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PROJECT REPORT

FILE-SYSTEM FORMATTING

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CERTIFICATE

This is to certify that the seminar entitled “FILE-SYSTEM FORMATTING” has been carried out by NISHANT KUMAR and CHETAN PAWAR under my guidance in partial fulfillment of Third Year Computer Engineering of Savitribai Phule Pune University, Pune during the academic year 2017-2018.

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ABSTRACT

In computing, a **file system** or **filesystem** is used to control how data is stored and retrieved. Without a file system, information placed in a storage medium would be one large body of data with no way to tell where one piece of information stops and the next begins. By separating the data into pieces and giving each piece a name, the information is easily isolated and identified. Taking its name from the way paper-based information systems are named, each group of data is called a "file". The structure and logic rules used to manage the groups of information and their names is called a "file system".

There are many different kinds of file systems. Each one has different structure and logic, properties of speed, flexibility, security, size and more. Some file systems have been designed to be used for specific applications. For example, the ISO 9660 file system is designed specifically for optical discs.

The file system provides the mechanism for online storage and access to file contents, including data and programs. This paper covers the high-level details of file systems, as well as related topics such as the disk cache, the file system interface to the kernel, and the user-level APIs that use the features of the file system. It will give you a thorough understanding of how a file system works in general. The main component of the operating system is the file system. It is used to create, manipulate, store, and retrieve data. At the highest level, a file system is a way to manage information on a secondary storage medium. There are so many layers under and above the file system. All the layers are to be fully described here. This paper will give the explanatory knowledge of the file system designers and the researchers in the area.

1. INTRODUCTION

1.1 Problem Statement

Implement file system format program which will copy host OS file system and formats secondary storage such as Flash drives, USB drives with same file system.

1.2 Project Background

File systems can be used on numerous different types of storage devices that use different kinds of media. The most common storage device in use today is a hard disk drive. Other kinds of media that are used include flash memory, magnetic tapes, and optical discs. In some cases, such as with tmpfs, the computer's main memory (random-access memory, RAM) is used to create a temporary file system for short-term use.

1.3 Objective

- The purpose of this document is to Design and Implement file system format program which will copy host OS file system and formats secondary storage such as Flash drives, USB drives with file system such as-
 - 1)ext4
 - 2)NTFS
 - 3)Fat32
 - 4)Btrfs
 - 5)Reiserfs
- Provides a concrete description of the project's effect at the outcome.
- Was developed in a participatory process;
- Is accepted by the target group and other stakeholders;
- Is clear and concise.

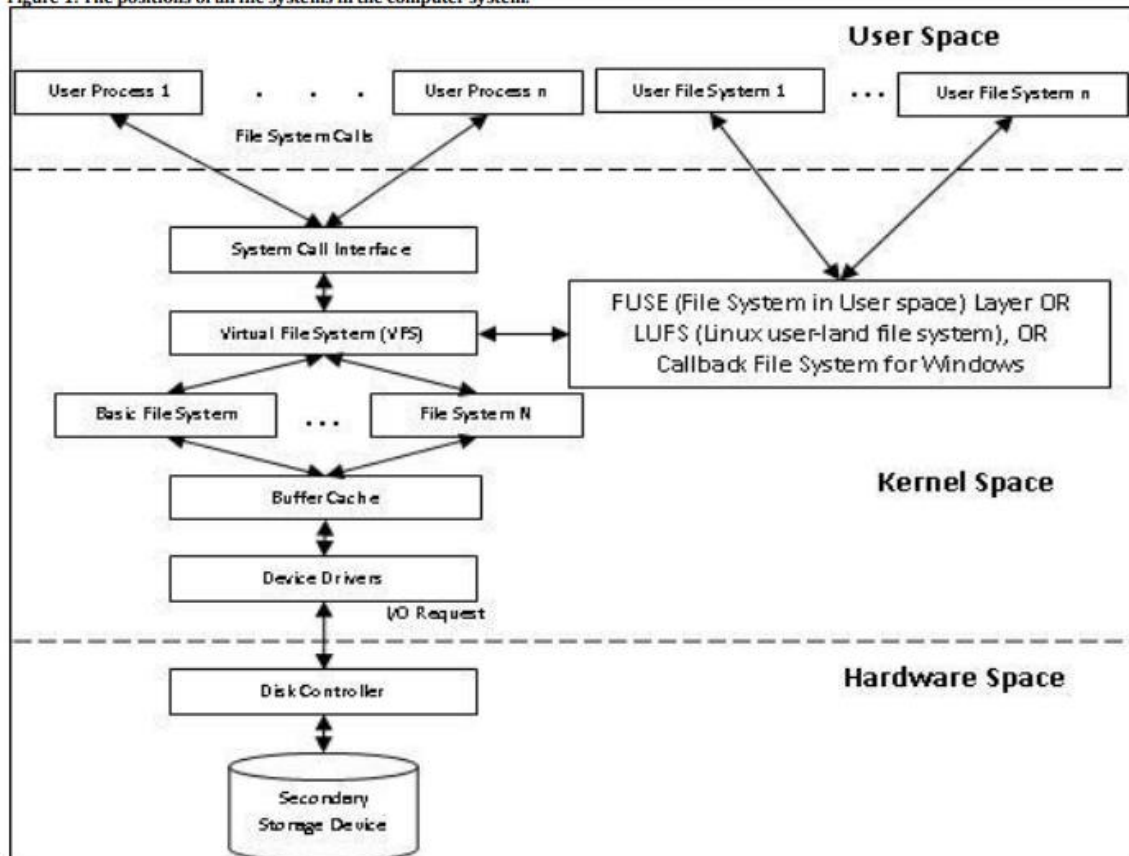
1.4 Motivation

Project motivation is a key aspect to a successful project, yet few studies exist that shed light on this important subject. This article reviews the current literature and theoretical aspects of motivation and provides an analysis of the data.

2. Design Details:

2.1 UML-Diagram:

Figure 1: The positions of all file systems in the computer system.



3.Implementation Details

3.1 Hardware and Software requirements

- **Apache2 :**

The Apache HTTP Server, colloquially called Apache, is a free and open-source cross-platform web server, released under the terms of Apache License 2.0.

- **Python3:**

Python is an interpreted high-level programming language for general-purpose programming

- **Django Framework:**

Django is a free and open-source web framework, written in Python, which follows the model-view-template (MVT) architectural pattern.

- **Html :**

Hypertext Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS) and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web.

- **Css:**

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language.

- **Gksudo :**

GKsudo prompting for root access, to open the Synaptic Package Manager.

- **Linux OS:**

Linux Operating System.

3.2 Environmental Setup Steps:

- `sudo apt-get -y install python3-pip`
- `pip3 install -y Django`
- `sudo apt-get -y install gksudo`
- `sudo apt-get -y install libguestfs-reiserfs`
- `sudo apt-get update`
- `sudo apt-get -y install btrfs-tools`

3.3 Code:

```
import os
import sys

def Unmounting(loc):
    unmount_cmd = 'umount '+loc
    os.system('gksudo '+unmount_cmd)

def MakeExt4System(loc):
    ext_format_cmd = 'mkfs.ext4 '+loc
    os.system('gksudo '+ext_format_cmd)

def MakeNtfsSystem(loc):
    ntfs_format_cmd = 'mkfs.ntfs '+loc
    os.system('gksudo '+ntfs_format_cmd)

def MakeFat32System(loc):
    fat32_format_cmd = 'mkfs.vfat '+loc
    os.system('gksudo '+fat32_format_cmd)

def MakeBtrfsSystem(loc):
    btrfs_format_cmd = 'mkfs.btrfs -f '+loc
    os.system('xterm -e sudo '+btrfs_format_cmd)
```

```

def MakeReiserfsSystem(loc):
    reiserfs_format_cmd = 'mkfs.reiserfs '+loc
    os.system('xterm -e sudo '+reiserfs_format_cmd)

def main(type1,loc):
    if type1 == "ext4":
        Unmounting(loc)
        MakeExt4System(loc)
    elif type1 == "ntfs":
        Unmounting(loc)
        MakeNtfsSystem(loc)
    elif type1 == "fat32":
        Unmounting(loc)
        MakeFat32System(loc)
    elif type1 == "reiserfs":
        Unmounting(loc)
        MakeReiserfsSystem(loc)
    elif type1 == "btrfs":
        Unmounting(loc)
        MakeBtrfsSystem(loc)

if __name__ == '__main__':
    main(sys.argv[1],sys.argv[2])

```

3.4 Compilation Steps

- 1) cd filesystem.
- 2) python3 manage.py runserver 8000
- 3) goto ipaddress localhost:8000

4. Testing

4.1 Test Cases

a) Precondition :

Your System should contain all the applications listed in requirements.

b) Input :

The path of your secondary device where you want to write file-system.

c) Validation point/trigger/action :

On Clicking the “Format” button , the File-system formatting commands will be excuted.

d) Output :

Your secondary device will be formatted in your required type.

e) Postcondition :

Once you clicked on format button ,Wait for a webpage to get refreshed.

5.Applications:

5.1 Ext 4

Ext4 was born as a series of backward-compatible extensions to ext3, many of them originally developed by Cluster File Systems for the Lustre file system between 2003 and 2006, meant to extend storage limits and add other performance improvements. However, other Linux kernel developers opposed accepting extensions to ext3 for stability reasons and proposed to fork the source code of ext3, rename it as ext4, and perform all the development there, without affecting the current ext3 users. This proposal was accepted, and on 28 June 2006, Theodore Ts'o, the ext3 maintainer, announced the new plan of development for ext4.

5.2 FAT32

In order to overcome the volume size limit of FAT16, while at the same time allowing DOS real mode code to handle the format, Microsoft designed a new version of the file system, FAT32, which supported an increased number of possible clusters, but could reuse most of the existing code, so that the conventional memory footprint was increased by less than 5 KiB under DOS. Cluster values are represented by 32-bit numbers, of which 28 bits are used to hold the cluster number.

5.3 NTFS

NTFS ("New Technology File System") is a proprietary file system developed by Microsoft. Starting with Windows NT 3.1, it is the default file system of the Windows NT family. NTFS has several technical improvements over the file systems that it superseded – File Allocation Table (FAT) and High Performance File System (HPFS) – such as improved support for metadata and advanced data structures to improve performance, reliability, and disk space use. Additional extensions are a more elaborate security system based on access control lists (ACLs) and file system journaling.

5.1 Btrfs

Btrfs (B-tree file system) is a file system based on the copy-on-write (COW) principle, initially designed at Oracle Corporation for use in Linux. The development of Btrfs began in 2007, and since August 2014 the file system's on-disk format has been marked as stable. Chris Mason, the principal Btrfs author, has stated that its goal was "to let Linux scale for the storage that will be available. Scaling is not just about addressing the storage but also means being able to administer and to manage it with a clean interface that lets people see what's being used and makes it more reliable".

5.5 ReiserFs

ReiserFS is a general-purpose, journaled computer file system formerly designed and implemented by a team at Namesys led by Hans Reiser. ReiserFS is currently supported on Linux (without quota support) licensed as GPLv2. Introduced in version 2.4.1 of the Linux kernel, it was the first journaling file system to be included in the standard kernel. ReiserFS is the default file system on the Elive, Xandros, Linspire, and YOPER Linux distributions. ReiserFS was the default file system in Novell's SUSE Linux Enterprise until Novell decided to move to ext3 on October 12, 2006 for future releases.

6.Conclusion

This paper gives a light on the layer of file system in the computer system. All the upper layers and the lower layer are shown in it that gives a sound knowledge about the file system interaction between them. This review paper also tells about the view of file systems that may be the user file systems which has the interface kernel module like FUSE, LUGS, and Callback File System. These interface modules are intermediate between the VFS and the user space file systems.

7.References

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