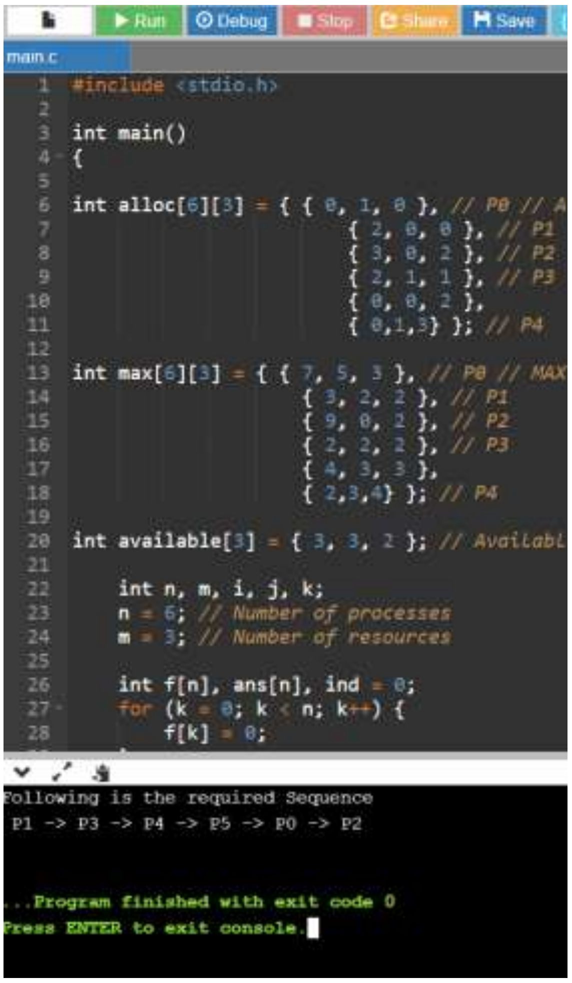
18BCB0142
David B.A.De Vieira Velho
OS Lab DA3

Q1. Bankers algorithm

```c
#include <stdio.h>

int main()
{

int alloc[6][3] = { { 0, 1, 0 }, // P0 // Allocation Matrix
                    { 2, 0, 0 }, // P1
                    { 3, 0, 2 }, // P2
                    { 2, 1, 1 }, // P3
                    { 0, 0, 2 },
                    { 0,1,3} }; // P4

int max[6][3] = { { 7, 5, 3 }, // P0 // MAX Matrix
                  { 3, 2, 2 }, // P1
                  { 9, 0, 2 }, // P2
                  { 2, 2, 2 }, // P3
                  { 4, 3, 3 },
                  { 2,3,4} }; // P4

int available[3] = { 3, 3, 2 }; // Available Resources
  int n, m, i, j, k;
  n = 6; // Number of processes
  m = 3; // Number of resources

  int f[n], ans[n], ind = 0;
  for (k = 0; k < n; k++) {
    f[k] = 0;
  }
  int need[n][m];
  for (i = 0; i < n; i++) {
    for (j = 0; j < m; j++)
      need[i][j] = max[i][j] - alloc[i][j];
  }
  int y = 0;
  for (k = 0; k < 5; k++) {
    for (i = 0; i < n; i++) {
      if (f[i] == 0) {

        int flag = 0;
        for (j = 0; j < m; j++) {
          if (need[i][j] > available[j]){
            flag = 1;
            break;
          }
        }
```

```
                if (flag == 0) {
                    ans[ind++] = i;
                    for (y = 0; y < m; y++)
                        available[y] += alloc[i][y];
                    f[i] = 1;
                }
            }
        }
    }

    printf("Following is the required Sequence\n");
    for (i = 0; i < n - 1; i++)
        printf(" P%d ->", ans[i]);
    printf(" P%d\n", ans[n - 1]);

    return (0);

}
```

Output:



```
#include <stdio.h>

int main()
{

int alloc[6][3] = { { 0, 1, 0 }, // P0 // A
                    { 2, 0, 0 }, // P1
                    { 3, 0, 2 }, // P2
                    { 2, 1, 1 }, // P3
                    { 0, 0, 2 },
                    { 0,1,3} }; // P4

int max[6][3] = { { 7, 5, 3 }, // P0 // MAX
                  { 3, 2, 2 }, // P1
                  { 9, 0, 2 }, // P2
                  { 2, 2, 2 }, // P3
                  { 4, 3, 3 },
                  { 2,3,4} }; // P4

int available[3] = { 3, 3, 2 }; // Availabl

    int n, m, i, j, k;
    n = 6; // Number of processes
    m = 3; // Number of resources

    int f[n], ans[n], ind = 0;
    for (k = 0; k < n; k++) {
        f[k] = 0;
```

```
Following is the required Sequence
 P1 -> P3 -> P4 -> P5 -> P0 -> P2


...Program finished with exit code 0
Press ENTER to exit console.
```

Q2. Multiple logins by users

```c
#include <stdio.h>
#include <stdlib.h>
int main(){

    system("last | sort | cut -d ' ' -f 1 | uniq -c | sort -n");

    return 0;
}
```

Output :

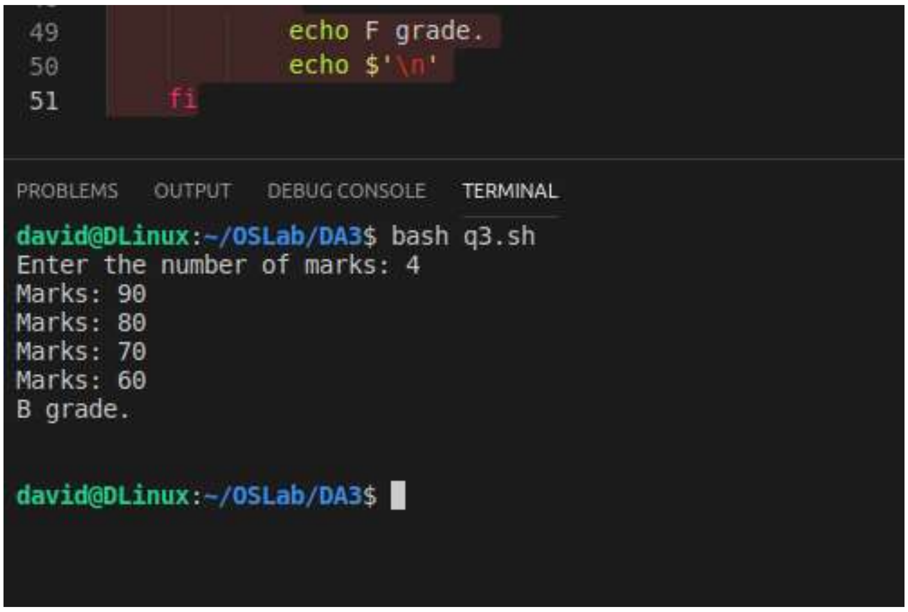
```
1
1 wtmp
6 david
6 reboot
```

(did not have a linux computer now to record output)

Q3. Bash Program for average grade

```bash
#!/bin/bash
echo -n "Enter the number of marks: "
read n
i=0

sum=0

for(( i; i < $n; i++));
    do
        echo -n "Marks: ";
        read m
        while [ $m -lt 0 ] || [ $m -gt 100 ]
        do
            echo -n "Enter a positive number: "
            read m
        done

        sum=$(($sum+$m))


done

sum=$(($sum/$n));
if [ $sum -ge 90 ]
```

```
    then
        echo S grade.
        echo $'\n'
    elif [ $sum -ge 80 ] && [ $sum -lt 90 ]
    then
        echo A grade.
        echo $'\n'
    elif [ $sum -ge 70 ] && [ $sum -lt 80 ]
    then
        echo B grade.
        echo $'\n'
    elif [ $sum -ge 60 ] && [ $sum -lt 70 ]
    then
        echo C grade.
        echo $'\n'
    elif [ $sum -ge 55 ] && [ $sum -lt 60 ]
    then
        echo D grade.
        echo $'\n'
    elif [ $sum -ge 55 ] && [ $sum -lt 50 ]
    then
        echo E grade.
        echo $'\n'
    else
        echo F grade.
        echo $'\n'
fi
```



```
            echo F grade.
            echo $'\n'
    fi
```

```
david@DLinux:~/OSLab/DA3$ bash q3.sh
Enter the number of marks: 4
Marks: 90
Marks: 80
Marks: 70
Marks: 60
B grade.


david@DLinux:~/OSLab/DA3$ 
```

Q4. Bash script to display files in users home directory

```
#!/bin/bash
DIR=/home/david
```

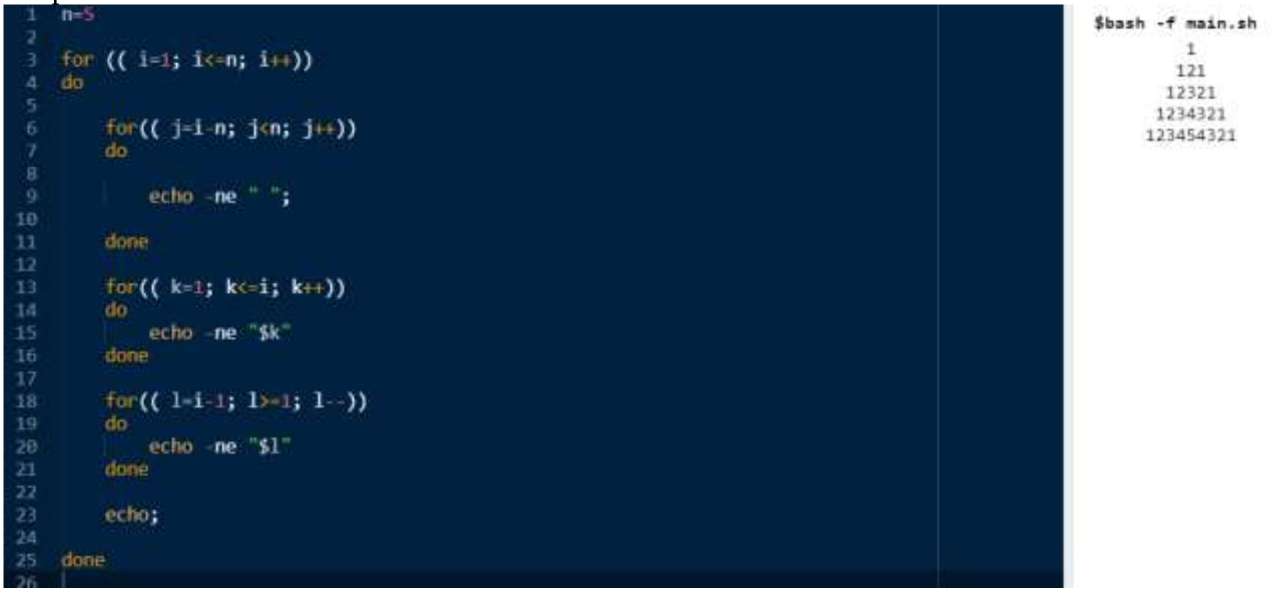
```
for list in `ls -p /home/david`;
do
    if echo -n $list | grep -v /
    then
        echo `ls -l $DIR/$list | cut -d ' ' -f 1`
        chmod 444 $DIR/$list
        echo 'permission changed'
        echo $'\n'
    else
        echo $list
    fi
done;
echo $'\n'
echo "New permissions"
for list in `ls -p /home/david`;
do
    if echo -n $list | grep -v /
    then
        echo `ls -l $DIR/$list | cut -d ' ' -f 1`
        echo $'\n'
    else
        echo $list
    fi
done;
```

Q5) Pattern

```
n=5

for (( i=1; i<=n; i++))
do

    for(( j=i-n; j<n; j++))
    do

        echo -ne " ";

    done

    for(( k=1; k<=i; k++))
    do
        echo -ne "$k"
    done

    for(( l=i-1; l>=1; l--))
    do
        echo -ne "$l"
    done

    echo;
```

done

Output:



```
n=5

for (( i=1; i<=n; i++))
do

    for(( j=i-n; j<n; j++))
    do

        echo -ne " ";

    done

    for(( k=1; k<=i; k++))
    do
        echo -ne "$k"
    done

    for(( l=i-1; l>=1; l--))
    do
        echo -ne "$l"
    done

    echo;

done
```

```
$bash -f main.sh
     1
    121
   12321
  1234321
 123454321
```

Q6)

```
#!/bin/bash
echo "Select an option:"
echo "a. Print first n triangular numbers"
echo "b. Check if a number is Automorphic Number"
echo "c. Check if a number is Abundant Number"
echo "d. Exit"
while :
do
echo -n 'Select an option: '
read CHAR
case $CHAR in
a)
echo -n "a) Input a number: "
read n
l=0
j=0
for(( i=1; i <= n; i++));
do
l=$(($j + $i))
j=l
echo -n ' '$l
done;
echo $'\n'
;;
b)
echo -n 'b) Input a number: '
read n
m=$(($n*$n))
```

```
while (( $n != 0 ));
do
check=0
a=$(($n%10))
b=$(($m%10))
if [ $a -eq $b ];
then
n=$(($n/10))
m=$(($m/10))
check=1
else
check=0
break
fi
done
if [ $check -eq 1 ];
then
echo "Automorphic"
elif [ $check -eq 0 ];
then
echo "Not Automorphic"
fi
;;
c)
sum=0
echo -n "c) Input a number: "
read n
for(( i=1; i < n; i++ ));
do
m=$(($n%$i))
echo $m
if [ $m -eq 0 ];
then
sum=$(($sum+$i))
fi
done
echo $'\n'
echo $sum
if [ $sum -gt $n ];
then
echo 'Abundant number'
else
echo 'Not an Abundant number'
fi
;;
*)
echo "Enter a valid option"
break
;;
esac
done;
```

Output: (no ubuntu laptop at the time to record output)

```
Select an option:
a. Print first n triangular numbers
b. Check if a number is Automorphic Number
c. Check if a number is Abundant Number
d. Exit
Select an option: a
a) Input a number: 8
1 3 6 10 15 21 28 36
Select an option: b
b) Input a number: 76
Automorphic
Select an option: c
c) Input a number: 12
Abundant number
```