
            scanf("%d", &matris[i][j]);
        }
    }
    //Matrisin Transpozunu alma
    for(i=0; i<a; i++){
        for(j=0; j<b; j++){
            matrisT[j][i] = matris[i][j];
        }
    }
    for(i=0; i<a; i++){
        for(j=0; j<b; j++){
            printf("%d ", matris[i][j]);
        }
        printf("\n");
    }
    // Matrisin Transpozunun Ekrana Yazdirma
    printf("Transpozu\n");
    for(i=0; i<b; i++){
        for(j=0; j<a; j++){
            printf("%d ", matrisT[i][j]);
        }
        printf("\n");
    }

    write(fd, matrisT, sizeof(matrisT));

    read(fd, matrisT, sizeof(matrisT));

    return 0;
}
```

```
root@gkand-VirtualBox:/home/gkand/Desktop/matrisT# gcc -o matrisProgram matrisProgram.c
```

matrisProgram.c kod dizinini derliyoruz.a


```
root@gkand-VirtualBox: /home/gkand/Desktop/matrixT# ./matrixProgram
Matrix Satir Sayisi Giriniz: 3
Matrix Sutun Sayisi Giriniz: 3
1x1 elemanini giriniz: 1
1x2 elemanini giriniz: 2
1x3 elemanini giriniz: 3
2x1 elemanini giriniz: 4
2x2 elemanini giriniz: 5
2x3 elemanini giriniz: 6
3x1 elemanini giriniz: 7
3x2 elemanini giriniz: 8
3x3 elemanini giriniz: 9
1 2 3
4 5 6
7 8 9
Transpozu
1 4 7
2 5 8
3 6 9
root@gkand-VirtualBox: /home/gkand/Desktop/matrixT#
```

./matrixProgram ile uygulamamızı çalıştırıyoruz. Matris için değerleri giriyoruz.

```
root@gkand-VirtualBox: /home/gkand/Desktop/matrixT
File Edit View Search Terminal Help
snap.gnome-logs.gnome-logs" pid=560 comm="apparmor_parser"
[ 21.798249] audit: type=1400 audit(1544378168.284:34): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
snap.gnome-system-monitor.gnome-system-monitor" pid=561 comm="apparmor_parser"
[ 21.802563] audit: type=1400 audit(1544378168.288:35): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
snap-update-ns.core" pid=562 comm="apparmor_parser"
[ 21.839516] audit: type=1400 audit(1544378168.324:36): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
snap-update-ns.gnome-calculator" pid=563 comm="apparmor_parser"
[ 21.877933] audit: type=1400 audit(1544378168.364:37): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
snap-update-ns.gnome-characters" pid=564 comm="apparmor_parser"
[ 21.944257] audit: type=1400 audit(1544378168.428:38): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
snap-update-ns.gnome-logs" pid=565 comm="apparmor_parser"
[ 21.983072] audit: type=1400 audit(1544378168.468:39): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
snap-update-ns.gnome-system-monitor" pid=566 comm="apparmor_parser"
[ 27.806436] IPv6: ADDRCONF(NETDEV_UP): enp0s3: link is not ready
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[ 1187.045939] matrix: loading out-of-tree module taints kernel.
[ 1187.045947] matrix: module license 'unspecified' taints kernel.
[ 1187.045949] Disabling lock debugging due to kernel taint
[ 1187.046056] matrix: module verification failed: signature and/or required key missing - tainting kernel
[ 1187.052888] Major number : 239 use "mknod /dev/matrix c 239 0" komudu girilmeli.
[ 1187.052900]
[ 1492.198794] Olusturulan surucu baslatildi.
[ 1507.723348] Surucuye yaziliyor..
[ 1507.723360] Surucuden okunuyor..
[ 1507.723360]
[ 1507.723362]
[ 1507.723363]
[ 1507.723363]
[ 1507.723364]
root@gkand-VirtualBox: /home/gkand/Desktop/matrixT#
```

Sürücünden loga yazarken bazı kayıplar oluştu. Matrisin bütün elemanlarını yazamadı.

```
root@gkand-VirtualBox: /home/gkand/Desktop/matrixT
File Edit View Search Terminal Help
snap.gnome-system-monitor.gnome-system-monitor" pid=561 comm="apparmor_parser"
[ 21.802563] audit: type=1400 audit(1544378168.288:35): apparmor="STATUS" operation="profile_load" profile="unconfined" name="
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[ 1187.052900]
[ 1492.198794] Olusturulan surucu baslatildi.
[ 1507.723348] Surucuya yaziliyor..
[ 1507.723360] Surucuden okunuyor..
[ 1507.723360]
[ 1507.723362]
[ 1507.723363]
[ 1507.723363]
[ 1507.723364]
[ 1507.724402] surucu kapaniyor..
[ 1588.999609] modulu kapatildi.
root@gkand-VirtualBox: /home/gkand/Desktop/matrixT#
```

en son olarak rmmmod matrix ile modülümüzü kapadık ve dmesg ile son mesajlarımızı yazdırdık