

## Latihan Praktikum Sistem Operasi Modul ke-8

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Kelas : A

Kode program fork.c



```
GNU nano 2.9.3 fork.c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
main() {
    pid_t pid;
    int x = 5;
    pid = fork();
    x++;
    if (pid < 0)
    {
        printf("Process creation error"); exit(-1);
    }
    else if (pid == 0)
    {
        printf("Child process:");
        printf("\nProcess id is %d", getpid());
        printf("\nValue of x is %d", x);
        printf("\nProcess id of parent is %d\n", getppid());
    }
    else
    {
        printf("\nParent process:");
        printf("\nProcess id is %d", getpid());
        printf("\nValue of x is %d", x);
        printf("\nProcess id of shell is %d\n", getppid());
    }
}
```

```
kayon-pc27@kayonpc27:~$ gcc fork.c
fork.c:4:10: fatal error: sys/types.h: No such file or directory
#include <sys/types.h>
         ^
compilation terminated.
kayon-pc27@kayonpc27:~$ gcc fork.c
fork.c:4:10: fatal error: sys/types.h: No such file or directory
#include <sys/types.h>
         ^
compilation terminated.
kayon-pc27@kayonpc27:~$ gcc fork.c
gcc: fork.c: command not found
kayon-pc27@kayonpc27:~$ gcc fork.c
fork.c:4:10: fatal error: sys/types.h: No such file or directory
#include <sys/types.h>
         ^
compilation terminated.
kayon-pc27@kayonpc27:~$ gcc fork.c
fork.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main() {
^
kayon-pc27@kayonpc27:~$ gcc fork.c
fork.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main() {
^
kayon-pc27@kayonpc27:~$ gcc fork.c
fork.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main() {
^
kayon-pc27@kayonpc27:~$ ./a.out
bash: ./a.out: No such file or directory
kayon-pc27@kayonpc27:~$ ./a.out

Parent process:
Process id is 2668
Value of x is 6
Process id of shell is 2602
Child process:
Process id is 2669
Value of x is 6
Process id of parent is 2668

kayon-pc27@kayonpc27:~$
```

## Kode program wait.c

```
Terminal - root@kayonpc27: /home/kayon-pc27
File Edit View Terminal Tabs Help
root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x
GNU nano 2.9.3 wait.c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>
main() {
    int i, status;
    pid_t pid;
    pid = fork();

    if (pid < 0) {
        printf("\nPembustan proses gagal\n");
        exit(-1);
    }
    else if (pid > 0)
    {
        wait(NULL);
        printf("\nParent starts\nNomor Genap:");
        for (i=2; i<=10; i+=2)
            printf(" %3d", i);
        printf("\nParent ends\n");
    }
    else if (pid == 0)
    {
        printf("\nChild starts\nNomor Ganjil:");
        for (i=1; i<=10; i+=2)
            printf(" %3d", i);
        printf("\nChild ends\n");
    }
}
```

```
Terminal - kayon-pc27@kayonpc27: ~
File Edit View Terminal Tabs Help
root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x
kayon-pc27@kayonpc27: ~$ gcc exec.c
gcc: error: exec.c: No such file or directory
gcc: fatal error: no input files
compilation terminated.
kayon-pc27@kayonpc27: ~$ gcc wait.c
wait.c:6:1: warning: return type defaults to 'int' [-Wimplicit-int]
main() {
^~~~~
kayon-pc27@kayonpc27: ~$ ./a.out /bin/ls ls
bash: ./a.out: No such file or directory
kayon-pc27@kayonpc27: ~$ ./a.out
bash: ./a.out: No such file or directory
kayon-pc27@kayonpc27: ~$ ./a.out
Child starts
Nomor Ganjil: 1 3 5 7 9
Child ends

Parent starts
Nomor Genap: 2 4 6 8 10
Parent ends
kayon-pc27@kayonpc27: ~$
```

## Kode program exec.c

```
Terminal - root@kayonpc27: /home/kayon-pc27
File Edit View Terminal Tabs Help

root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x

GNU nano 2.9.3 exec.c

#include <stdio.h>
#include <sys/types.h>
#include <unistd.h>
#include <stdlib.h>
main(int argc, char*argv[]) {
    pid_t pid;
    int i;
    if (argc != 3)
    {
        printf("\nInsufficient arguments to load program");
        printf("\nUsage: ./a.out <path> <cmd>\n"); exit(-1);
    }
    switch(pid = fork())
    {
        case -1:
            printf("Fork failed");
            exit(-1);
        case 0:
            printf("Child process\n");
            i = execl(argv[1], argv[2], 0);
            if (i < 0)
            {
                printf("\ns program not loaded using exec system call\n", argv[2]);
                exit(-1);
            }
        default:
            wait(NULL);
            printf("Child Terminated\n");
            exit(0);
    }
}

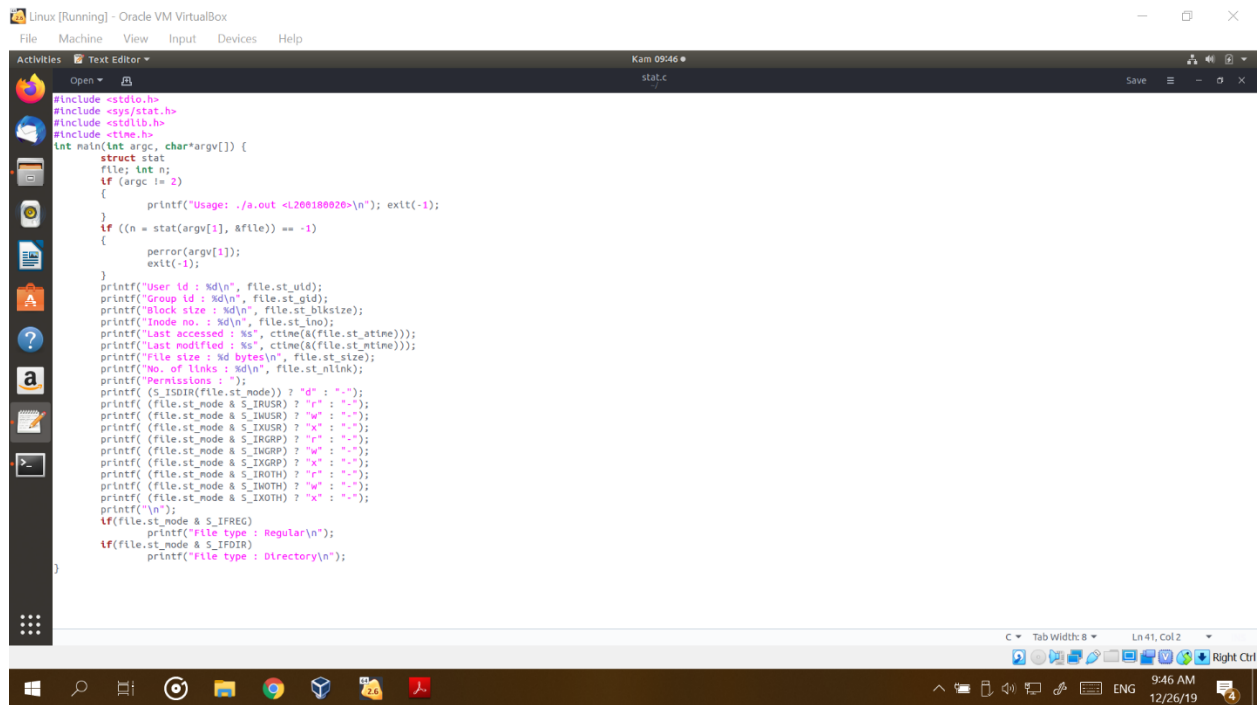
[ Wrote 33 lines ]
Get Help Write Out Where Is Cut Text Justify Cur Pos M-U Undo M-A Mark Text M-] To Bracket M-A Previous RE Back
Exit Read File Replace U Uncut Text M-T To Spell Go To Line M-E Redo M-C Copy Text M-X WhereIs Next M-V Next RE Forward
19 Nov, 15:41
```

```
Terminal - kayon-pc27@kayonpc27: ~
File Edit View Terminal Tabs Help

root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x root@kayonpc27: /home/kay... x kayon-pc27@kayonpc27: ~ x

i = execl(argv[1], argv[2], 0);
^
exec.c:30:3: warning: implicit declaration of function 'wait'; did you mean 'main'? [-Wimplicit-function-declaration]
    wait(NULL);
    ^
    main
kayon-pc27@kayonpc27:~$ ./a.out
Insufficient arguments to load program
Usage: ./a.out <path> <cmd>
kayon-pc27@kayonpc27:~$ gcc exec.c
exec.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(int argc, char*argv[]) {
^
exec.c: In function 'main':
exec.c:22:3: warning: missing sentinel in function call [-Wformat=]
    i = execl(argv[1], argv[2], 0);
    ^
exec.c:29:3: warning: implicit declaration of function 'wait'; did you mean 'main'? [-Wimplicit-function-declaration]
    wait(NULL);
    ^
    main
kayon-pc27@kayonpc27:~$ ./a.out
Insufficient arguments to load program
Usage: ./a.out <path> <cmd>
kayon-pc27@kayonpc27:~$ gcc exec.c
exec.c:5:1: warning: return type defaults to 'int' [-Wimplicit-int]
main(int argc, char*argv[]) {
^
exec.c: In function 'main':
exec.c:22:3: warning: missing sentinel in function call [-Wformat=]
    i = execl(argv[1], argv[2], 0);
    ^
exec.c:29:3: warning: implicit declaration of function 'wait'; did you mean 'main'? [-Wimplicit-function-declaration]
    wait(NULL);
    ^
    main
kayon-pc27@kayonpc27:~$ ./a.out /bin/ls ls
Child process
a.out Desktop Documents Downloads exec.c fork.c info infol200180148.sh Music Pictures Public Templates Videos wait.c
Child Terminated
kayon-pc27@kayonpc27:~$
```

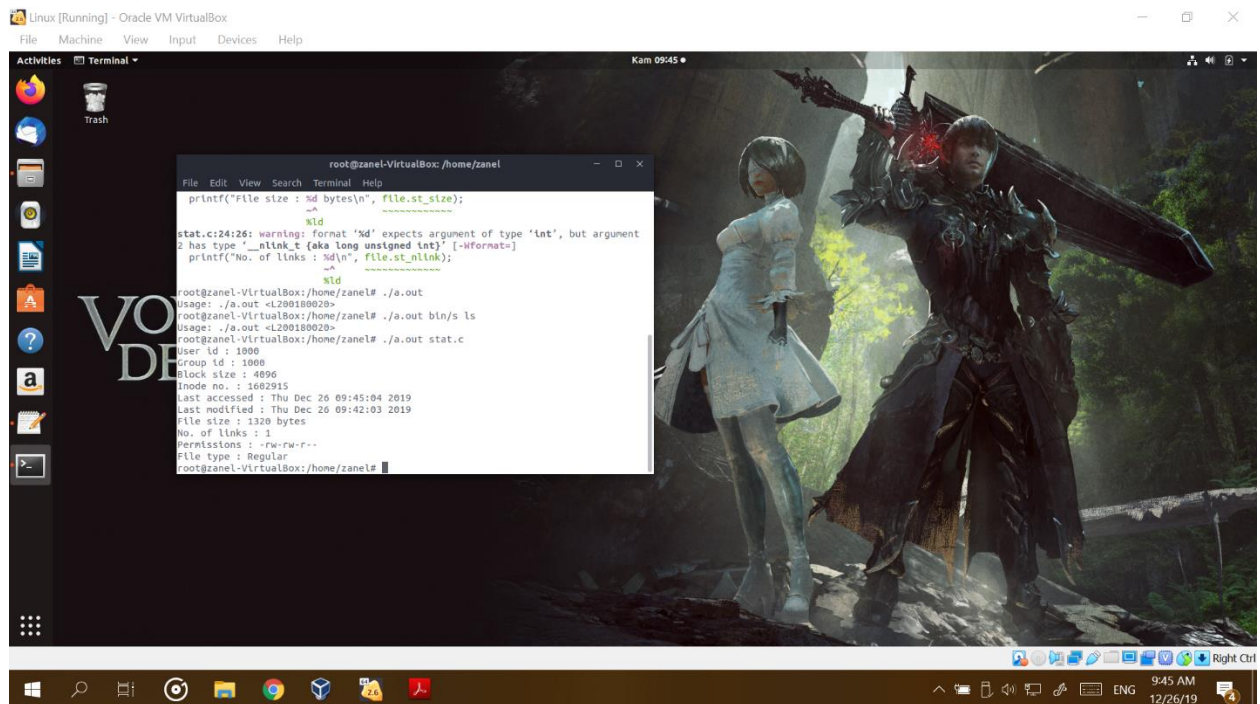
## Kode program stat.c



The screenshot shows a Linux VM window titled "Linux [Running] - Oracle VM VirtualBox". The window contains a text editor with the source code of a program named `stat.c`. The code includes headers `<stdio.h>`, `<sys/stat.h>`, `<stdlib.h>`, and `<time.h>`. It defines a `main` function that takes command-line arguments and prints various file statistics for a given file. The statistics include user ID, group ID, block size, inode number, last accessed and modified times, file size, number of links, permissions, and file type (regular or directory). The code uses `printf` to format the output and `error` for handling invalid arguments.

```
#include <stdio.h>
#include <sys/stat.h>
#include <stdlib.h>
#include <time.h>

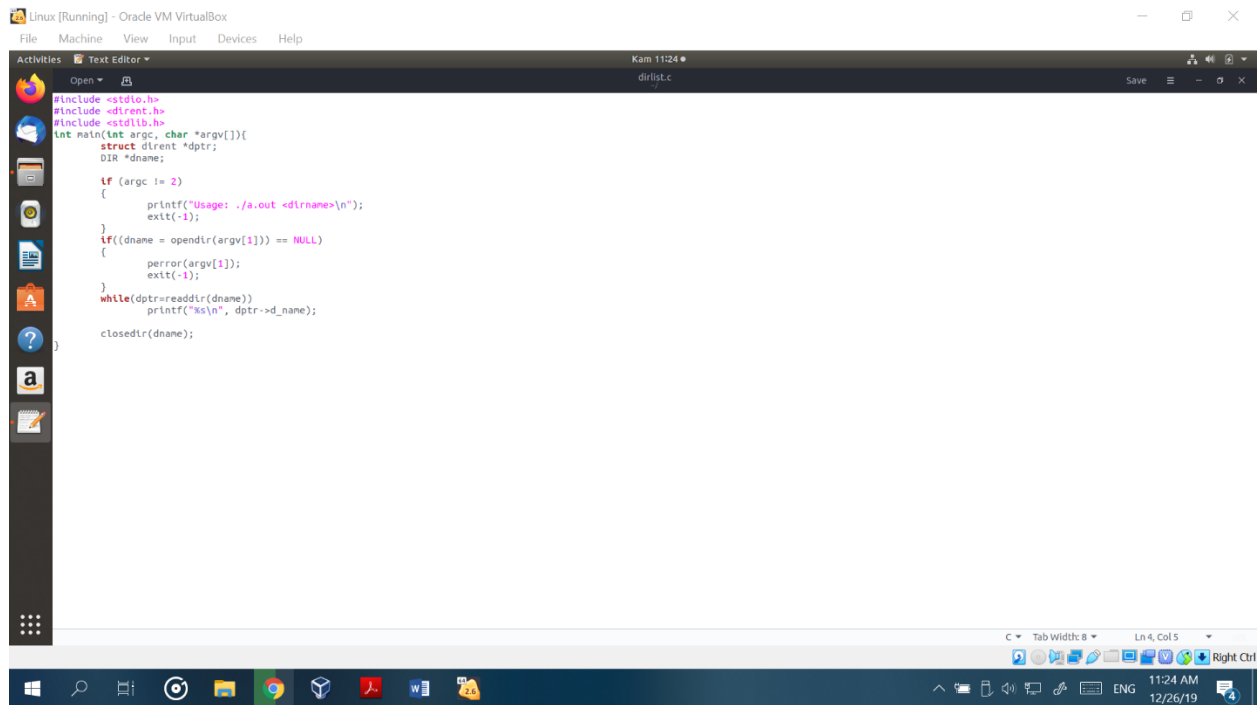
int main(int argc, char*argv[]) {
    struct stat
    file; int n;
    if (argc != 2)
    {
        printf("Usage: ./a.out <L200180020>\n"); exit(-1);
    }
    if ((n = stat(argv[1], &file)) == -1)
    {
        perror(argv[1]);
        exit(-1);
    }
    printf("User id : %d\n", file.st_uid);
    printf("Group id : %d\n", file.st_gid);
    printf("Block size : %d\n", file.st_blksize);
    printf("Inode no. : %d\n", file.st_ino);
    printf("Last accessed : %s", ctime(&(file.st_atime)));
    printf("Last modified : %s", ctime(&(file.st_mtime)));
    printf("File size : %d bytes\n", file.st_size);
    printf("No. of links : %d\n", file.st_nlink);
    printf("Permissions : ");
    printf(" (%sDIR(file.st_mode)) ? 'd' : '-');
    printf(" (%sS_IRUSR) ? 'r' : '-');
    printf(" (%sS_IWUSR) ? 'w' : '-');
    printf(" (%sS_IXUSR) ? 'x' : '-');
    printf(" (%sS_IRGRP) ? 'r' : '-');
    printf(" (%sS_IWGRP) ? 'w' : '-');
    printf(" (%sS_IXGRP) ? 'x' : '-');
    printf(" (%sS_IROTH) ? 'r' : '-');
    printf(" (%sS_IWOTH) ? 'w' : '-');
    printf(" (%sS_IXOTH) ? 'x' : '-');
    printf("\n");
    if (file.st_mode & S_IFREG)
        printf("File type : Regular\n");
    if (file.st_mode & S_IFDIR)
        printf("File type : Directory\n");
}
```



The screenshot shows the same Linux VM window, but now with a terminal window open. The terminal displays the output of the `stat.c` program when it is run on a file named `stat.c`. The output shows the file's statistics, including user ID, group ID, block size, inode number, last accessed and modified times, file size, number of links, permissions, and file type. The terminal also shows the command `./a.out stat.c` being executed and the resulting output.

```
root@zanel-VirtualBox: /home/zanel
File Edit View Search Terminal Help
printf("File size : %d bytes\n", file.st_size);
                                %ld
stat.c:24:26: warning: format '%d' expects argument of type 'int', but argument
2 has type '_nlink_t {aka long unsigned int}' [-Wformat=]
printf("No. of links : %d\n", file.st_nlink);
                                %ld
root@zanel-VirtualBox:/home/zanel# ./a.out
Usage: ./a.out <L200180020>
root@zanel-VirtualBox:/home/zanel# ./a.out bln/s ls
Usage: ./a.out <L200180020>
root@zanel-VirtualBox:/home/zanel# ./a.out stat.c
User id : 1000
Group id : 1000
Block size : 4096
Inode no. : 1682915
Last accessed : Thu Dec 26 09:45:04 2019
Last modified : Thu Dec 26 09:42:03 2019
File size : 1320 bytes
No. of links : 1
Permissions : -rw-r--r--
File type : Regular
root@zanel-VirtualBox:/home/zanel#
```

## Kode program dirlist.c



The screenshot shows a Linux VM window titled "Linux [Running] - Oracle VM VirtualBox". The main window is a text editor displaying the source code of a C program named `dirlist.c`. The code is as follows:

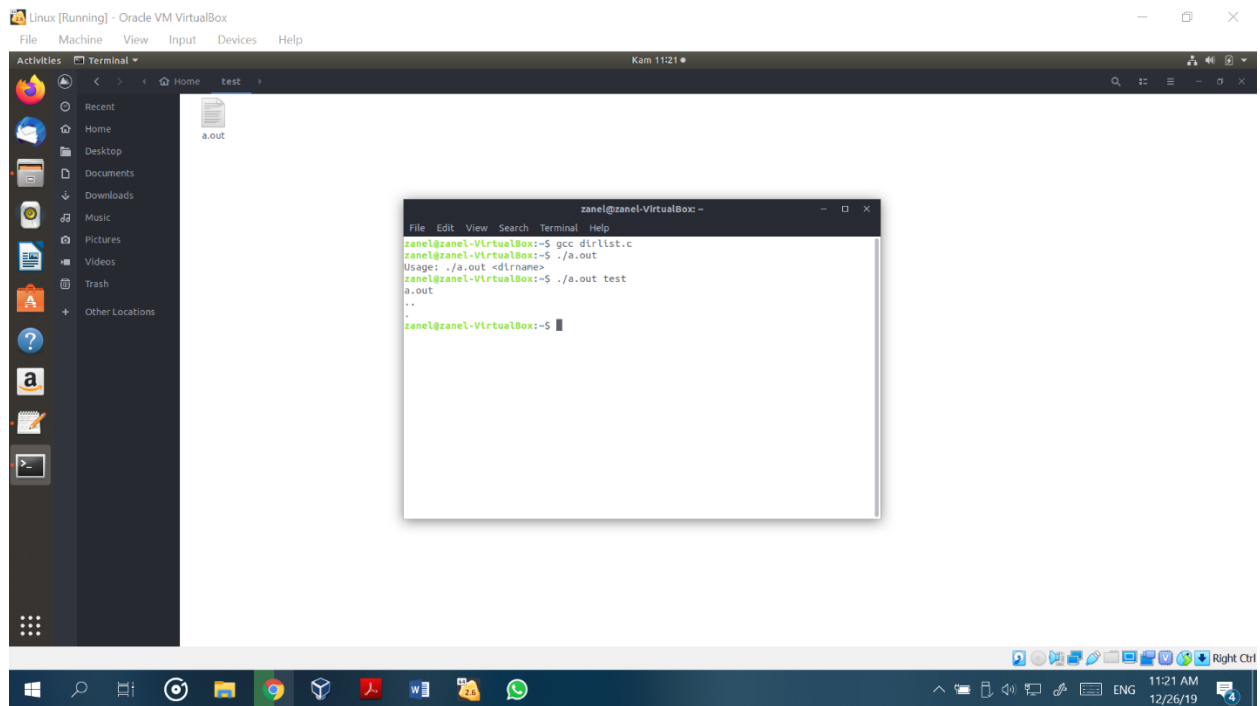
```
#include <stdio.h>
#include <dirent.h>
#include <stdlib.h>

int main(int argc, char *argv[]){
    struct dirent *dptr;
    DIR *dname;

    if (argc != 2)
    {
        printf("Usage: ./a.out <dirname>\n");
        exit(-1);
    }
    if((dname = opendir(argv[1])) == NULL)
    {
        perror(argv[1]);
        exit(-1);
    }
    while(dptr=readdir(dname))
        printf("%s\n", dptr->d_name);

    closedir(dname);
}
```

The text editor has a menu bar with "File", "Machine", "View", "Input", "Devices", and "Help". The status bar at the bottom indicates "Ln 4, Col 5". The system tray at the bottom right shows the time as 11:24 AM on 12/26/19.



The screenshot shows the same Linux VM window, but now with a terminal window open. The terminal shows the compilation and execution of the `dirlist.c` program. The output is as follows:

```
zanel@zanel-VirtualBox: ~
File Edit View Search Terminal Help
zanel@zanel-VirtualBox:~$ gcc dirlist.c
zanel@zanel-VirtualBox:~$ ./a.out
Usage: ./a.out <dirname>
zanel@zanel-VirtualBox:~$ ./a.out test
a.out
..
.
zanel@zanel-VirtualBox:~$
```

The terminal window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The background of the VM shows a file manager window with a sidebar containing "Recent", "Home", "Desktop", "Documents", "Downloads", "Music", "Pictures", "Videos", "Trash", and "Other Locations". The system tray at the bottom right shows the time as 11:21 AM on 12/26/19.

