

```
//multiplyMatrices.c
```

```
#include <stdio.h>
```

```
// Function to multiply two matrices
```

```
void multiplyMatrices(int a[2][2], int b[2][2], int result[2][2]) {  
    for (int i = 0; i < 2; i++) {  
        for (int j = 0; j < 2; j++) {  
            result[i][j] = 0;  
            for (int k = 0; k < 2; k++) {  
                result[i][j] += a[i][k] * b[k][j];  
            }  
        }  
    }  
}
```

```
//addMatrices.c
```

```
#include <stdio.h>
```

```
// Function to add two matrices
```

```
void addMatrices(int a[2][2], int b[2][2], int result[2][2]) {  
    for (int i = 0; i < 2; i++) {  
        for (int j = 0; j < 2; j++) {  
            result[i][j] = a[i][j] + b[i][j];  
        }  
    }  
}
```

```
//printMatrix.c
```

```
#include <stdio.h>
```

```
// Function to print a matrix
```

```
void printMatrix(int matrix[2][2]) {  
    for (int i = 0; i < 2; i++) {  
        for (int j = 0; j < 2; j++) {  
            printf("%d ", matrix[i][j]);  
        }  
        printf("\n");  
    }  
}
```

```
//headerFile.h
```

```
void printMatrix(int matrix[2][2]);  
void addMatrices(int a[2][2], int b[2][2], int result[2][2]);  
void multiplyMatrices(int a[2][2], int b[2][2], int result[2][2]);
```

```
//main.c
```

```
#include <stdio.h>
```

```
#include "headerFile.h"
```

```
int main() {
```

```
    int matrixA[2][2] = {{1, 2}, {3, 4}};
```

```
    int matrixB[2][2] = {{5, 6}, {7, 8}};
```

```
    int result[2][2];
```

```
    printf("Matrix A:\n");
```

```
    printMatrix(matrixA);
```

```
    printf("Matrix B:\n");
```

```
    printMatrix(matrixB);
```

```
    addMatrices(matrixA, matrixB, result);
```

```
    printf("\nSum of A and B:\n");
```

```
    printMatrix(result);
```

```
    multiplyMatrices(matrixA, matrixB, result);
```

```
    printf("\nProduct of A and B:\n");
```

```
    printMatrix(result);
```

```
    return 0;
```

```
}
```

STATIC LINKING:

```
kstra@kstra-VirtualBox: ~/Desktop/unix_lab/week6
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ls
addMatrices.c  example  headerFile.h  main.c  multiplyMatrices.c  printMatrix.c
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc -c addMatrices.c -o addMatrices_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc -c main.c -o main_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc -c printMatrix.c -o printMatrix_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc -c multiplyMatrices.c -o multiplyMatrices_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ar rcs eg_static.a addMatrices_obj.o
multiplyMatrices_obj.o printMatrix_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ls
addMatrices.c  example  main_obj.o  printMatrix.c
addMatrices_obj.o  headerFile.h  multiplyMatrices.c  printMatrix_obj.o
eg_static.a  main.c  multiplyMatrix_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc -o main_result main_obj.o -L. eg_static.a
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ./main_result
Matrix A:
1 2
3 4
Matrix B:
5 6
7 8
Sum of A and B:
6 8
10 12
Product of A and B:
19 22
43 50
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ls
addMatrices.c  example  main_obj.o  multiplyMatrix_obj.o
addMatrices_obj.o  headerFile.h  main_result  printMatrix.c
eg_static.a  main.c  multiplyMatrices.c  printMatrix_obj.o
```

DYNAMIC LINKING:

```
kstra@kstra-VirtualBox: ~/Desktop/unix_lab/week6
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc *.o -shared -o eg_dynamic.so
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ls
addMatrices.c  example  main_result  printMatrix_obj.o
addMatrices_obj.o  headerFile.h  multiplyMatrices.c
eg_dynamic.so  main.c  multiplyMatrix_obj.o
eg_static.a  main_obj.o  printMatrix.c
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ gcc -o main_result_dynamic main_obj.o -L. eg_dynamic.so
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ./main_result_dynamic
./main_result_dynamic: error while loading shared libraries: eg_dynamic.so: cannot open shared object file: No such file or directory
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ sudo cp eg_dynamic.so /usr/lib
[sudo] password for kstra:
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ./main_result_dynamic
Matrix A:
1 2
3 4
Matrix B:
5 6
7 8
Sum of A and B:
6 8
10 12
Product of A and B:
19 22
43 50
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ sudo rm /usr/lib/eg_dynamic.so
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ export LD_LIBRARY_PATH=/home/kstra/Desktop/unix_lab/week6
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ export LD_LIBRARY_PATH=/home/kstra/Desktop/unix_lab/week6
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ./main_result_dynamic
Matrix A:
1 2
3 4
Matrix B:
5 6
7 8
Sum of A and B:
6 8
10 12
Product of A and B:
19 22
43 50
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ls
addMatrices.c  example  main_result  printMatrix.c
addMatrices_obj.o  headerFile.h  main_result_dynamic  printMatrix_obj.o
eg_dynamic.so  main.c  multiplyMatrices.c
eg_static.a  main_obj.o  multiplyMatrix_obj.o
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ldd main
main.c          main_result
main_obj.o      main_result_dynamic
kstra@kstra-VirtualBox:~/Desktop/unix_lab/week6$ ldd main_result
linux-vdso.so.1 (0x00007ffff35f1000)
libc.so.6 => /lib/x86_64-linux-gnu/libc.so.6 (0x00007fa48b000000)
/lib64/ld-linux-x86-64.so.2 (0x00007fa48b398000)
```