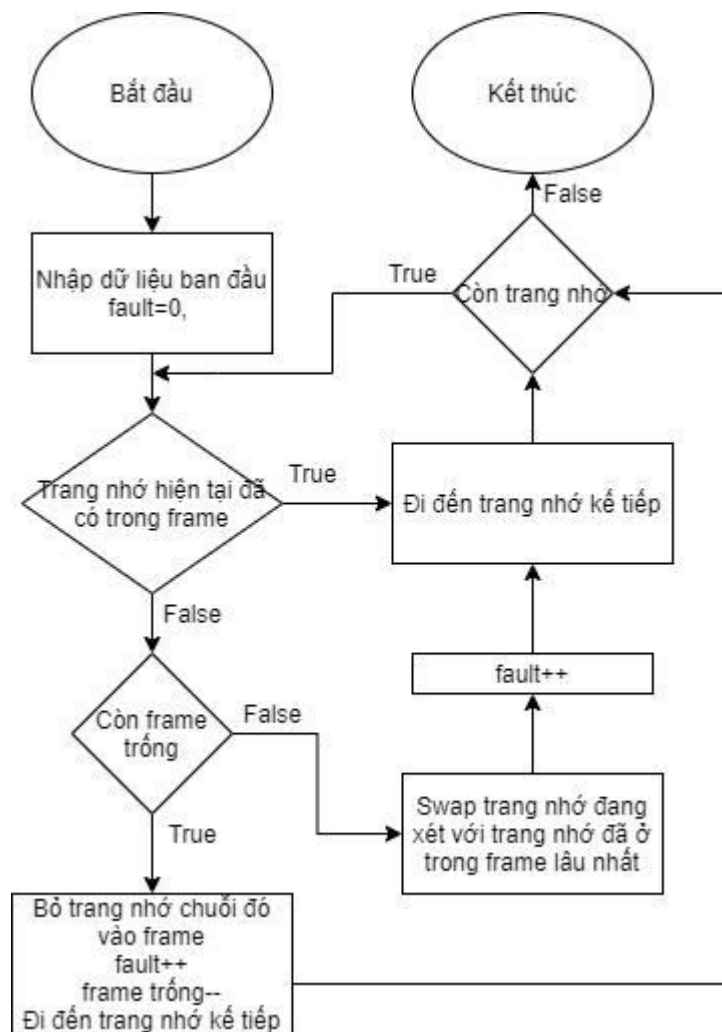


6.3.3

FIFO



	0	2	1	6	4	0	1	0	3	1	2	1
F1	<u>0</u>	0	0	<u>6</u>	6	6	<u>1</u>	1	1	1	1	1
F2		<u>2</u>	2	2	<u>4</u>	4	4	4	<u>3</u>	3	3	3
F3			<u>1</u>	1	1	<u>0</u>	0	0	0	0	<u>2</u>	2
	*	*	*	*	*	*	*		*		*	

-> 9 lỗi

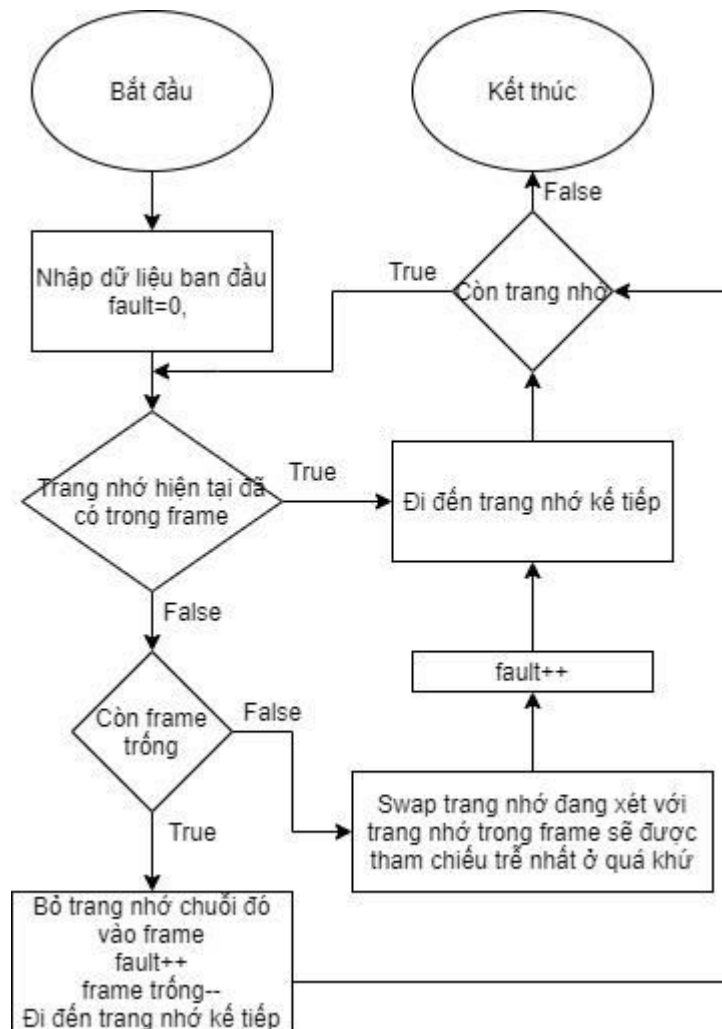
OTP



	0	2	1	6	4	0	1	0	3	1	2	1
F1	0	0	0	0	0	0	0	0	0	0	0	0
F2		2	2	6	4	4	4	4	3	3	2	2
F3			1	1	1	1	1	1	1	1	1	1
	*	*	*	*	*				*		*	

-> 7 lỗi

LRU

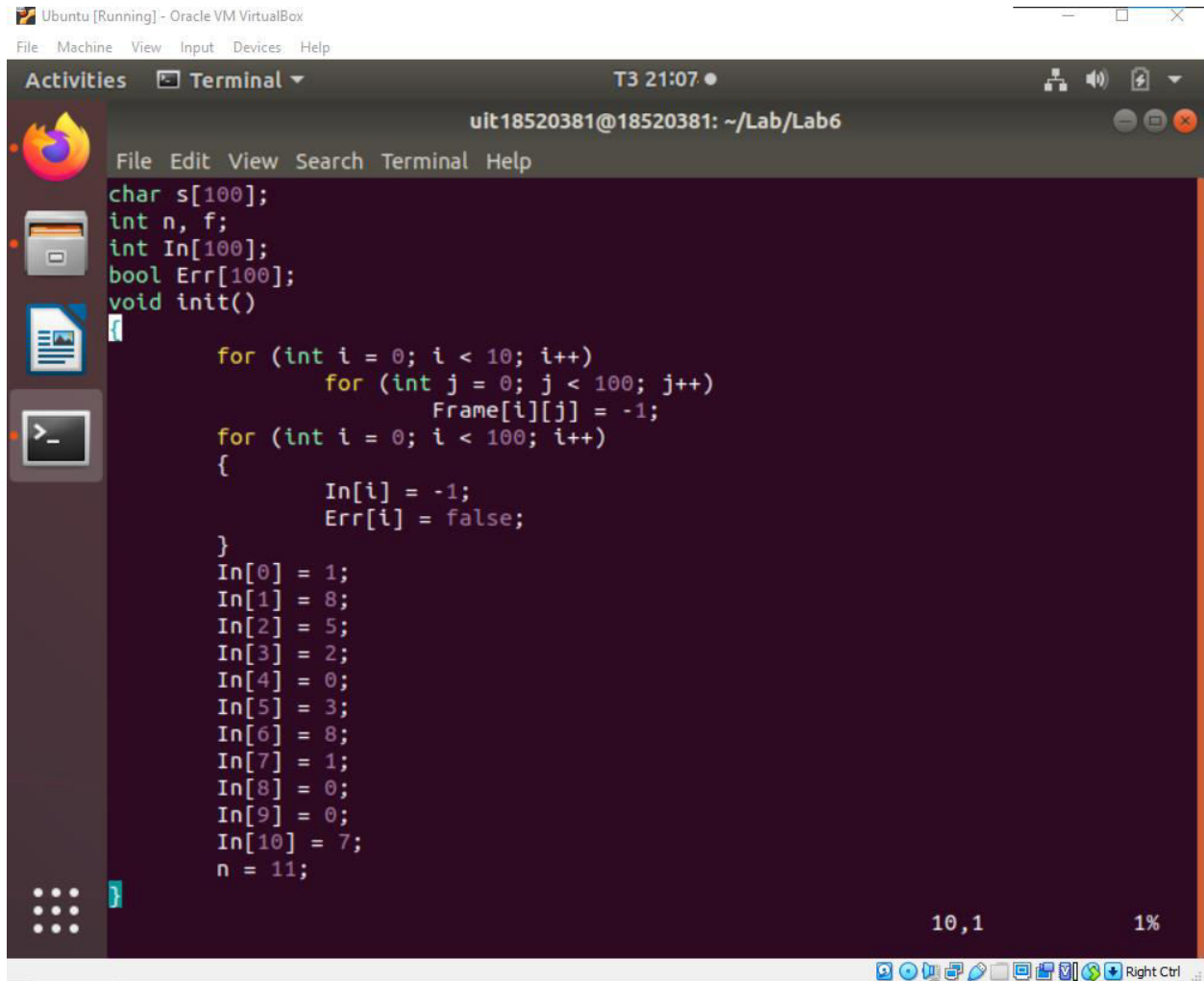


	0	2	1	6	4	0	1	0	3	1	2	1
F1	0	0	0	6	6	6	1	1	1	1	1	1
F2		2	2	2	4	4	4	4	3	3	3	3
F3			1	1	1	0	0	0	0	0	2	2
	*	*	*	*	*	*	*		*		*	

-> 9 lỗi

6.4

Hàm `init()` dùng để khởi tạo giá trị của các biến được sử dụng, các trang nhớ mặc định (Default) là MSSV (18520381) kèm theo 007 ở cuối -> có 11 trang nhớ

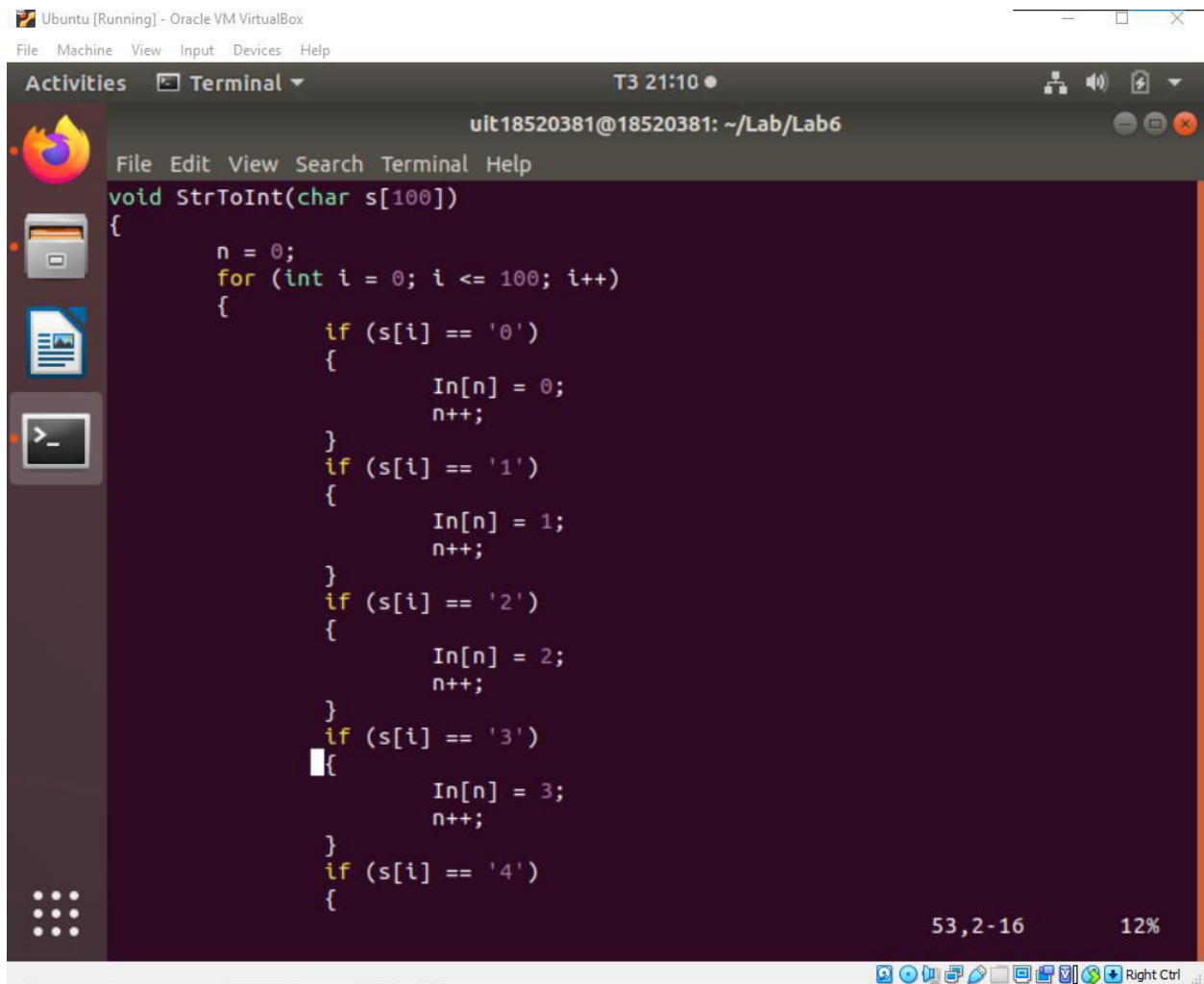


The screenshot shows a terminal window titled "uit18520381@18520381: ~/Lab/Lab6". The terminal displays the following C code:

```
char s[100];
int n, f;
int In[100];
bool Err[100];
void init()
{
    for (int i = 0; i < 10; i++)
        for (int j = 0; j < 100; j++)
            Frame[i][j] = -1;
    for (int i = 0; i < 100; i++)
    {
        In[i] = -1;
        Err[i] = false;
    }
    In[0] = 1;
    In[1] = 8;
    In[2] = 5;
    In[3] = 2;
    In[4] = 0;
    In[5] = 3;
    In[6] = 8;
    In[7] = 1;
    In[8] = 0;
    In[9] = 0;
    In[10] = 7;
    n = 11;
}
```

The terminal window includes a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the bottom shows "10,1" and "1%".

Hàm StrToInt(char s[100]) giúp chuyển chuỗi mà ta nhập vào thành số nếu ta chọn Manual



The screenshot shows a terminal window titled "uit18520381@18520381: ~/Lab/Lab6". The terminal displays the following C code for the StrToInt function:

```
void StrToInt(char s[100])
{
    n = 0;
    for (int i = 0; i <= 100; i++)
    {
        if (s[i] == '0')
        {
            In[n] = 0;
            n++;
        }
        if (s[i] == '1')
        {
            In[n] = 1;
            n++;
        }
        if (s[i] == '2')
        {
            In[n] = 2;
            n++;
        }
        if (s[i] == '3')
        {
            In[n] = 3;
            n++;
        }
        if (s[i] == '4')
        {
```

The terminal window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the bottom shows "53,2-16" and "12%". The bottom of the window shows a taskbar with various icons and the text "Right Ctrl".

Hàm NumErr() giúp đếm số lỗi khi kết thúc chương trình

Hàm Printf() sẽ cho ra bảng thay thế trang



The screenshot shows a terminal window titled "ult18520381@18520381: ~/Lab/Lab6". The terminal displays the following C code:

```
int NumErr()
{
    int t = 0;
    for (int i = 0; i < n; i++)
        if (Err[i]) t++;
    return t;
}

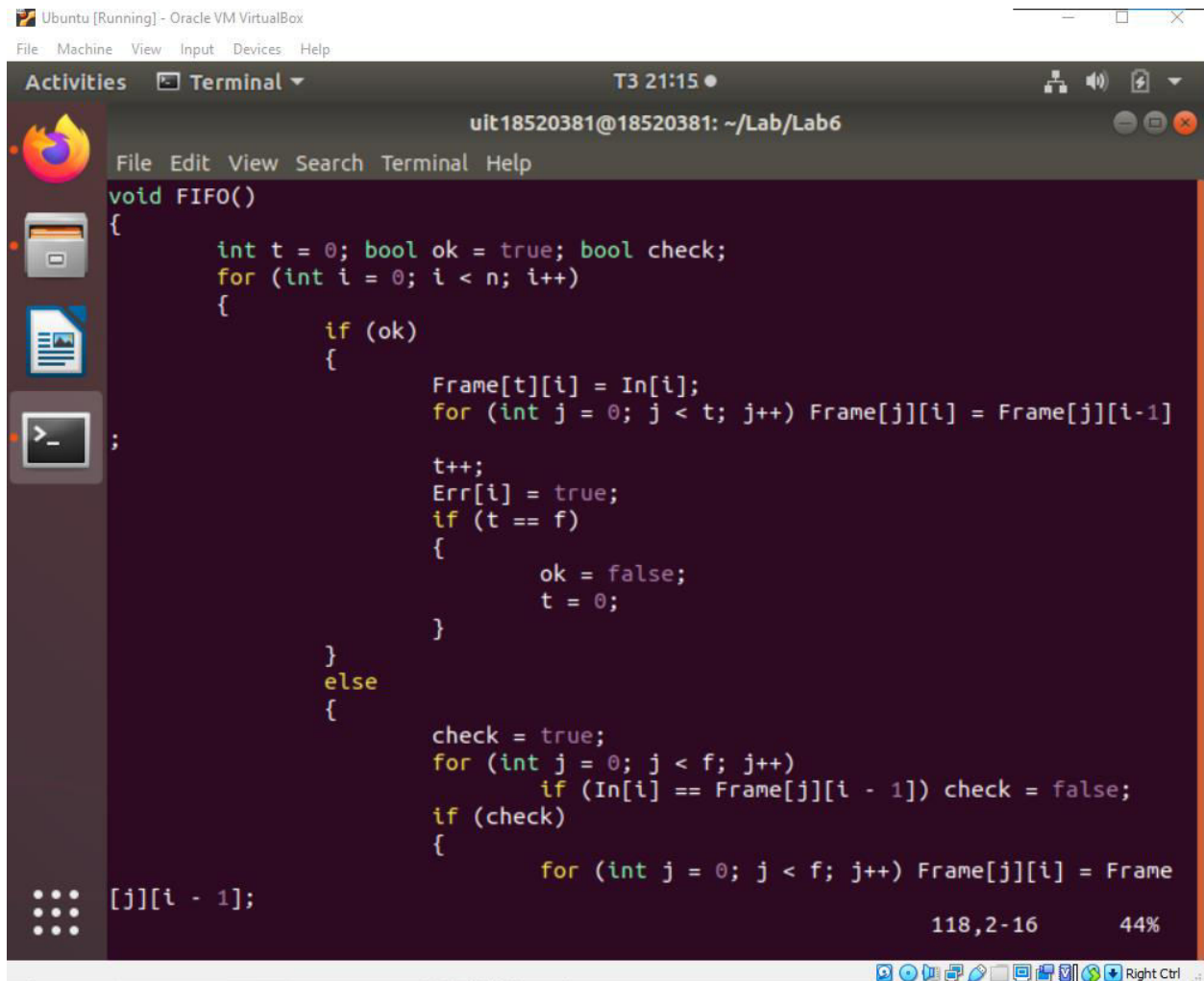
void Printf()
{
    for (int i = 0; i < n; i++)
        printf("%d ", In[i]);
    printf("\n");
    for (int i = 0; i < f; i++)
    {
        for (int j = 0; j < n; j++)
            if (Frame[i][j] == -1) printf(" ");
            else printf("%d ", Frame[i][j]);
        printf("\n");
    }
    for (int i = 0; i < n; i++)
        if (Err[i]) printf("* ");
        else printf(" ");
    printf("\nTotal error: %d\n", NumErr());
}

void FIFO()
{
    int t = 0; bool ok = true; bool check;
```

The terminal window includes a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the bottom shows "101,7-14" and "35%".

Thuật toán FIFO:

Ban đầu t có nghĩa là đang ở frame thứ mấy, từ đó lần lượt chạy từ 0->f(số frame tối đa) và quay lại với những điều kiện đã thiết lập trước



The screenshot shows a terminal window titled "Ubuntu [Running] - Oracle VM VirtualBox" with a menu bar (File, Machine, View, Input, Devices, Help) and a status bar (T3 21:15). The terminal prompt is "uit18520381@18520381: ~/Lab/Lab6". The code being displayed is a C++ function named "FIFO()".

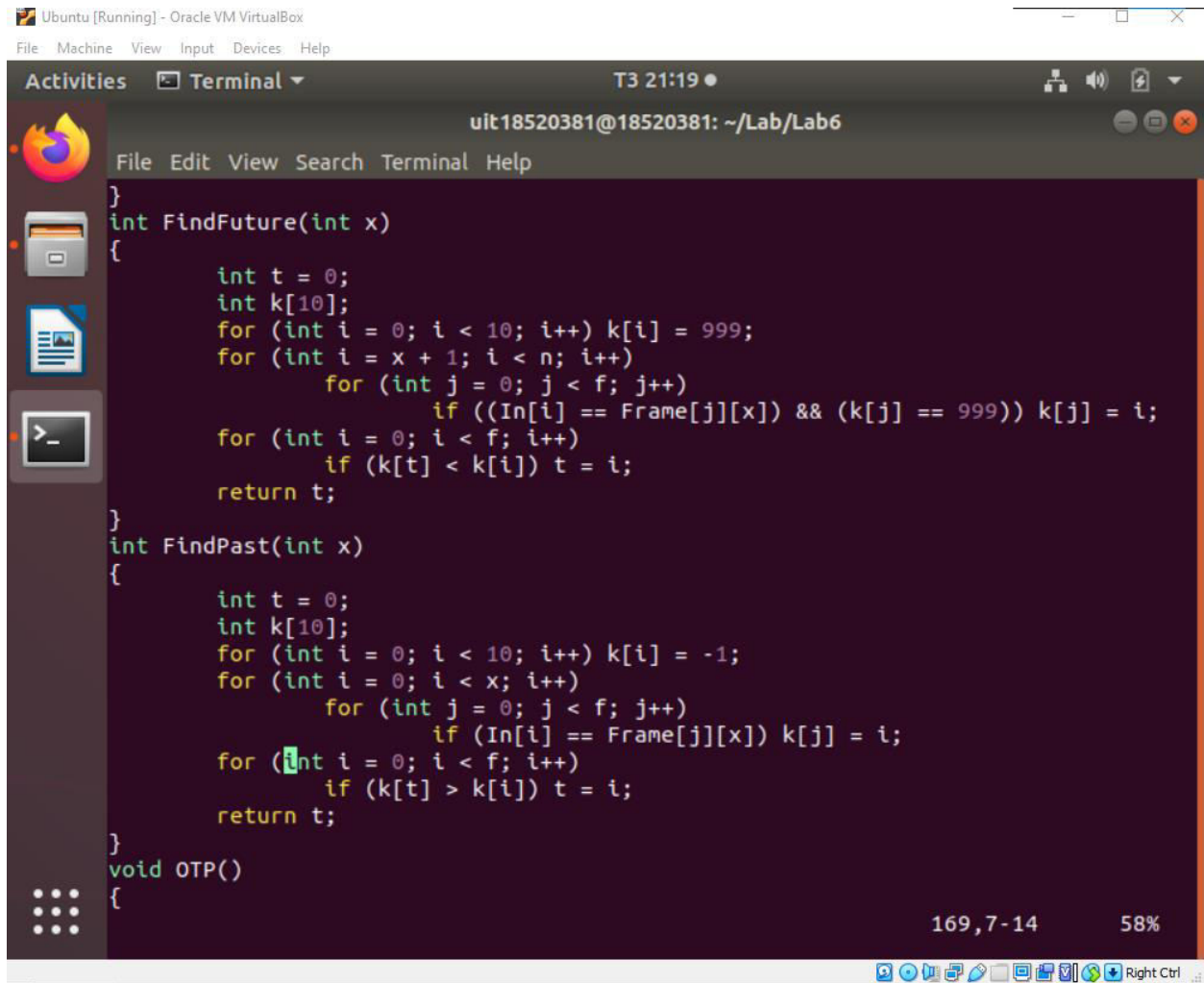
```
void FIFO()
{
    int t = 0; bool ok = true; bool check;
    for (int i = 0; i < n; i++)
    {
        if (ok)
        {
            Frame[t][i] = In[i];
            for (int j = 0; j < t; j++) Frame[j][i] = Frame[j][i-1]

            t++;
            Err[i] = true;
            if (t == f)
            {
                ok = false;
                t = 0;
            }
        }
        else
        {
            check = true;
            for (int j = 0; j < f; j++)
                if (In[i] == Frame[j][i - 1]) check = false;
            if (check)
            {
                for (int j = 0; j < f; j++) Frame[j][i] = Frame
                [j][i - 1];
            }
        }
    }
}
```

The terminal window also shows a sidebar with icons for Activities, Terminal, and other applications. The bottom status bar indicates the window is at 118,2-16 and 44% zoom.

FindPast(int x) dùng để tìm khung trang tiếp theo khi đang ở trang nhớ thứ x trong thuật toán LRU

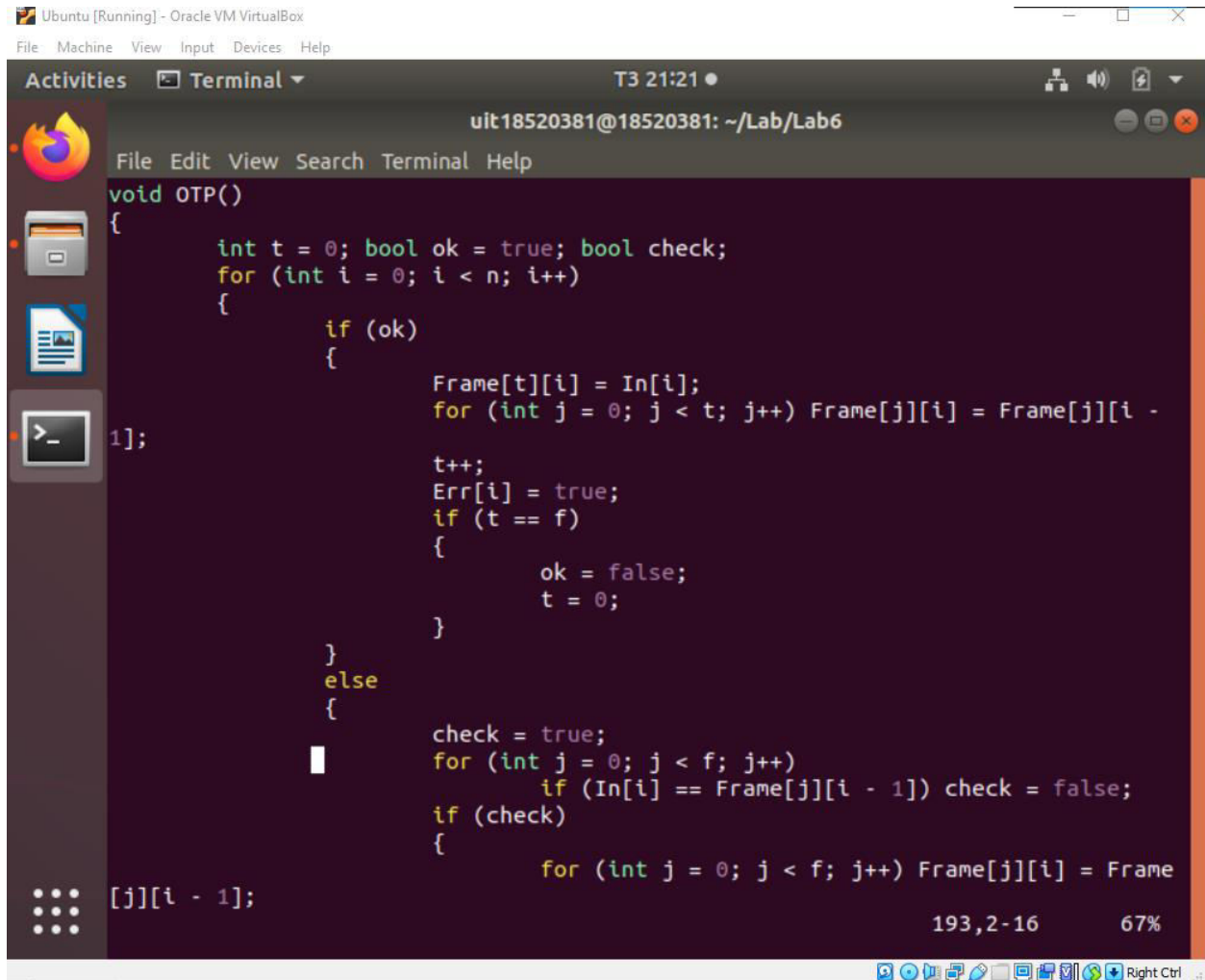
FindFuture(int x) dùng để tìm khung trang tiếp theo khi đang ở trang nhớ thứ x trong thuật toán OTP



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal T3 21:19
uit18520381@18520381: ~/Lab/Lab6
File Edit View Search Terminal Help
}
int FindFuture(int x)
{
    int t = 0;
    int k[10];
    for (int i = 0; i < 10; i++) k[i] = 999;
    for (int i = x + 1; i < n; i++)
        for (int j = 0; j < f; j++)
            if ((In[i] == Frame[j][x]) && (k[j] == 999)) k[j] = i;
    for (int i = 0; i < f; i++)
        if (k[t] < k[i]) t = i;
    return t;
}
int FindPast(int x)
{
    int t = 0;
    int k[10];
    for (int i = 0; i < 10; i++) k[i] = -1;
    for (int i = 0; i < x; i++)
        for (int j = 0; j < f; j++)
            if (In[i] == Frame[j][x]) k[j] = i;
    for (int i = 0; i < f; i++)
        if (k[t] > k[i]) t = i;
    return t;
}
void OTP()
{
    169,7-14 58%
```


Thuật toán OTP:

Cũng giống như thuật toán FIFO nhưng frame t tiếp theo sẽ được tìm thông qua hàm FindFuture(int x) chứ không theo thứ tự lần lượt



The screenshot shows a terminal window titled "Ubuntu [Running] - Oracle VM VirtualBox" with a menu bar (File, Machine, View, Input, Devices, Help) and a status bar (T3 21:21). The terminal prompt is "uit18520381@18520381: ~/Lab/Lab6". The code being edited is a C++ function named OTP(). The code includes a loop for i from 0 to n-1. Inside this loop, there is an if(ok) block and an else block. The if(ok) block contains a for loop for j from 0 to t-1, where Frame[j][i] is assigned the value of In[i]. After this loop, t is incremented, Err[i] is set to true, and if t equals f, ok is set to false and t is reset to 0. The else block contains a check = true; statement, followed by a for loop for j from 0 to f-1. Inside this loop, if In[i] equals Frame[j][i - 1], check is set to false. After the loop, if check is true, another for loop for j from 0 to f-1 is executed, where Frame[j][i] is assigned the value of Frame[j][i - 1]. The code ends with a closing brace for the OTP() function.

```
void OTP()
{
    int t = 0; bool ok = true; bool check;
    for (int i = 0; i < n; i++)
    {
        if (ok)
        {
            Frame[t][i] = In[i];
            for (int j = 0; j < t; j++) Frame[j][i] = Frame[j][i - 1];
            t++;
            Err[i] = true;
            if (t == f)
            {
                ok = false;
                t = 0;
            }
        }
        else
        {
            check = true;
            for (int j = 0; j < f; j++)
                if (In[i] == Frame[j][i - 1]) check = false;
            if (check)
            {
                for (int j = 0; j < f; j++) Frame[j][i] = Frame[j][i - 1];
            }
        }
    }
}
```

Thuật toán LRU:

Cũng giống như thuật toán FIFO nhưng frame tiếp theo sẽ được tìm thông qua hàm FindPast(int x) chứ không theo thứ tự lần lượt



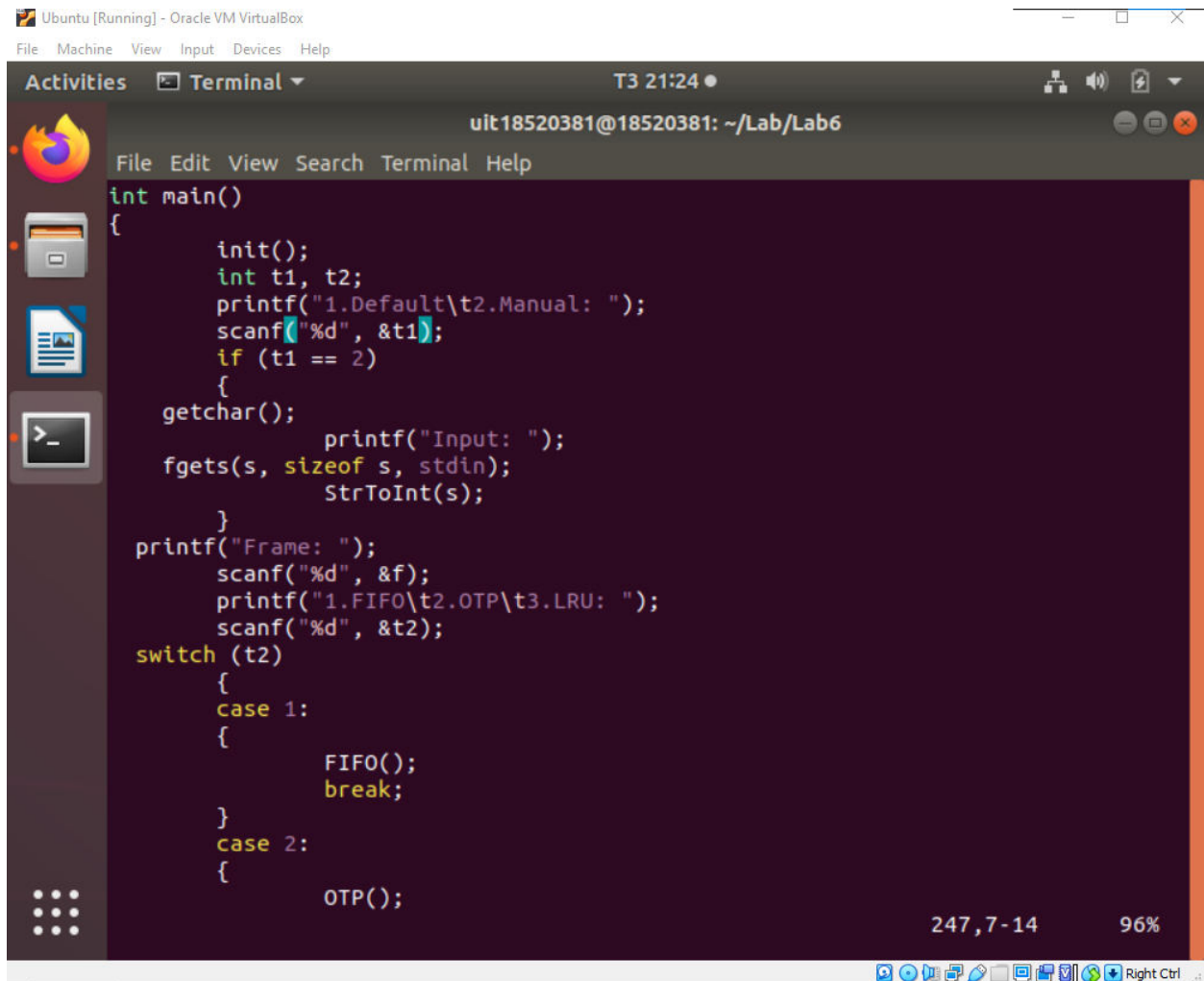
The screenshot shows a terminal window titled "Ubuntu [Running] - Oracle VM VirtualBox" with a menu bar (File, Machine, View, Input, Devices, Help) and a status bar (T3 21:23). The terminal prompt is "uit18520381@18520381: ~/Lab/Lab6". The code being executed is as follows:

```
void LRU()
{
    int t = 0; bool ok = true; bool check;
    for (int i = 0; i < n; i++)
    {
        if (ok)
        {
            Frame[t][i] = In[i];
            for (int j = 0; j < t; j++) Frame[j][i] = Frame[j][i - 1];
            t++;
            Err[i] = true;
            if (t == f)
            {
                ok = false;
                t = 0;
            }
        }
        else
        {
            check = true;
            for (int j = 0; j < f; j++)
                if (In[i] == Frame[j][i - 1]) check = false;
            if (check)
            {
                for (int j = 0; j < f; j++) Frame[j][i] = Frame[j][i - 1];
            }
        }
    }
}
```

The terminal window also shows a sidebar with icons for Activities, Terminal, and other applications. The bottom status bar indicates "226,2-16" and "81%".

Chương trình chính:

Cho phép người dùng nhập thủ công (Manual) hay tự động (Default), số frame tối đa và lựa chọn thuật toán để tính toán



The screenshot shows a terminal window titled "uit18520381@18520381: ~/Lab/Lab6". The terminal displays the following C code:

```
int main()
{
    init();
    int t1, t2;
    printf("1.Default\t2.Manual: ");
    scanf("%d", &t1);
    if (t1 == 2)
    {
        getchar();
        printf("Input: ");
        fgets(s, sizeof s, stdin);
        StrToInt(s);
    }
    printf("Frame: ");
    scanf("%d", &f);
    printf("1.FIFO\t2.OTP\t3.LRU: ");
    scanf("%d", &t2);
    switch (t2)
    {
        case 1:
        {
            FIFO();
            break;
        }
        case 2:
        {
            OTP();
        }
    }
}
```

The terminal window includes a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the bottom shows "247,7-14" and "96%". The VirtualBox interface shows the "Activities" panel on the left with icons for the Dash, Home, and Terminal. The top bar of the VirtualBox window indicates "Ubuntu [Running] - Oracle VM VirtualBox" and includes standard window controls.

Một số test case để thử nghiệm:

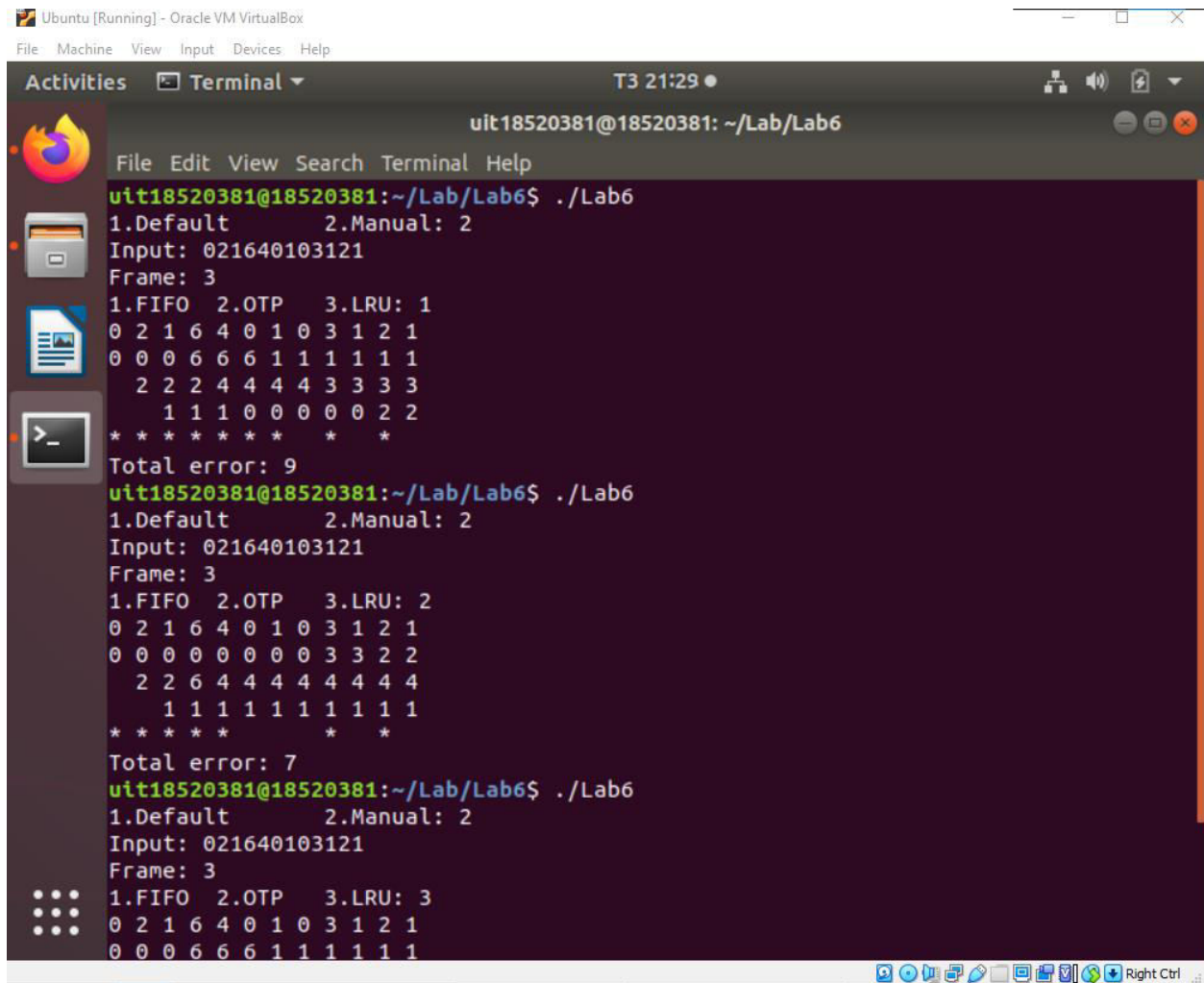
1./ Với Input là Default

The screenshot shows a terminal window titled "uit18520381@18520381: ~/Lab/Lab6". The terminal displays the output of a program, likely a scheduling algorithm, for a default input. The output is as follows:

```
1.Default          2.Manual: 1
Frame: 3
1.FIFO  2.OTP    3.LRU: 1
1 8 5 2 0 3 8 1 0 0 7
1 1 1 2 2 2 8 8 8 8 7
   8 8 8 0 0 0 1 1 1 1
   5 5 5 3 3 3 0 0 0
* * * * *
Total error: 10
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 1
Frame: 3
1.FIFO  2.OTP    3.LRU: 2
1 8 5 2 0 3 8 1 0 0 7
1 1 1 1 1 1 1 1 0 0 7
   8 8 8 8 8 8 8 8 8 8
   5 2 0 3 3 3 3 3 3
* * * * *
Total error: 8
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 1
Frame: 3
1.FIFO  2.OTP    3.LRU: 3
1 8 5 2 0 3 8 1 0 0 7
1 1 1 2 2 2 8 8 8 8 7
   8 8 8 0 0 0 1 1 1 1
   5 5 5 3 3 3 0 0 0
* * * * *
Total error: 10
```

The terminal window includes a menu bar (File, Edit, View, Search, Terminal, Help) and a status bar at the bottom showing system icons and the text "Right Ctrl".

2./ Với Input là Manual (sử dụng từ bài 6.3.3)



The screenshot shows a terminal window titled "uit18520381@18520381: ~/Lab/Lab6". The terminal displays the output of a program that takes manual input. The program's output is as follows:

```
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 2
Input: 021640103121
Frame: 3
1.FIFO  2.OTP    3.LRU: 1
0 2 1 6 4 0 1 0 3 1 2 1
0 0 0 6 6 6 1 1 1 1 1 1
  2 2 2 4 4 4 4 3 3 3 3
    1 1 1 0 0 0 0 0 2 2
* * * * * * * *
Total error: 9
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 2
Input: 021640103121
Frame: 3
1.FIFO  2.OTP    3.LRU: 2
0 2 1 6 4 0 1 0 3 1 2 1
0 0 0 0 0 0 0 0 3 3 2 2
  2 2 6 4 4 4 4 4 4 4 4
    1 1 1 1 1 1 1 1 1 1
* * * * * * * *
Total error: 7
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 2
Input: 021640103121
Frame: 3
1.FIFO  2.OTP    3.LRU: 3
0 2 1 6 4 0 1 0 3 1 2 1
0 0 0 6 6 6 1 1 1 1 1 1
```

The terminal window includes a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the bottom shows the time "T3 21:29" and various system icons.

```
Activities T3 21:30
uit18520381@18520381: ~/Lab/Lab6
File Edit View Search Terminal Help
0 0 0 6 6 6 1 1 1 1 1
  2 2 2 4 4 4 4 3 3 3
    1 1 1 0 0 0 0 0 2 2
  * * * * * * * *
Total error: 9
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 2
Input: 021640103121
Frame: 3
1.FIFO  2.OTP    3.LRU: 2
0 2 1 6 4 0 1 0 3 1 2 1
0 0 0 0 0 0 0 0 3 3 2 2
  2 2 6 4 4 4 4 4 4 4 4
    1 1 1 1 1 1 1 1 1 1
  * * * * * * * *
Total error: 7
uit18520381@18520381:~/Lab/Lab6$ ./Lab6
1.Default          2.Manual: 2
Input: 021640103121
Frame: 3
1.FIFO  2.OTP    3.LRU: 3
0 2 1 6 4 0 1 0 3 1 2 1
0 0 0 6 6 6 1 1 1 1 1 1
  2 2 2 4 4 4 4 3 3 3 3
    1 1 1 0 0 0 0 0 2 2
  * * * * * * * *
Total error: 9
uit18520381@18520381:~/Lab/Lab6$
```