



Faculty of Engineering and Technology

Electrical and Computer Engineering Department

Linux Laboratory – ENCS3130

Project One

Shell Scripting Project – Medical Test Management System

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Abstract

This project involved the development of a comprehensive medical test management system utilizing shell scripting. The system allows users to perform various operations, including adding new tests, removing existing tests, updating test results, and conducting searches based on multiple criteria. Additionally, the system incorporates robust error handling mechanisms to manage exceptions resulting from invalid user inputs, ensuring a seamless and reliable user experience.

1. Adding a new medical test

```
Aug 13 10:11
ubuntu@ubuntu: ~/Desktop/MedicalTest

ubuntu@ubuntu:~/Desktop/MedicalTest$ chmod 755 managementSystem
ubuntu@ubuntu:~/Desktop/MedicalTest$ ./managementSystem
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
1
=====
Adding A New Medical Test Record
=====
Please Enter A Patient ID:
1210k
=====
Invalid Patient ID, Please Enter 7 Digits Number.
=====
Please Enter A Patient ID:
1211088
=====
Please Choose The Test Name Type You Want To Add:
1) Hgb
2) LDL
3) BGT
4) systole
5) diastole
=====
7
=====
Invalid Test Number, Please Enter 1 Digit Number Between 1-5.
=====
Please Choose The Test Name Type You Want To Add:
1) Hgb
2) LDL
3) BGT
4) systole
5) diastole
=====
1
=====
Please Enter The Test Date:
209-09k
=====
Invalid Date Format! Please enter the date in YYYY-MM format.
=====
Please Enter The Test Date:
2024-09
=====
Please Enter The Test Result:
kkk
=====
Invalid Result! Please enter a valid number with optional decimal point.
=====
Please Enter The Test Result:
14
=====
Please Choose The Test Status:
1) Pending
2) Completed
```

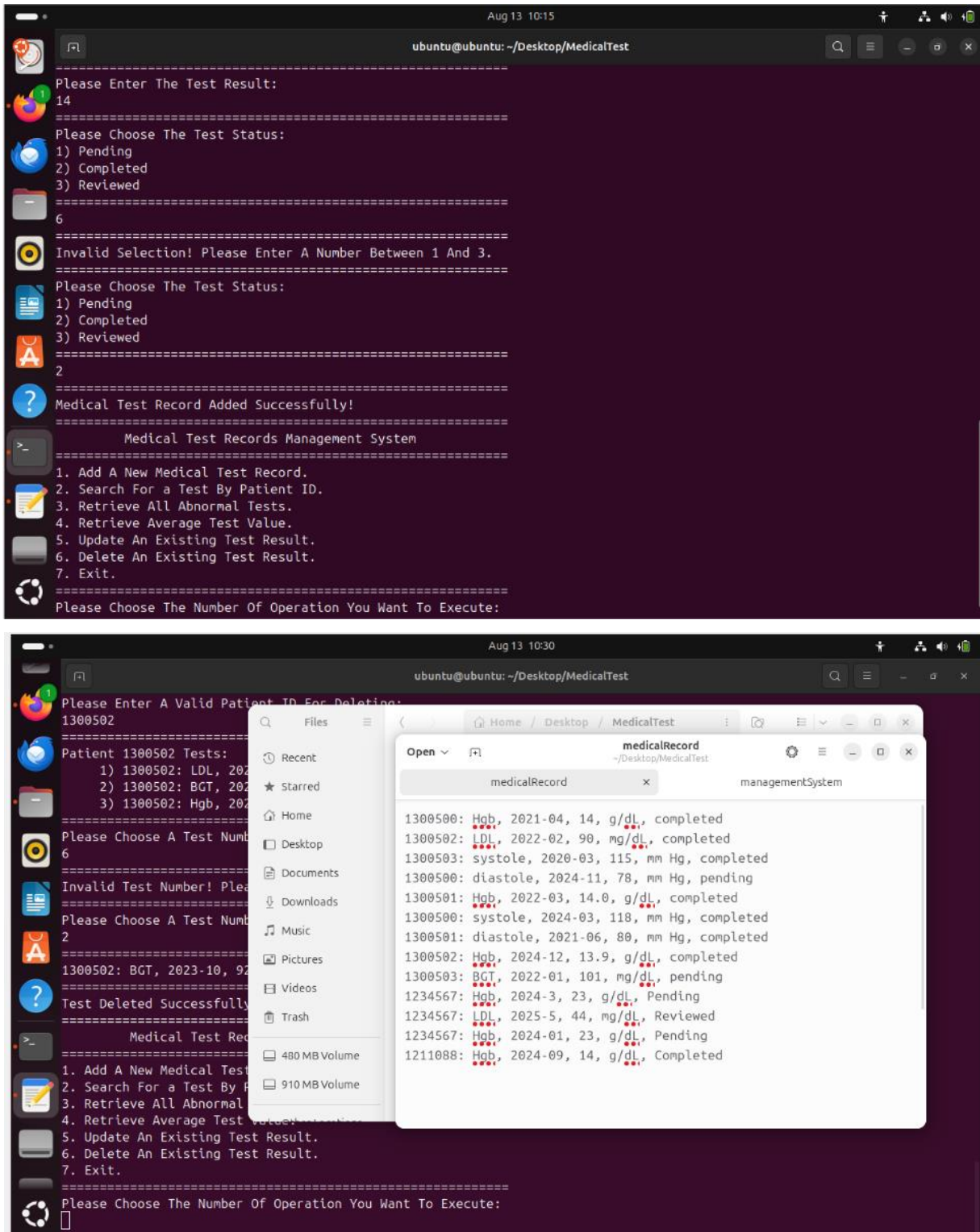
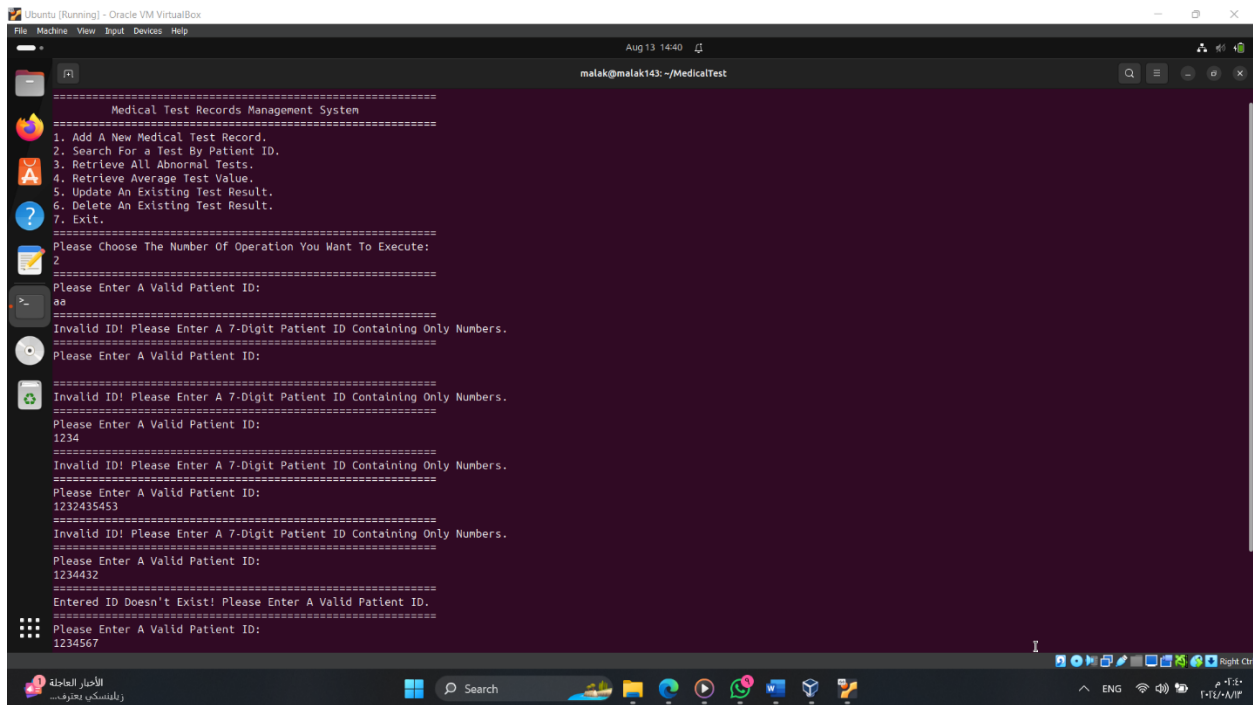


Figure 1: Adding a new medical test

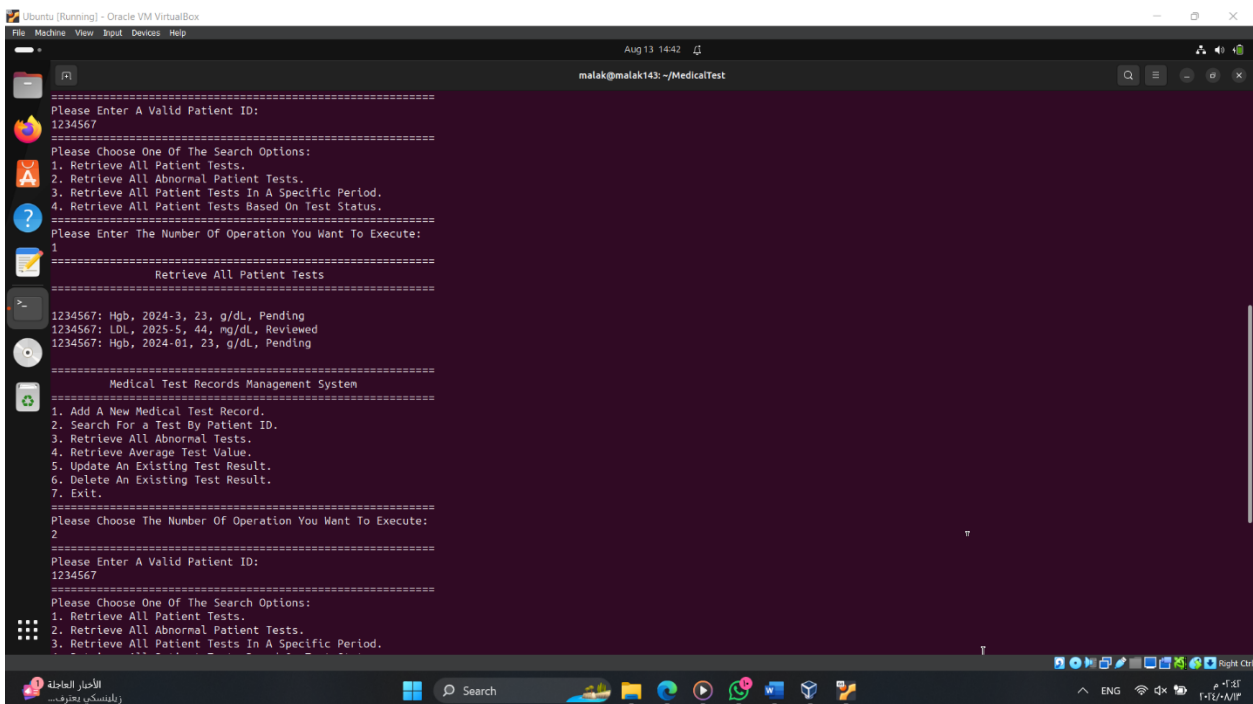
As shown in the figure above, the medical test has been added successfully to the file.

2. Search



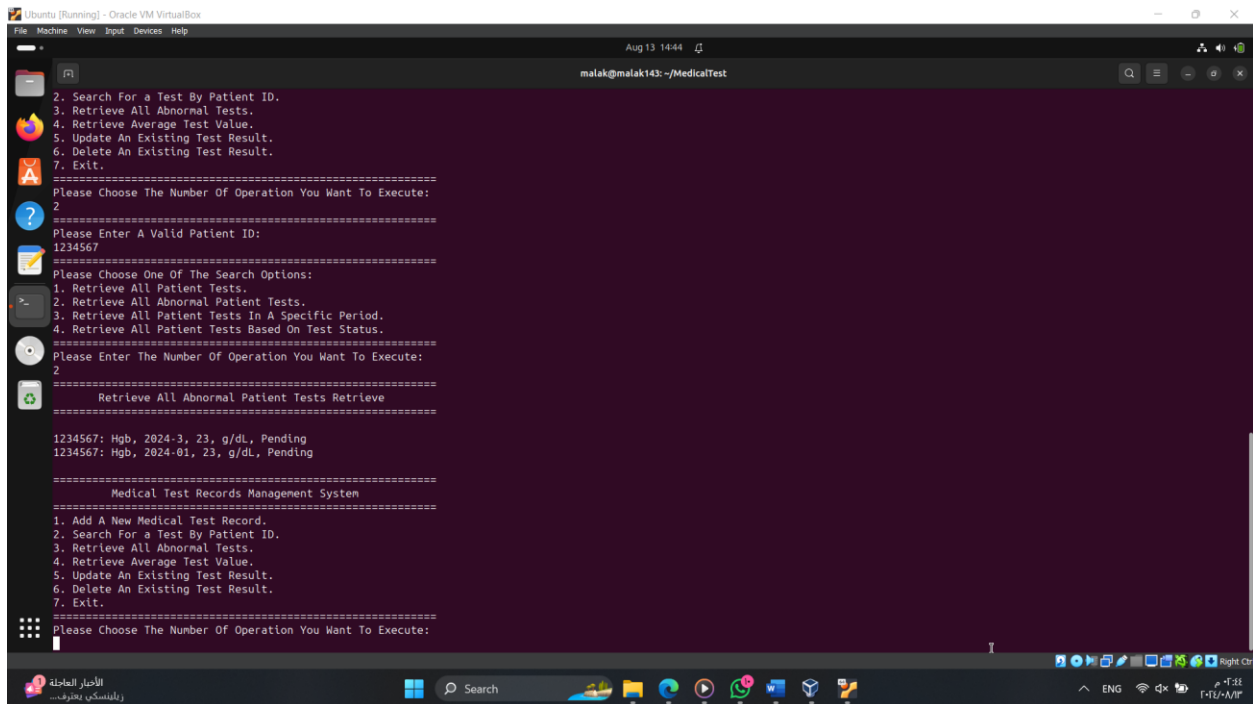
```
malak@malak143: ~/MedicalTest
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
2
=====
Please Enter A Valid Patient ID:
aa
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID:
1234
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID:
1234432
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID:
1234567
=====
Entered ID Doesn't Exist! Please Enter A Valid Patient ID.
=====
Please Enter A Valid Patient ID:
1234567
=====
Please Choose One Of The Search Options:
1. Retrieve All Patient Tests.
2. Retrieve All Abnormal Patient Tests.
3. Retrieve All Patient Tests In A Specific Period.
4. Retrieve All Patient Tests Based On Test Status.
=====
Please Enter The Number Of Operation You Want To Execute:
1
=====
Retrieve All Patient Tests
=====
1234567: Hgb, 2024-3, 23, g/dL, Pending
1234567: LDL, 2025-5, 44, mg/dL, Reviewed
1234567: Hgb, 2024-01, 23, g/dL, Pending
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
2
=====
Please Enter A Valid Patient ID:
1234567
=====
Please Choose One Of The Search Options:
1. Retrieve All Patient Tests.
2. Retrieve All Abnormal Patient Tests.
3. Retrieve All Patient Tests In A Specific Period.
```

In this phase of testing, the system was evaluated for its ability to validate and process Patient IDs. Various invalid inputs, including non-numeric characters, entries with fewer than 7 digits, and non-existing 7-digit IDs, were correctly identified and rejected by the system.



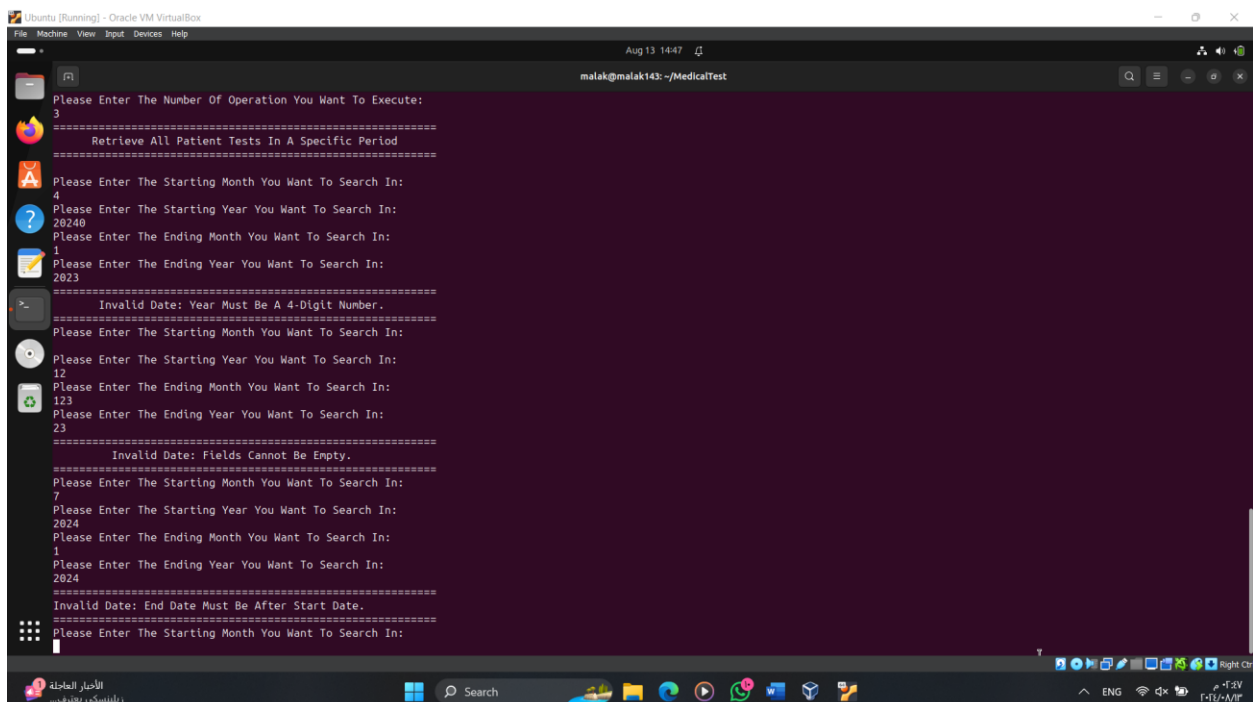
```
malak@malak143: ~/MedicalTest
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
2
=====
Please Enter A Valid Patient ID:
aa
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID:
1234
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID:
1234432
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID:
1234567
=====
Entered ID Doesn't Exist! Please Enter A Valid Patient ID.
=====
Please Enter A Valid Patient ID:
1234567
=====
Please Choose One Of The Search Options:
1. Retrieve All Patient Tests.
2. Retrieve All Abnormal Patient Tests.
3. Retrieve All Patient Tests In A Specific Period.
4. Retrieve All Patient Tests Based On Test Status.
=====
Please Enter The Number Of Operation You Want To Execute:
1
=====
Retrieve All Patient Tests
=====
1234567: Hgb, 2024-3, 23, g/dL, Pending
1234567: LDL, 2025-5, 44, mg/dL, Reviewed
1234567: Hgb, 2024-01, 23, g/dL, Pending
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
2
=====
Please Enter A Valid Patient ID:
1234567
=====
Please Choose One Of The Search Options:
1. Retrieve All Patient Tests.
2. Retrieve All Abnormal Patient Tests.
3. Retrieve All Patient Tests In A Specific Period.
```

The system successfully retrieves and displays all test records associated with the entered Patient ID.



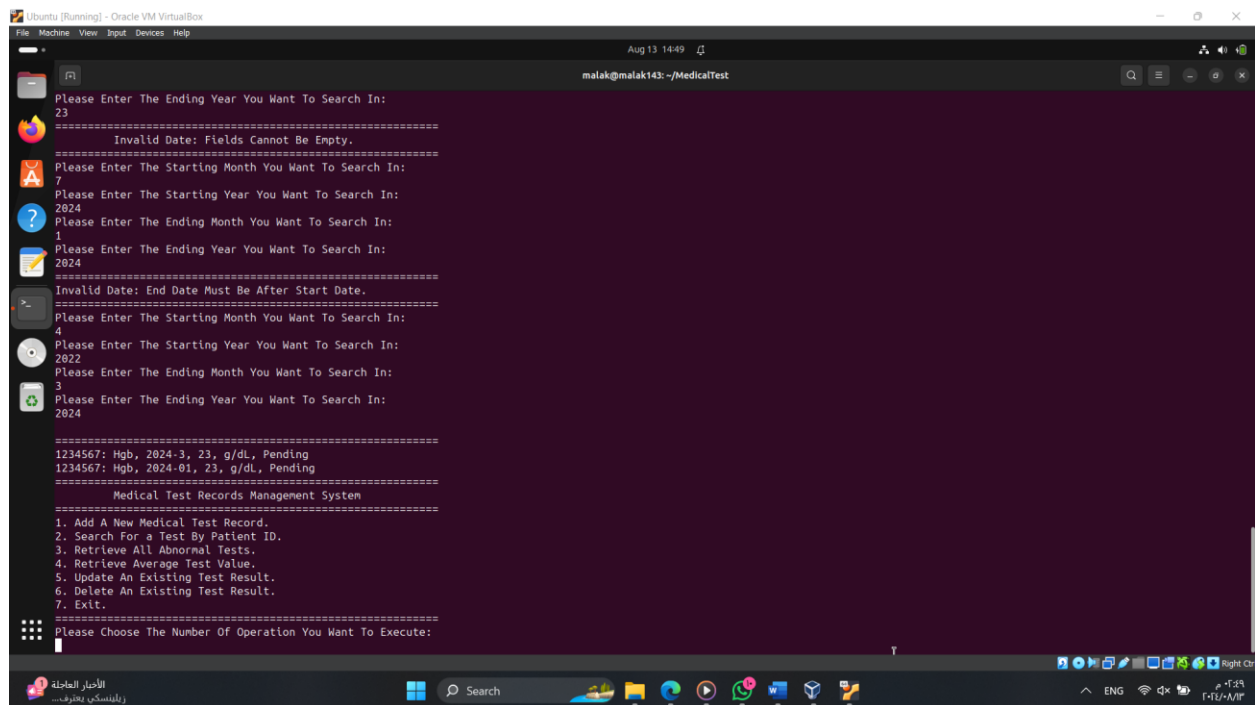
```
malak@malak143: ~/MedicalTest
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
2
=====
Please Enter A Valid Patient ID:
1234567
=====
Please Choose One Of The Search Options:
1. Retrieve All Patient Tests.
2. Retrieve All Abnormal Patient Tests.
3. Retrieve All Patient Tests In A Specific Period.
4. Retrieve All Patient Tests Based On Test Status.
=====
Please Enter The Number Of Operation You Want To Execute:
2
=====
Retrieve All Abnormal Patient Tests Retrieve
=====
1234567: Hgb, 2024-3, 23, g/dL, Pending
1234567: Hgb, 2024-01, 23, g/dL, Pending
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
```

Same as retrieving all abnormal tests, and shows “No Records Found” if no abnormal tests were made.



```
malak@malak143: ~/MedicalTest
Please Enter The Number Of Operation You Want To Execute:
3
=====
Retrieve All Patient Tests In A Specific Period
=====
Please Enter The Starting Month You Want To Search In:
4
Please Enter The Starting Year You Want To Search In:
20240
Please Enter The Ending Month You Want To Search In:
1
Please Enter The Ending Year You Want To Search In:
2023
=====
Invalid Date: Year Must Be A 4-Digit Number.
=====
Please Enter The Starting Month You Want To Search In:
Please Enter The Starting Year You Want To Search In:
12
Please Enter The Ending Month You Want To Search In:
123
Please Enter The Ending Year You Want To Search In:
23
=====
Invalid Date: Fields Cannot Be Empty.
=====
Please Enter The Starting Month You Want To Search In:
7
Please Enter The Starting Year You Want To Search In:
2024
Please Enter The Ending Month You Want To Search In:
1
Please Enter The Ending Year You Want To Search In:
2024
=====
Invalid Date: End Date Must Be After Start Date.
=====
Please Enter The Starting Month You Want To Search In:
```

In the search function for a specific period, the system robustly handles various input validation scenarios to ensure accurate and meaningful results. It checks for empty fields and prevents the search from proceeding if any required dates are missing. Additionally, the system validates the date format, ensuring that only 4-digit years are accepted. It also verifies that the starting date is not later than the ending date, preventing illogical date ranges.



```
malak@malak143: ~/MedicalTest
Please Enter The Ending Year You Want To Search In:
23
=====
Invalid Date: Fields Cannot Be Empty.
=====
Please Enter The Starting Month You Want To Search In:
7
Please Enter The Starting Year You Want To Search In:
2024
Please Enter The Ending Month You Want To Search In:
1
Please Enter The Ending Year You Want To Search In:
2024
=====
Invalid Date: End Date Must Be After Start Date.
=====
Please Enter The Starting Month You Want To Search In:
4
Please Enter The Starting Year You Want To Search In:
2022
Please Enter The Ending Month You Want To Search In:
3
Please Enter The Ending Year You Want To Search In:
2024
=====
1234567: Hgb, 2024-3, 23, g/dL, Pending
1234567: Hgb, 2024-01, 23, g/dL, Pending
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
1
```

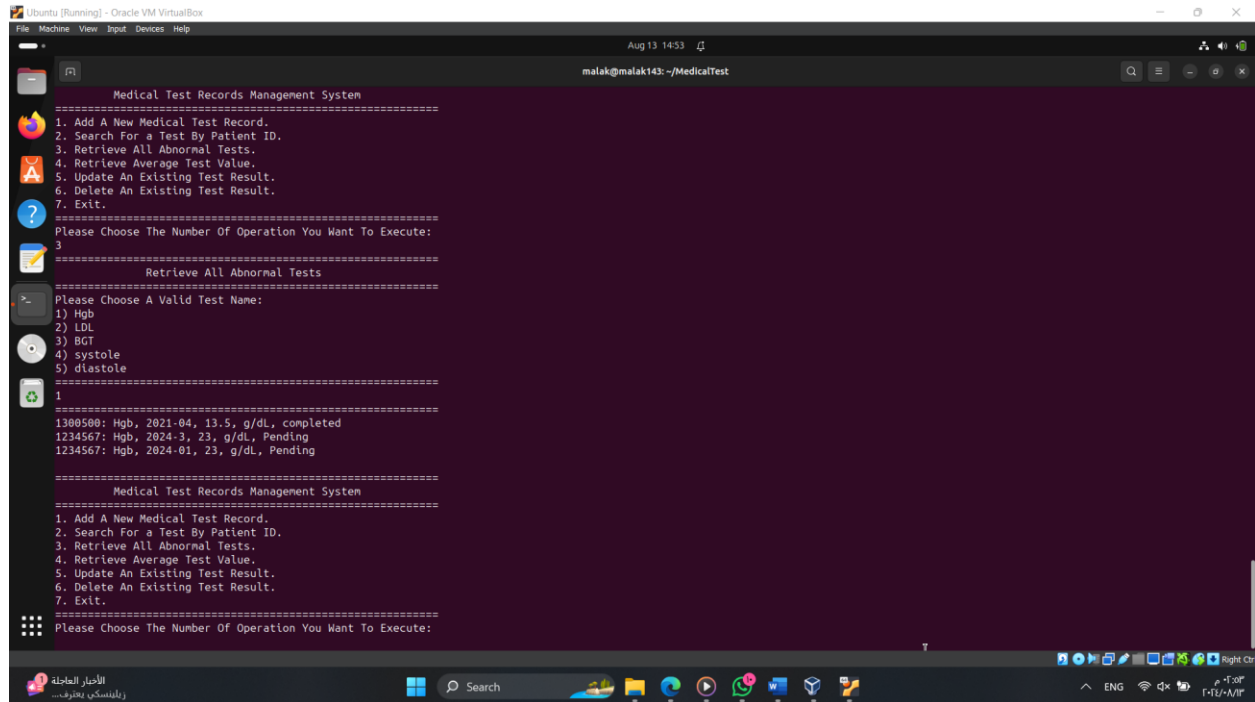
If a valid date range is entered, the system retrieves and displays all medical tests corresponding to that specific period.

```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Aug 13 14:51
malak@malak143: ~/MedicalTest

Please Enter A Valid Patient ID:
1234567
=====
Please Choose One Of The Search Options:
1. Retrieve All Patient Tests.
2. Retrieve All Abnormal Patient Tests.
3. Retrieve All Patient Tests In A Specific Period.
4. Retrieve All Patient Tests Based On Test Status.
=====
Please Enter The Number Of Operation You Want To Execute:
4
=====
Retrieve All Patient Tests Based On Test Status
=====
Enter The Number Of Test Status You Want To Look For:
1) Pending
2) Completed
3) Reviewed
=====
1
=====
1234567: Hgb, 2024-3, 23, g/dL, Pending
1234567: Hgb, 2024-01, 23, g/dL, Pending
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
```

In searching for tests based on status, the system allows the user to select a specific status, such as "Pending" or "Reviewed." If a valid status is chosen, the system retrieves and displays all tests that match the selected status.

3. Search for abnormal tests



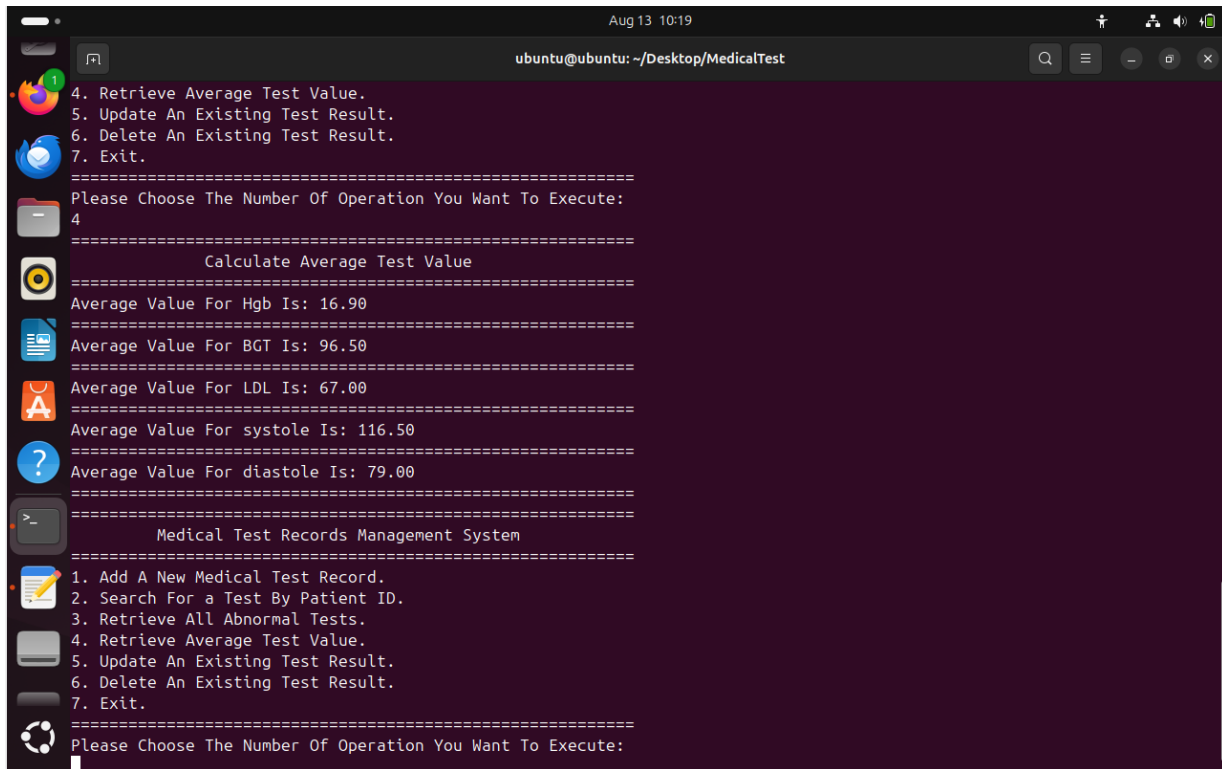
```

=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
3
=====
Retrieve All Abnormal Tests
=====
Please Choose A Valid Test Name:
1) Hgb
2) LDL
3) BGT
4) systole
5) diastole
=====
1
=====
1380580: Hgb, 2021-04, 13.5, g/dL, completed
1234567: Hgb, 2024-3, 23, g/dL, Pending
1234567: Hgb, 2024-01, 23, g/dL, Pending
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:

```

For retrieving all abnormal tests in the system based on the test name, the system allows the user to specify a particular test, such as "Hgb" or "LDL." The program then searches for all records where the test results fall outside the normal range for that test. If any abnormal results are found, they are displayed to the user.

4. Average test value



```
Aug 13 10:19
ubuntu@ubuntu: ~/Desktop/MedicalTest

4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
4
=====
                        Calculate Average Test Value
=====
Average Value For Hgb Is: 16.90
=====
Average Value For BGT Is: 96.50
=====
Average Value For LDL Is: 67.00
=====
Average Value For systole Is: 116.50
=====
Average Value For diastole Is: 79.00
=====
                        Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
```

Figure 2: Average test value

As shown in the figure above, the program calculated the average values for all tests successfully, depending on the results stored in the file.

5. Update an existing test result

```
Aug 13 10:22
ubuntu@ubuntu: ~/Desktop/MedicalTest

=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
5
=====
Update Existing Test Result
=====
Please Enter A Valid Patient ID For Updating:
130050000
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID For Updating:
1300600
=====
Entered ID Doesn't Exist! Please Enter A Valid Patient ID.
=====
Please Enter A Valid Patient ID For Updating:
1300500
=====
Patient 1300500 Tests:
1) 1300500: Hgb, 2021-04, 13.5, g/dL, completed
2) 1300500: diastole, 2024-11, 78, mm Hg, pending
```

```
Aug 13 10:23
ubuntu@ubuntu: ~/Desktop/MedicalTest

=====
Patient 1300500 Tests:
1) 1300500: Hgb, 2021-04, 13.5, g/dL, completed
2) 1300500: diastole, 2024-11, 78, mm Hg, pending
3) 1300500: systole, 2024-03, 118, mm Hg, completed
=====
Please Choose A Test Number To Update:
5
=====
Invalid Test Number! Please Enter A Valid Number Corresponding To The Test You Want To Update.
=====
Please Choose A Test Number To Update:
1
=====
Selected Test: 1300500: Hgb, 2021-04, 13.5, g/dL, completed
=====
Please Enter The New Result:
k
=====
Invalid Result! Please Enter A Valid Number With Optional Decimal Point & No Characters.
=====
Please Enter The New Result:
14
=====
Test Updated Successfully!
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
```

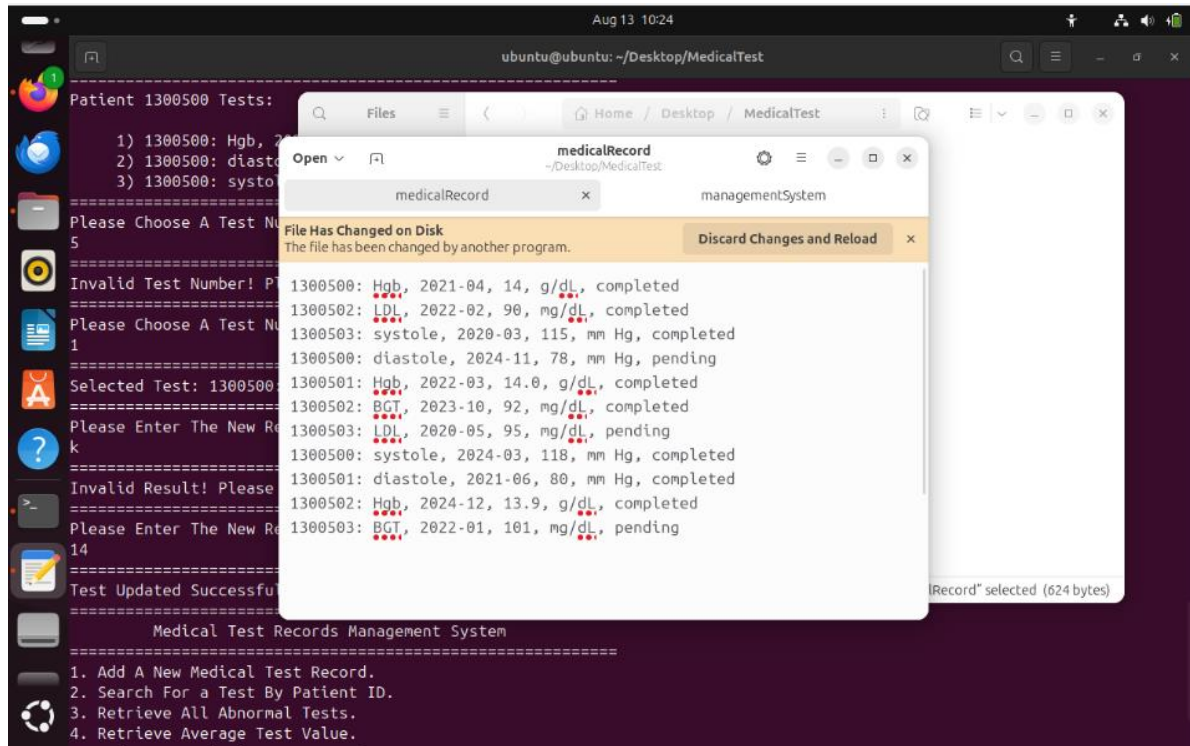


Figure 3: Updating a test result

As indicated in the figure above, the result of the test has been changed from **13.5** to **14** successfully.

6. Delete medical Record

```
Aug 13 10:26
ubuntu@ubuntu: ~/Desktop/MedicalTest

=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
6
=====
Delete Existing Test Result
=====
Please Enter A Valid Patient ID For Deleting:
1235k
=====
Invalid ID! Please Enter A 7-Digit Patient ID Containing Only Numbers.
=====
Please Enter A Valid Patient ID For Deleting:
1300502
=====
Patient 1300502 Tests:
1) 1300502: LDL, 2022-02, 90, mg/dL, completed
2) 1300502: BGT, 2023-10, 92, mg/dL, completed
3) 1300502: Hgb, 2024-12, 13.9, g/dL, completed
=====
Please Choose A Test Number To Delete:
6
=====
Invalid Test Number! Please Enter A Valid Number Corresponding To The Test You Want To Delete
```

```
Aug 13 10:27
ubuntu@ubuntu: ~/Desktop/MedicalTest

Please Enter A Valid Patient ID For Deleting:
1300502
=====
Patient 1300502 Tests:
1) 1300502: LDL, 2022-02, 90, mg/dL, completed
2) 1300502: BGT, 2023-10, 92, mg/dL, completed
3) 1300502: Hgb, 2024-12, 13.9, g/dL, completed
=====
Please Choose A Test Number To Delete:
6
=====
Invalid Test Number! Please Enter A Valid Number Corresponding To The Test You Want To Delete.
=====
Please Choose A Test Number To Delete:
2
=====
1300502: BGT, 2023-10, 92, mg/dL, completed
=====
Test Deleted Successfully!
=====
Medical Test Records Management System
=====
1. Add A New Medical Test Record.
2. Search For a Test By Patient ID.
3. Retrieve All Abnormal Tests.
4. Retrieve Average Test Value.
5. Update An Existing Test Result.
6. Delete An Existing Test Result.
7. Exit.
=====
Please Choose The Number Of Operation You Want To Execute:
```

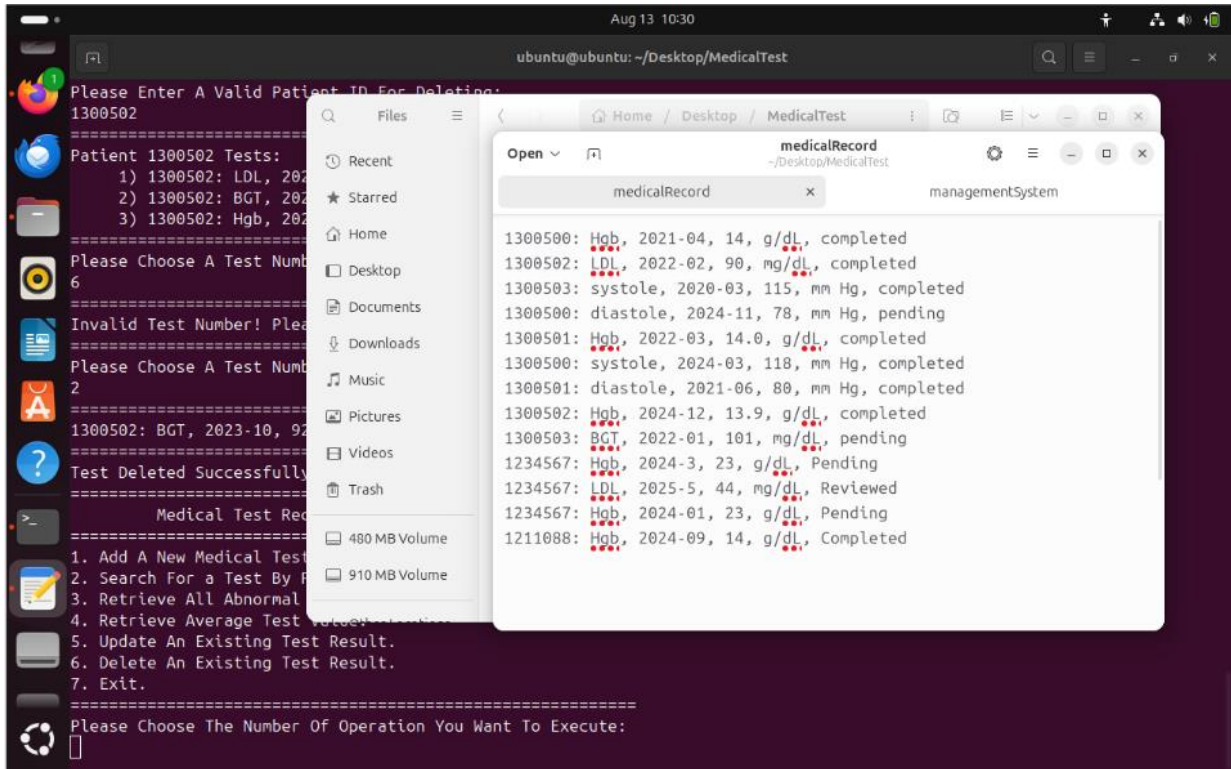


Figure 4: Deleting a medical record

We can see that the chosen medical record has been deleted successfully from the file.