

OS 1 Project
File System Implementation (OFS) – Based on EXT2
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OFS (Oh, File System?) is based on the EXT2 file system. All the file system components are stored in a random access file.

OFS Structure:

Superblock	Block Bitmap	Inode Bitmap	Inode Table	Blocks
------------	--------------	--------------	-------------	--------

Features of EXT2 in OFS:

- Linked directory entry list
- Inode table
- Block and Inode Bitmap
- Superblock

Shell Features:

- Create a directory
- Create a file (only text, for now) and insert content
- Navigate to a certain directory (both from root and from the current directory)
- List current directory contents
- Ability to display contents of a text file in the current directory
- Delete a directory and its contents
- Delete a file
- Change file systems files on the run

Features of EXT2 yet to be added in OFS:

- Defragmentation
- Block Groups
- Symbolic links
- Journaling
- Security Features

Programming Language Used: Java

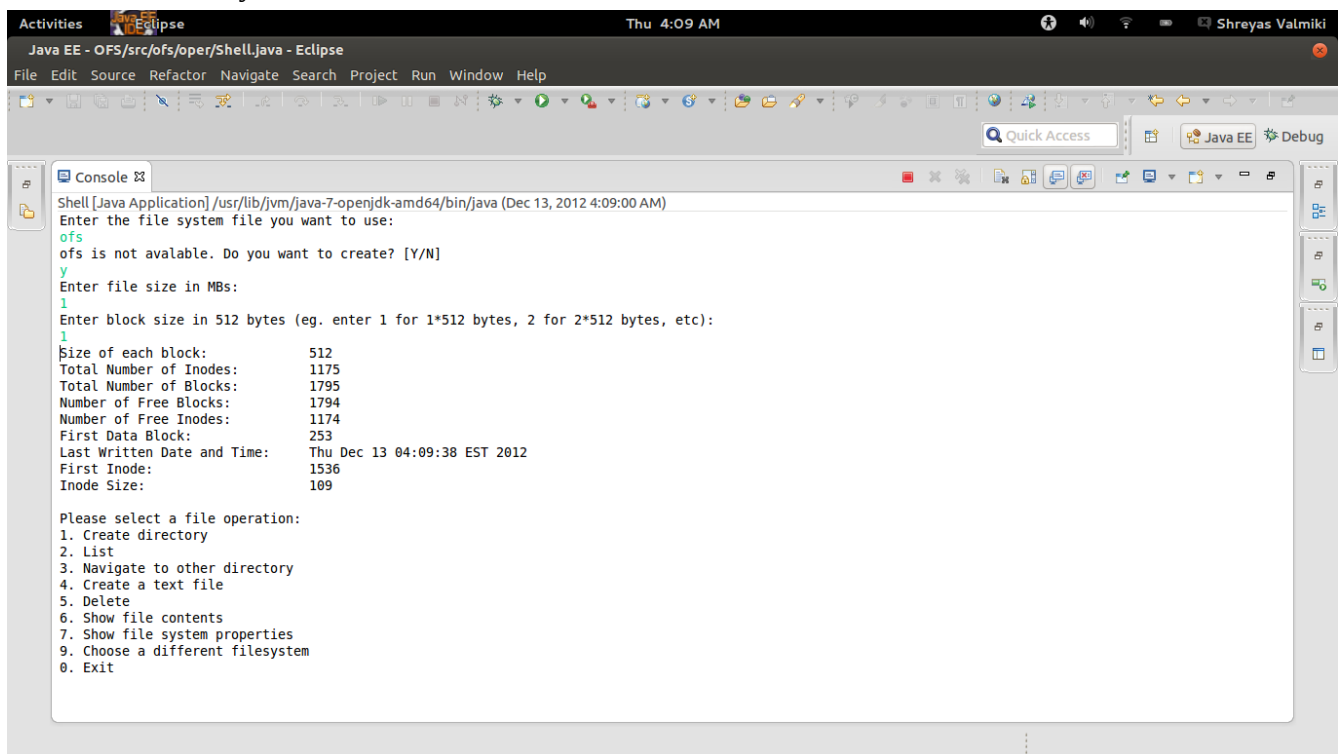
Environment Built in: Eclipse

OS Tested in: Linux

To Run: Run Shell.java (in ofs.oper package) as Java Application.

Results:

Creates a file system random access file if it is not already created. If it is, the file system file can be reused with already stored files and directories:



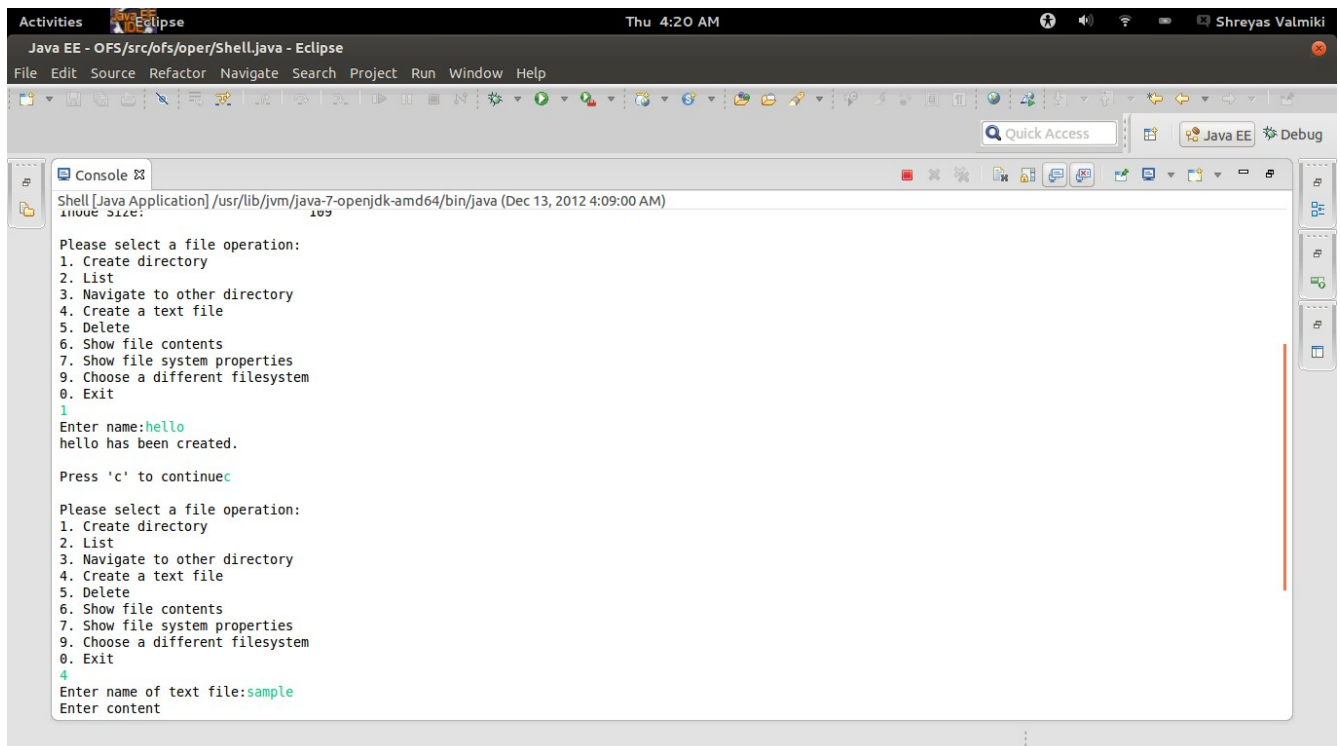
The screenshot shows the Eclipse IDE interface with a Java application running. The console output displays the execution of a shell script that creates a file system. The script prompts the user to enter the file system file name, which is 'ofs'. It then asks if the user wants to create it, and the user responds 'y'. The script then prompts for the file size in MBs (1) and the block size in 512 bytes (1). It then displays the file system properties:

```
Size of each block:      512
Total Number of Inodes:  1175
Total Number of Blocks:  1795
Number of Free Blocks:   1794
Number of Free Inodes:   1174
First Data Block:        253
Last Written Date and Time: Thu Dec 13 04:09:38 EST 2012
First Inode:             1536
Inode Size:              109
```

Finally, it prompts the user to select a file operation from a list:

```
Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
```

Create a directory:



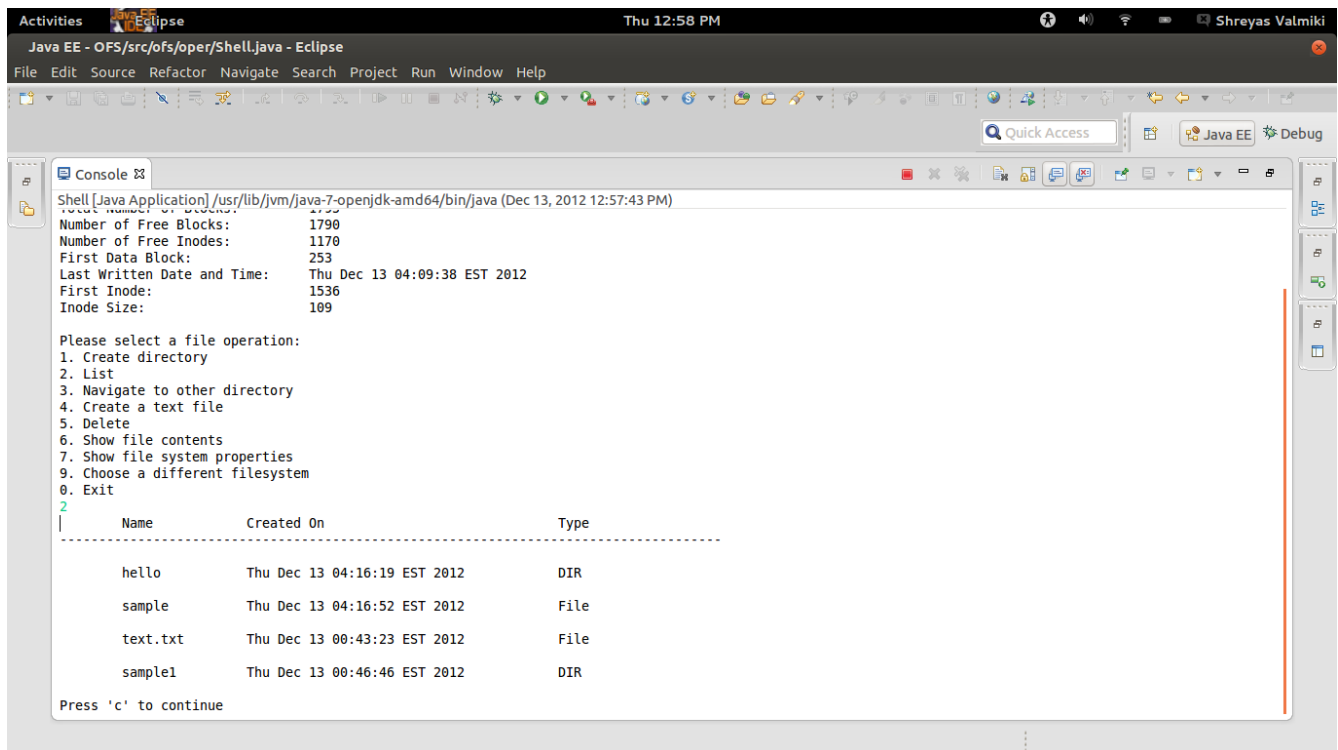
The screenshot shows the Eclipse IDE interface with a Java application running. The console output displays the execution of a shell script that creates a directory. The script prompts the user to select a file operation from a list, and the user selects '1. Create directory'. It then prompts the user to enter the name of the directory, which is 'hello'. The script then displays the message 'hello has been created.' and prompts the user to press 'c' to continue. The user presses 'c', and the script prompts the user to select a file operation from a list again. The user selects '4. Create a text file'. The script then prompts the user to enter the name of the text file, which is 'sample', and then prompts the user to enter the content of the file.

```
Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
1
Enter name:hello
hello has been created.

Press 'c' to continuec

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
4
Enter name of text file:sample
Enter content
```

List directory contents:



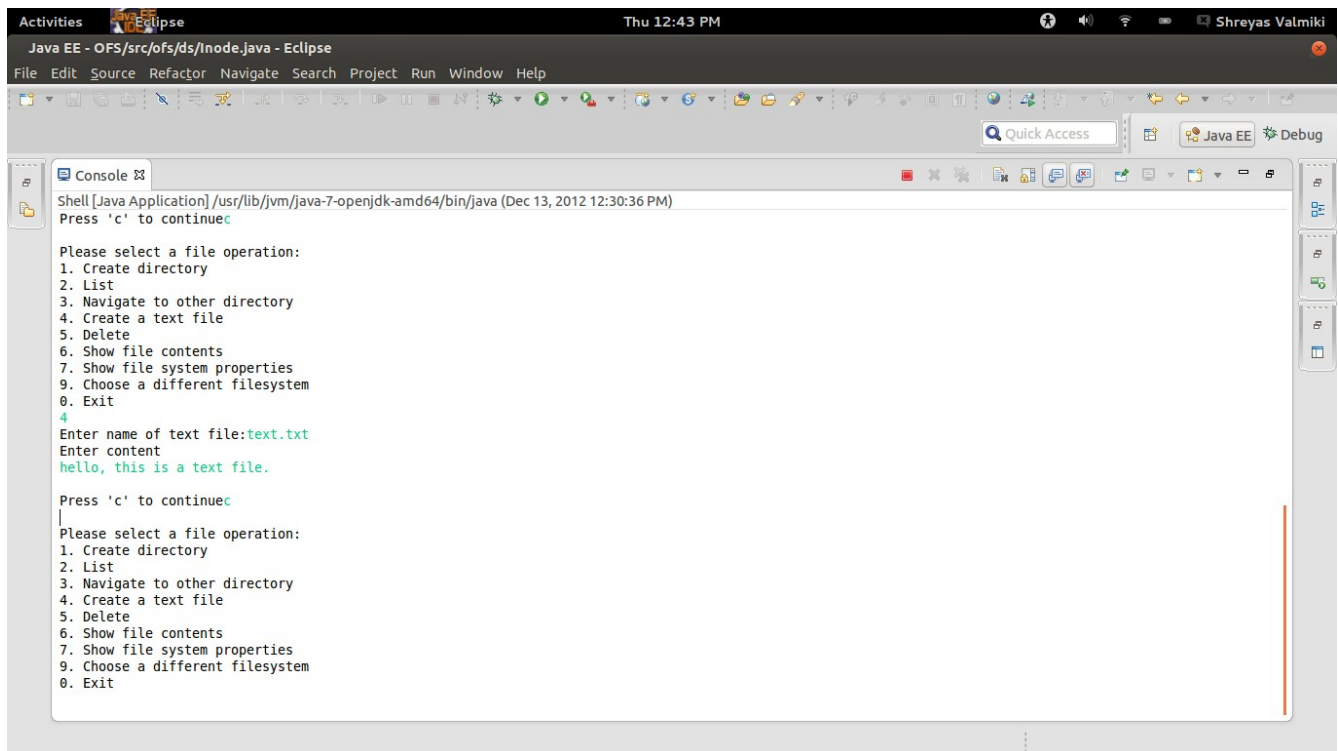
The screenshot shows the Eclipse IDE interface. The title bar indicates the project is 'Java EE - OFS/src/ofs/oper/Shell.java - Eclipse'. The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, and Help. The toolbar contains various icons for file operations and development tools. The 'Console' tab is active, displaying the output of a Java application. The application is running on a shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM). The output shows file system statistics and a list of files and directories in the current directory. The list includes 'hello' (DIR), 'sample' (File), 'text.txt' (File), and 'sample1' (DIR). The application prompts the user to select a file operation from a numbered list (1-10) and to press 'c' to continue.

```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)
Total number of blocks: 1790
Number of Free Blocks: 1170
Number of Free Inodes: 253
First Data Block: 253
Last Written Date and Time: Thu Dec 13 04:09:38 EST 2012
First Inode: 1536
Inode Size: 109

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
2
|      Name      Created On      Type
|-----|-----|
|      hello     Thu Dec 13 04:16:19 EST 2012  DIR
|      sample    Thu Dec 13 04:16:52 EST 2012  File
|      text.txt   Thu Dec 13 00:43:23 EST 2012  File
|      sample1   Thu Dec 13 00:46:46 EST 2012  DIR

Press 'c' to continue
```

Create a file with text content:



The screenshot shows the Eclipse IDE interface. The title bar indicates the project is 'Java EE - OFS/src/ofs/ds/Inode.java - Eclipse'. The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, and Help. The toolbar contains various icons for file operations and development tools. The 'Console' tab is active, displaying the output of a Java application. The application is running on a shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:30:36 PM). The output shows the application prompting the user to select a file operation from a numbered list (1-10) and to press 'c' to continue. The user selects option 4 (Create a text file), and the application prompts for the name of the text file and its content. The user enters 'text.txt' for the name and 'hello, this is a text file.' for the content. The application then prompts the user to select a file operation from the same numbered list and to press 'c' to continue.

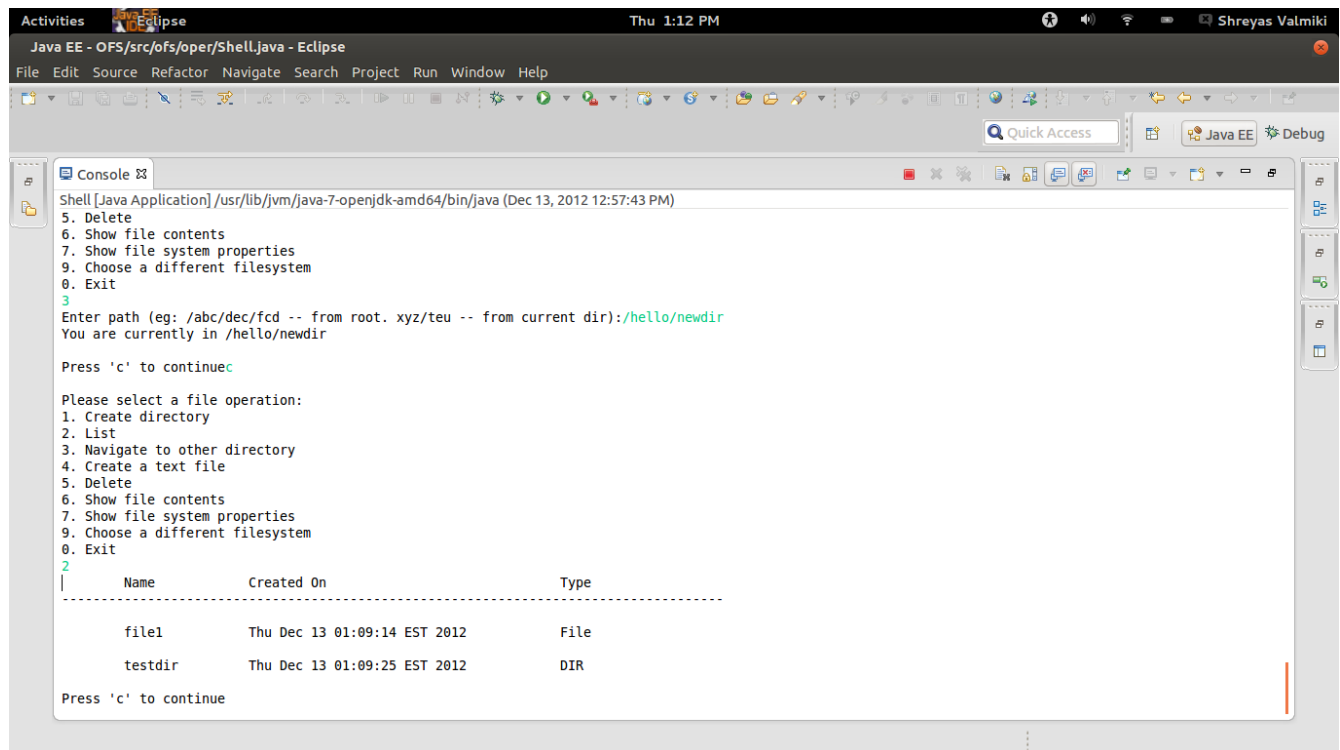
```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:30:36 PM)
Press 'c' to continuec

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
4
Enter name of text file:text.txt
Enter content
hello, this is a text file.

Press 'c' to continuec

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
```

Navigate to another directory from root (absolute path) and print contents of the new directory:



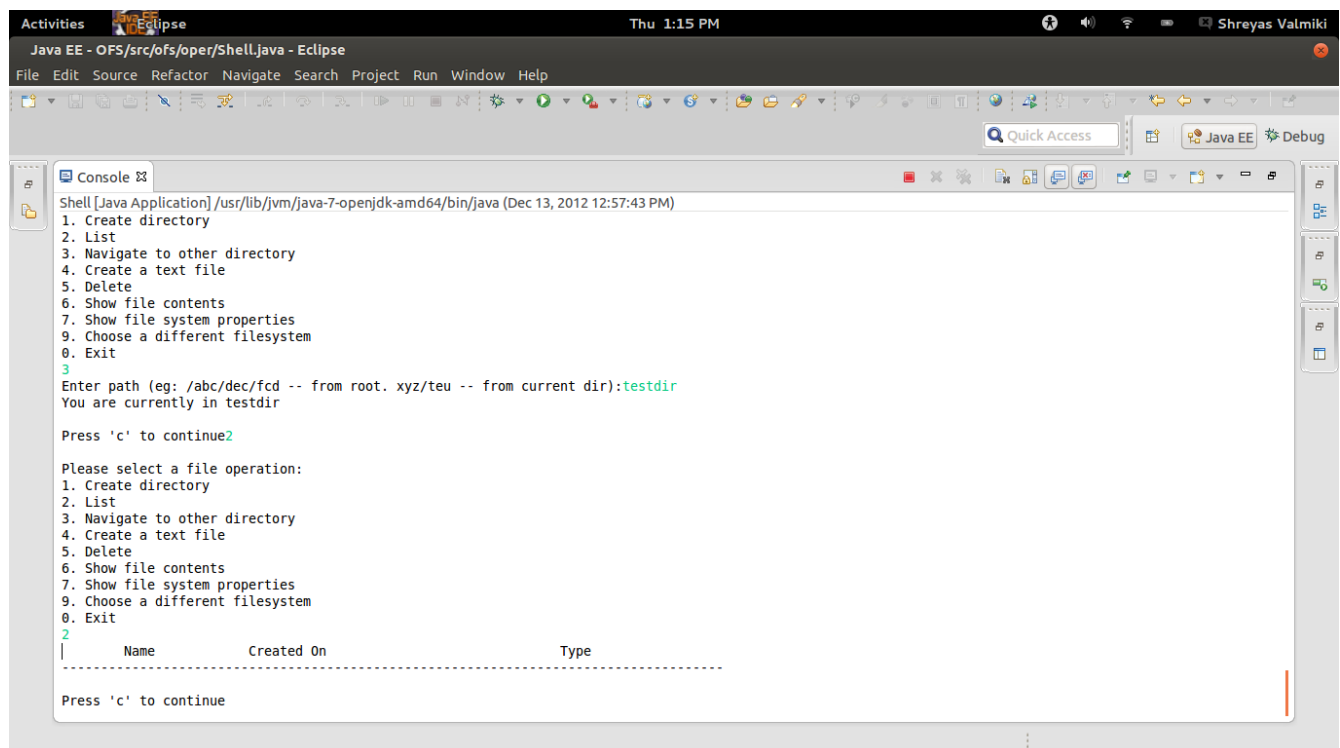
```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
3
Enter path (eg: /abc/dec/fcd -- from root. xyz/teu -- from current dir):/hello/newdir
You are currently in /hello/newdir

Press 'c' to continuec

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
2
|      Name      Created On      Type
|-----|-----|-----|
|      file1      Thu Dec 13 01:09:14 EST 2012      File
|      testdir      Thu Dec 13 01:09:25 EST 2012      DIR
|
Press 'c' to continue
```

Navigate to another directory from current directory and print contents of the empty dir:

Note: “..” navigates to the parent directory



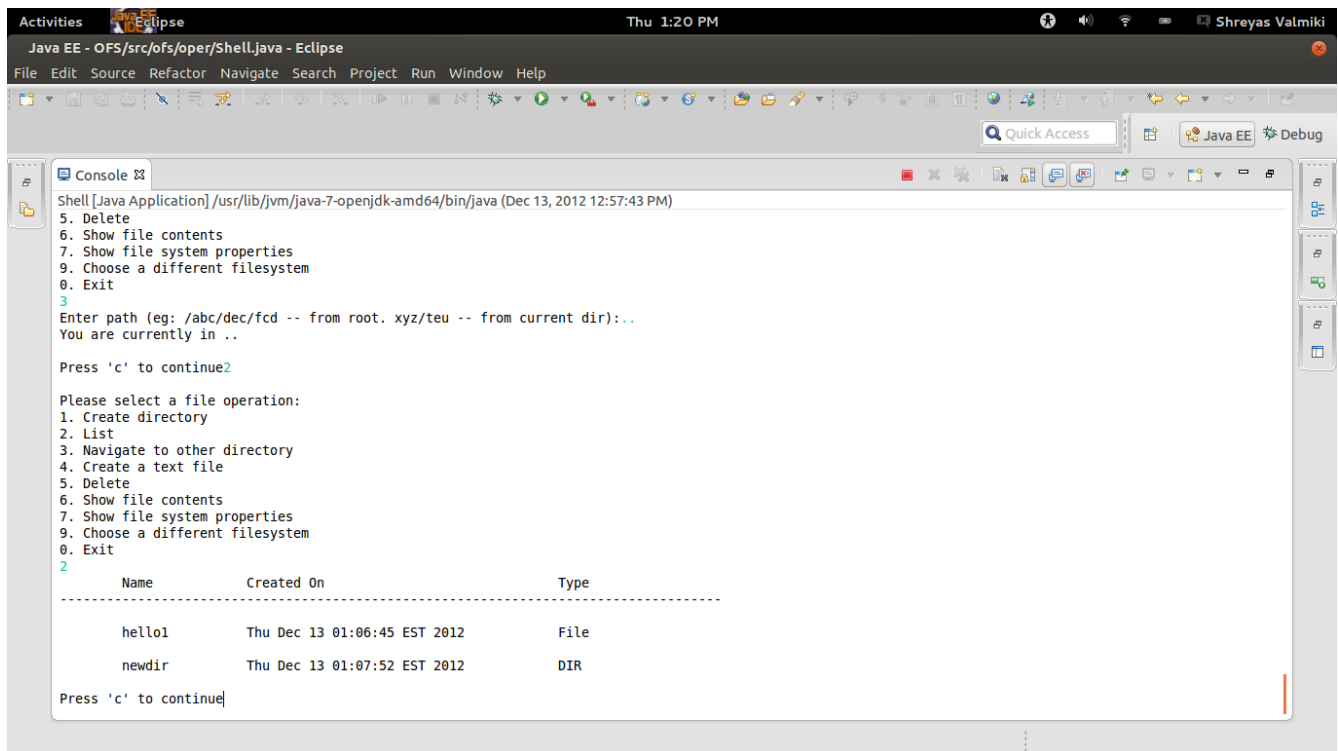
```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
3
Enter path (eg: /abc/dec/fcd -- from root. xyz/teu -- from current dir):testdir
You are currently in testdir

Press 'c' to continue2

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
2
|      Name      Created On      Type
|-----|-----|-----|
|      file1      Thu Dec 13 01:09:14 EST 2012      File
|      testdir      Thu Dec 13 01:09:25 EST 2012      DIR
|
Press 'c' to continue
```

Delete a dir with all its contents:

Before deleting newdir:



The screenshot shows the Eclipse IDE with a Java application running in the console. The application is a shell script that lists file operations. The user has selected '2' (List) from the menu. The console output shows a table of files and directories in the current directory.

```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
3
Enter path (eg: /abc/dec/fcd -- from root. xyz/teu -- from current dir):..
You are currently in ..

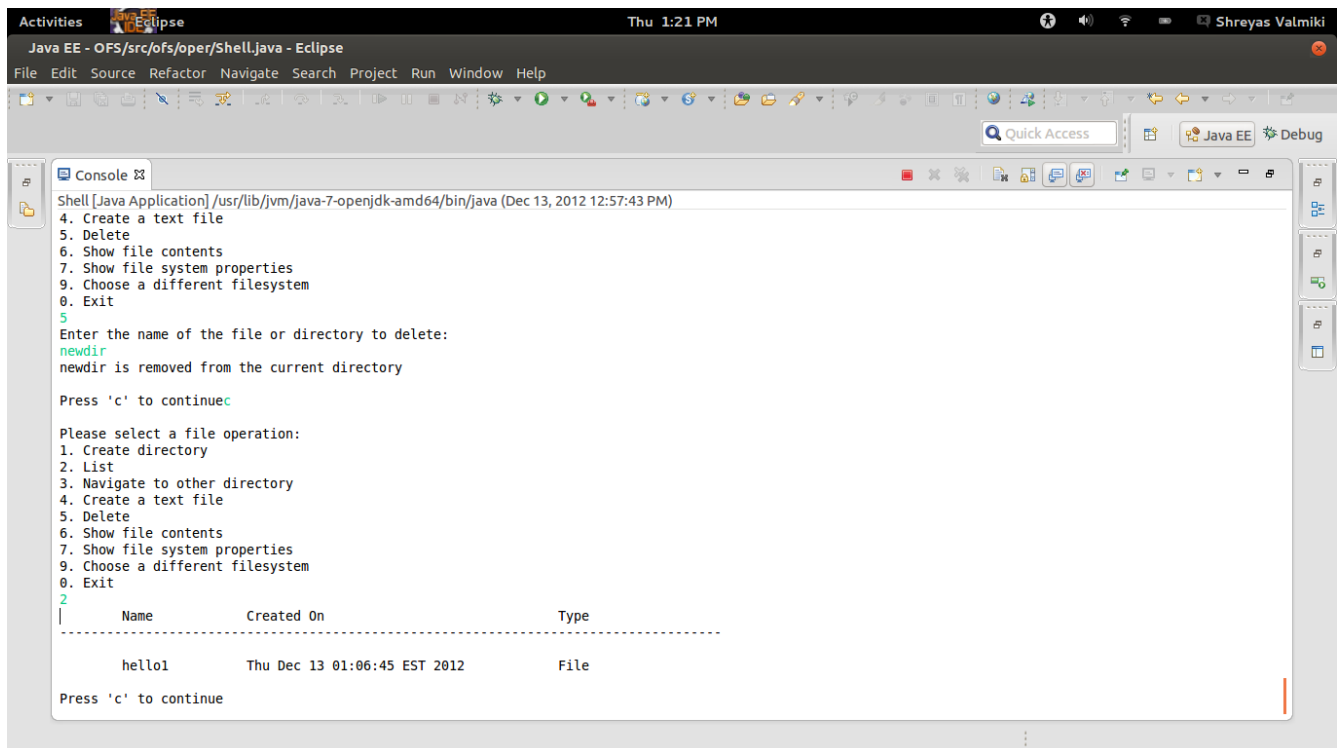
Press 'c' to continue2

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
2
```

Name	Created On	Type
hello1	Thu Dec 13 01:06:45 EST 2012	File
newdir	Thu Dec 13 01:07:52 EST 2012	DIR

Press 'c' to continue|

After deleting newdir:



The screenshot shows the Eclipse IDE with the same Java application running. The user has selected '5' (Delete) from the menu. The console output shows the user entering 'newdir' as the name of the file or directory to delete. The console output shows that 'newdir' is removed from the current directory.

```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
5
Enter the name of the file or directory to delete:
newdir
newdir is removed from the current directory

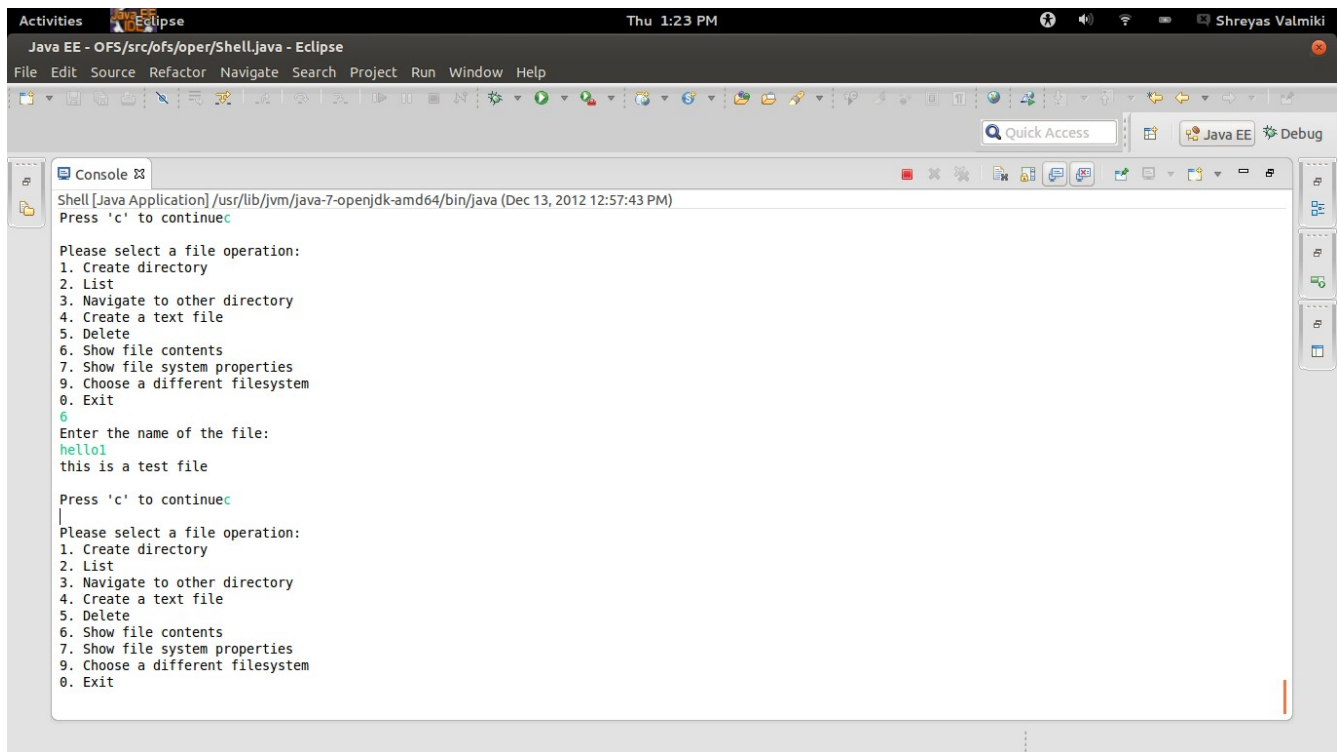
Press 'c' to continuec

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
2
```

Name	Created On	Type
hello1	Thu Dec 13 01:06:45 EST 2012	File

Press 'c' to continue

Display file contents:



The screenshot shows the Eclipse IDE interface. The title bar indicates 'Activities', 'Eclipse', and 'Thu 1:23 PM'. The menu bar includes 'File', 'Edit', 'Source', 'Refactor', 'Navigate', 'Search', 'Project', 'Run', 'Window', and 'Help'. The toolbar contains various icons for file operations and development tools. The 'Console' tab is active, displaying the output of a Java application. The application is running in a shell window titled 'Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)'. The output shows a menu of file operations, with option 6 ('Show file contents') selected. The user has entered 'hello1' as the filename, and the application has responded with 'this is a test file'. The menu is shown again, indicating the application is waiting for further input.

```
Shell [Java Application] /usr/lib/jvm/java-7-openjdk-amd64/bin/java (Dec 13, 2012 12:57:43 PM)
Press 'c' to continuec

Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
6
Enter the name of the file:
hello1
this is a test file

Press 'c' to continuec
|
Please select a file operation:
1. Create directory
2. List
3. Navigate to other directory
4. Create a text file
5. Delete
6. Show file contents
7. Show file system properties
9. Choose a different filesystem
0. Exit
```

References:

<http://www.nongnu.org/ext2-doc/>

<http://wiki.osdev.org/Ext2>

<http://wikipedia.org>

<http://java2s.com>

<http://stackoverflow.com>