AMRITA VISHWA VIDYAPEETHAM
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22AIE202 Operating Systems

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Project Report

FILE MANAGEMENT AND RETRIEVAL IN XOS FILE SYSTEM

Team Members:

CB.SC.U4AIE23024- V. DIVYA MADHURI

CB.SC.U4AIE23037-KEERTHIVASAN S V

CB.SC.U4AIE23044-MOPURU SAI BAVESH REDDY

CB.SC.U4AIE23073-V. BHAVYA KRUTHI

Department of CENTRE FOR COMPUTATIONAL ENGINEERING AND NETWORKING

AMRITA SCHOOL OF ENGINEERING

AMRITA VISHWA VIDYAPEETHAM

COIMBATORE – 641 112

AMRITA SCHOOL OF ARTIFICIAL INTELLIGENCE

AMRITA VISHWA VIDYAPEETHAM

COIMBATORE-641112

BONAFIDE CERTIFICATE

This is to certify that the report entitled "**FILE MANAGEMENT AND RETRIEVAL IN XOS FILE SYSTEM**" submitted by DIVYA MADHURI (CB.SC.U4AIE23024), KEERTHIVASAN S V (CB.SC.U4AIE23037), MOPURU SAI BAVESH REDDY (CB.SC.U4AIE23044), VEMULA BHAVYA KRUTHI (CB.SC.U4AIE23073), for the award of the Degree of Bachelor of Technology in the "CSE(AI) " is a Bonafide record of the work carried out by her under our guidance and supervision at Amrita School of Artificial Intelligence, Coimbatore.

Mr. Vipin Das

Project Supervisor

Dr. K.P.Soman

Professor and Head CEN

AMRITA SCHOOL OF ARTIFICIAL INTELLIGENCE AMRITA VISHWA VIDYAPEETHAM

COIMBATORE - 641 112

DECLARATION

We hereby declare that this thesis entitled "**FILE MANAGEMENT AND RETRIEVAL IN XOS FILE SYSTEM**", is the record of the original work done by me under the guidance of Mr. Vipin Das, Centre for Computational Engineering and Networking, Amrita School of Artificial Intelligence, Coimbatore. To the best of my knowledge this work has not formed the basis for the award of any degree/diploma/ associate ship/fellowship/or a similar award to any candidate in any University.

Signature of the Faculty

Names	Roll Numbers
DIVYA MADHURI	**CB.SC.U4AIE23024**
KEERTHIVASAN S V	**CB.SC.U4AIE23037**
BAVESH REDDY	**CB.SC.U4AIE23044**
BHAVYA KRUTHI	**CB.SC.U4AIE23073**

Place: Ettimadai
Date:20-11-2024

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1. Introduction

The XOS file system provides a hands-on platform for understanding operating system concepts, particularly file management and allocation. This project focuses on exploring how XOS handles files of varying sizes, their storage across disk blocks, and the retrieval process using the File Allocation Table (FAT).

Through this project, we aim to demonstrate the practical application of file management concepts, including block allocation, FAT indexing, and efficient storage mechanisms.

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2. Objectives

1. To create three files of varying sizes with content derived from team member names.
2. Ensure at least two files span multiple disk blocks.
3. Retrieve file contents using FAT and block references.
4. Analyze FAT structure, basic blocks, and data blocks for stored files.
5. Document observations, challenges, and insights gained.

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3. Setup and Configuration

Environment Setup

Navigate to the XOS installation directory by executing the following command:
cd ~/Desktop/XOS/myxos/xfs-interface

Start the XOS interface by running the command:
./xfs-interface

Verify the interface is running. You should see the output:
Unix-XFS Interface Version 1.0.
Type "help" for getting a list of commands.

Understanding XOS Disk Layout

The disk contains 512 blocks, with some reserved for OS operations. Files are stored in basic blocks (metadata) and data blocks (content). FAT resides at block 19, storing file names, sizes, and basic block pointers.

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4. Methodology

4.1 File Creation

Three files were created with varying sizes by repeating team member names.

File 1 (Small Size):
gedit file1.dat &

Content:
V. Divya Madhuri
Keerthivasan S V
Mopuru Sai Bavesh Reddy
V. Bhavya Kruthi

File 2 (Medium Size):
gedit file2.dat &

Content:
(Names repeated till some 1500 lines)

File 3 (Large Size):
printf "V. Divya Madhuri
Keerthivasan S V
Mopuru Sai Bavesh Reddy
V. Bhavya Kruthi
"%.0s" {1..100} > file3.dat

This ensured the file exceeded 1024 bytes and spanned multiple blocks. It spanned some 3500 lines.

4.2 File Upload
Files were uploaded to the XOS disk using the following commands:

load --data file1.dat
load --data file2.dat
load --data file3.dat

The df command confirmed block allocations after each upload:
df

4.3 File Retrieval

Retrieve FAT:
FAT stored at block 19 was copied to a readable file:
copy 19 19 fat.txt

Analyze Basic Blocks:
Basic blocks were retrieved using pointers from the FAT. For example, for file1.dat:
copy 26 26 basic.txt

Retrieve Data Blocks:
Data blocks were accessed using pointers in the basic block. For example, for file1.dat:
copy 25 25 file1_content.txt

5. Results

5.1 FAT Table

file1.dat 512 24
file2.dat 3584 26
file3.dat 6144 34

Here **file2.dat** and **file3.dat** satisfy the requirement of spanning multiple blocks on the XOS disk.

5.2 Basic Blocks

Example for file1.dat:
25
-1
-1

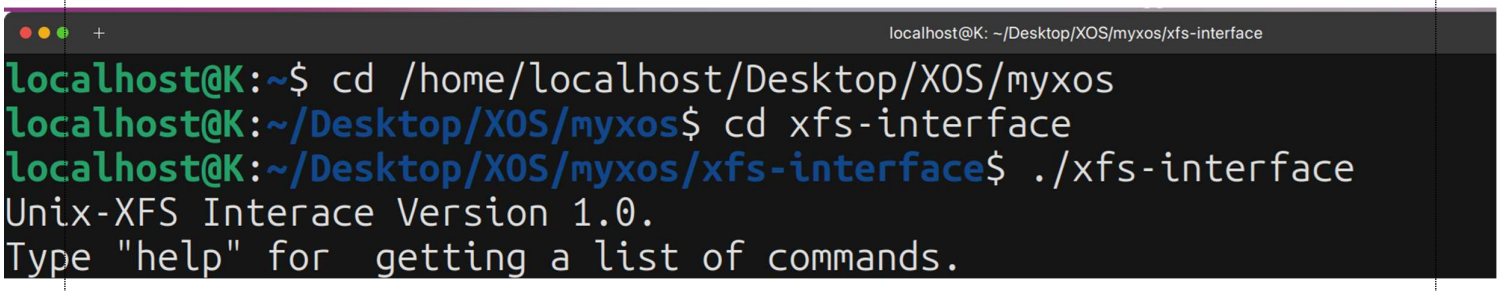
5.3 File Contents

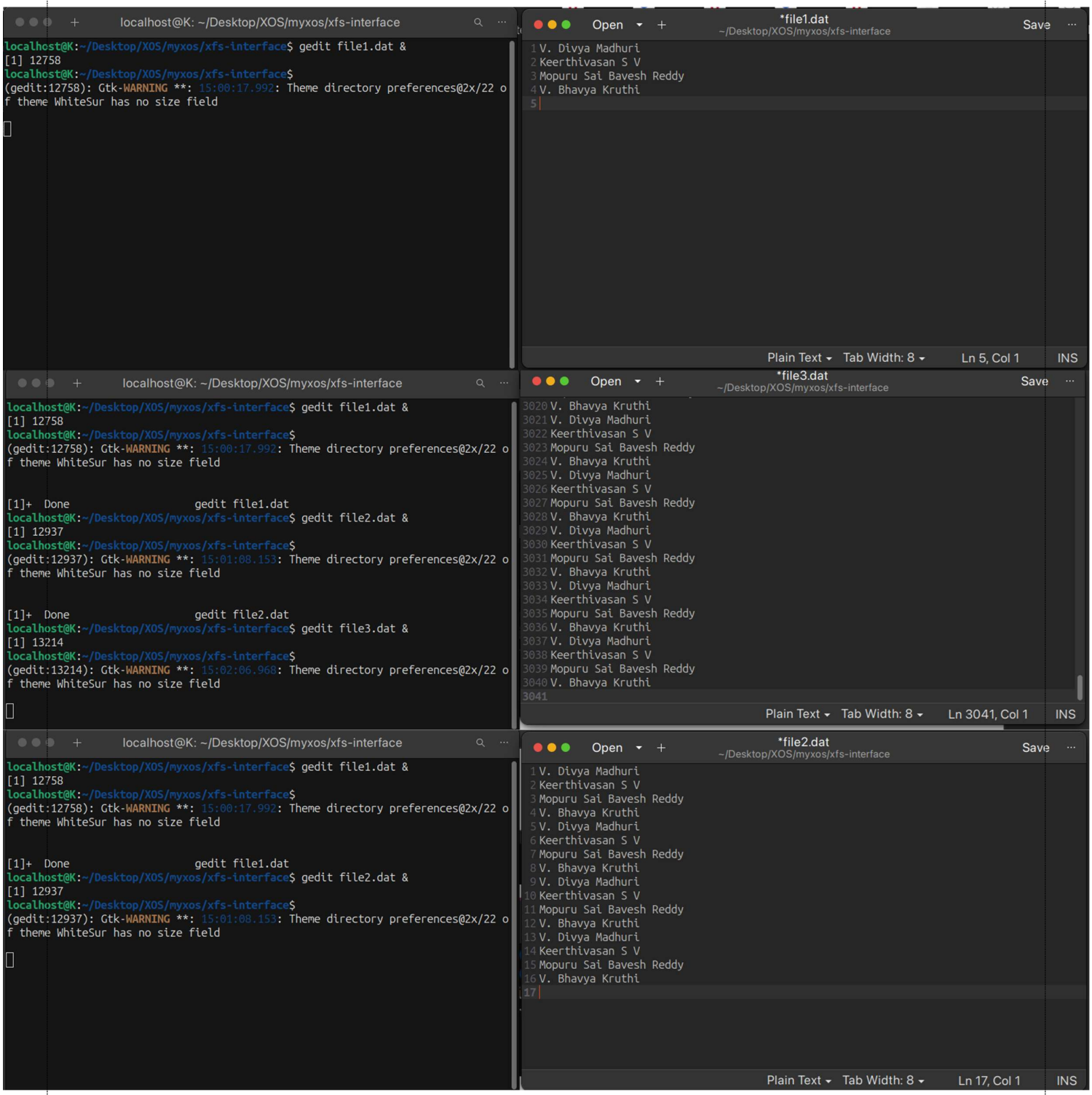
Example content retrieved from file1_content.txt:
V. Divya Madhuri
Keerthivasan S V
Mopuru Sai Bavesh Reddy
V. Bhavya Kruthi

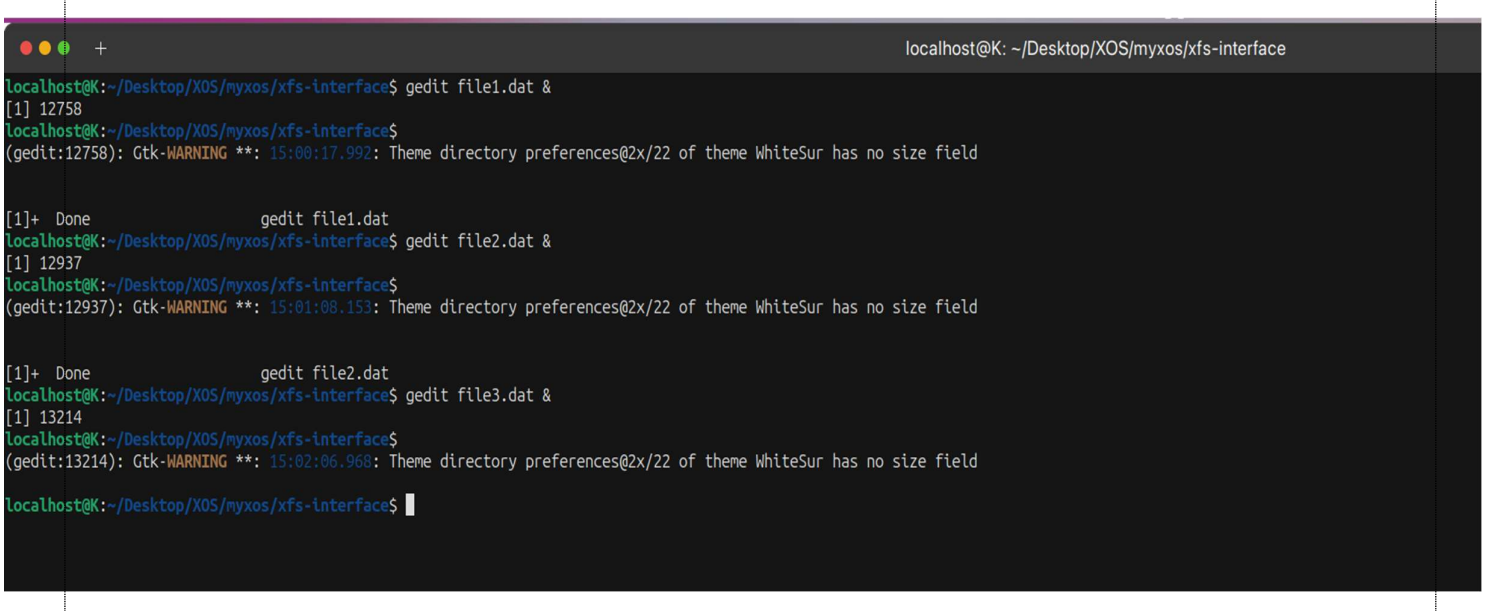
5.4 Disk Space Usage

The df command showed decreasing free space as files were uploaded, confirming successful allocation.

5.5 Codes and Results [Screenshots]




localhost@K: ~/Desktop/XOS/myxos/xfs-interface
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ gedit file1.dat &
[1] 12758
localhost@K:~/Desktop/XOS/myxos/xfs-interface$
(gedit:12758): Gtk-WARNING **: 15:00:17.992: Theme directory preferences@2x/22 of theme WhiteSur has no size field
Open
*file1.dat
~/Desktop/XOS/myxos/xfs-interface
Save
1 V. Divya Madhuri
2 Keerthivasan S V
3 Mopuru Sai Bavesh Reddy
4 V. Bhavya Kruthi
5
Plain Text
Tab Width: 8
Ln 5, Col 1
INS
localhost@K: ~/Desktop/XOS/myxos/xfs-interface
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ gedit file1.dat &
[1] 12758
localhost@K:~/Desktop/XOS/myxos/xfs-interface$
(gedit:12758): Gtk-WARNING **: 15:00:17.992: Theme directory preferences@2x/22 of theme WhiteSur has no size field
[1]+ Done gedit file1.dat
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ gedit file2.dat &
[1] 12937
localhost@K:~/Desktop/XOS/myxos/xfs-interface$
(gedit:12937): Gtk-WARNING **: 15:01:08.153: Theme directory preferences@2x/22 of theme WhiteSur has no size field
[1]+ Done gedit file2.dat
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ gedit file3.dat &
[1] 13214
localhost@K:~/Desktop/XOS/myxos/xfs-interface$
(gedit:13214): Gtk-WARNING **: 15:02:06.968: Theme directory preferences@2x/22 of theme WhiteSur has no size field
Open
*file3.dat
~/Desktop/XOS/myxos/xfs-interface
Save
3020 V. Bhavya Kruthi
3021 V. Divya Madhuri
3022 Keerthivasan S V
3023 Mopuru Sai Bavesh Reddy
3024 V. Bhavya Kruthi
3025 V. Divya Madhuri
3026 Keerthivasan S V
3027 Mopuru Sai Bavesh Reddy
3028 V. Bhavya Kruthi
3029 V. Divya Madhuri
3030 Keerthivasan S V
3031 Mopuru Sai Bavesh Reddy
3032 V. Bhavya Kruthi
3033 V. Divya Madhuri
3034 Keerthivasan S V
3035 Mopuru Sai Bavesh Reddy
3036 V. Bhavya Kruthi
3037 V. Divya Madhuri
3038 Keerthivasan S V
3039 Mopuru Sai Bavesh Reddy
3040 V. Bhavya Kruthi
3041
Plain Text
Tab Width: 8
Ln 3041, Col 1
INS
localhost@K: ~/Desktop/XOS/myxos/xfs-interface
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ gedit file1.dat &
[1] 12758
localhost@K:~/Desktop/XOS/myxos/xfs-interface$
(gedit:12758): Gtk-WARNING **: 15:00:17.992: Theme directory preferences@2x/22 of theme WhiteSur has no size field
[1]+ Done gedit file1.dat
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ gedit file2.dat &
[1] 12937
localhost@K:~/Desktop/XOS/myxos/xfs-interface$
(gedit:12937): Gtk-WARNING **: 15:01:08.153: Theme directory preferences@2x/22 of theme WhiteSur has no size field
Open
*file2.dat
~/Desktop/XOS/myxos/xfs-interface
Save
1 V. Divya Madhuri
2 Keerthivasan S V
3 Mopuru Sai Bavesh Reddy
4 V. Bhavya Kruthi
5 V. Divya Madhuri
6 Keerthivasan S V
7 Mopuru Sai Bavesh Reddy
8 V. Bhavya Kruthi
9 V. Divya Madhuri
10 Keerthivasan S V
11 Mopuru Sai Bavesh Reddy
12 V. Bhavya Kruthi
13 V. Divya Madhuri
14 Keerthivasan S V
15 Mopuru Sai Bavesh Reddy
16 V. Bhavya Kruthi
17
Plain Text
Tab Width: 8
Ln 17, Col 1
INS



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6. Analysis and Observations

1. FAT Structure:
    - Provides quick references for file name, size, and basic block location.
2. Block Allocation:
    - Basic blocks store pointers to data blocks.
    - Large files span multiple blocks, demonstrating efficient handling by XOS.
3. File Retrieval:
    - Navigation from FAT to basic and data blocks was seamless.
    - -1 in basic blocks indicated the end of file storage.
4. Efficiency:
    - XOS minimizes fragmentation and efficiently handles file sizes up to multiple kilobytes.

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7. Challenges Faced

1. File Size Management:
    - Ensuring that file2.dat and file3.dat spanned multiple blocks required careful repetition of content.

2. Understanding Pointers:
    - Decoding pointers in FAT and basic blocks was initially confusing but was clarified through hands-on practice.

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8. Conclusion

This project successfully demonstrated practical file management operations in the XOS file system. The observations highlighted the simplicity and efficiency of FAT-based indexing. By managing files of different sizes, we explored critical concepts of block allocation, fragmentation, and retrieval.

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9. References

1. XOS Documentation
2. 22AIE202 Operating Systems Course Materials

APPENDIX

```
localhost@K:~/Desktop/XOS/myxos/xfs-interface$ ./xfs-interface
Unix-XFS Interace Version 1.0.
Type "help" for  getting a list of commands.
# fdisk
Formatting Complete. "disk.xfs" created.
# load --data file1.dat
load --data file2.dat
load --data file3.dat
# # # df
0       -       1
1       -       1
2       -       1
3       -       1
4       -       1
5       -       1
6       -       1
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No of Free Blocks = 465
Total no of Blocks = 512# copy 19 19 fat.txt
# copy 26 26 basic.txt
# copy 25 25 file1_content.txt
# copy 25 25 file1_content.txt
#
```

fat.txt:

file1.dat
512
24

file2.dat
3584
26

file3.dat
6144
34

-1
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basic.txt:

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file1_content.txt:

START

MOV SP,
1535
MOV BP,
1535
JMP 00008

PUSH BP

MOV BP,SP

MOV R0,
"2"
OUT R0

MOV R0,
"4"
OUT R0

MOV R0,
"6"
OUT R0

MOV R0,
"8"
OUT R0

```
MOV R0,
"10"
OUT R0

MOV R0,
"12"
OUT R0

MOV R0,
"14"
OUT R0

MOV R0,
"16"
OUT R0

MOV R0,
"18"
OUT R0

MOV R0,
"20"
OUT R0

MOV R0,
10
PUSH R0

INT 7

INT 7
```