ADA C3 Assignment, Q3

-Group 03

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Drum rotates in discrete steps, α

- K = 360/α sectors on surface of drum
- Each sector can be either black or white
- Mounted r constructive heads for reading color of sector
- Input α taken
- Arrangement of colors for various k is shown

Interpretation of the question

- With given α, calculate k = 360 / α
- Each platter in a hard disk has two sides/surfaces, so each platter needs two heads
- Each surface is radially divided into k parts/sectors, like a pizza

Interpretation of the question

- Each sector can have either black(0) or white(1) value (initialized randomly in the program)
- For some data arrangement of black and white in the sectors, show that arrangement in specified platter and side

Algorithm

- Simply create an array of size k
- Store some possible arrangement in that array, where each index element corresponds to a sector on a platter surface
- Read all values stored in array corresponding to platter number and side
- Show those values to the user

Space and Time complexity

- Upon choosing the platter and the side, the number of values that needs to be read = k
- Time complexity = $\Theta(k) = \Theta(1/\alpha)$
- Space complexity = $\Theta(2 * \#\ \text{platters} * k)$

For k = 16

- Here, α = 360 / k = 360 / 16 = 22.5
- Truncating decimal point, α = 22
- Taking number of platters = 1, r = 2, since two sides for one platter
- To show arrangement of colours in these 16 sectors, 16 array elements are read and printed.
- Θ(k) = Θ(16) time taken

Code, class Platter

- . int sector[MAX]
- . int sectors
- . Platter()
- . Platter(int sectors)
- . showsectors(int side)

Code, class Platter

```
class Platter {
    public:
    int sector[MAX];
    int sectors;

    Platter() {}

    Platter(int sectors)
    {
            this->sectors = sectors;

            for (int i = 0; i < (sectors * 2); ++i) {
                    sector[i] = rand() % 2;

                    if (DEBUG) {
                            cout<<sector[i]<<" ";
                    }
            }
    }

    void showsectors(int side)
    {
            int i;
            int n;

            if (side == 0) {
                    i = 0;
                    n = sectors;
            } else {
                    i = sectors;
                    n = 2 * sectors;
            }

            cout<<"\nSector data: ";

            for (; i < n; ++i) {
                    cout<<sector[i]<<" ";
            }
    }
};
```

Code, main()

```
int main()
{
	int alpha;
	int k;
	int numplatters;
	int n;
	int side;

	srand(time(0));

	cout<<"\nAlpha? ";
	cin>>alpha;
	cout<<"\nNumber of platters? ";
	cin>>numplatters;

	k = 360 / alpha;

	Platter platter[numplatters];

	for (int i = 0; i < numplatters; ++i) {
		if (DEBUG) {
			cout<<"\n";
		}

		platter[i] = Platter(k);
	}

	cout<<"\nGenerated platter values to black (0) or white (1) randomly on both sides of platters.";

	n = 0;

	while (n != -1) {
		cout<<"\nEnter -1 or any number not in platter number range to exit.\n";
		cout<<"\nPlatter number(from 0)? ";
		cin>>n;

		if (n < 0 || n >= numplatters) {
			break;
		}

		cout<<"\nSide(0 or 1)? ";
		cin>>side;
```

Code, main()

```
n = 0;

while (n != -1) {
        cout<<"\nEnter -1 or any number not in platter number range to exit.\n";
        cout<<"\nPlatter number(from 0)? ";
        cin>>n;

        if (n < 0 || n >= numplatters) {
                break;
        }

        cout<<"\nSide(0 or 1)? ";
        cin>>side;

        if (side > 1 || side < 0) {
                break;
        }

        platter[n].showsectors(side);
}

return 0;
}
```

Code, execution

```
[layman806@layman806-pc C3]$ g++ -Wall Q3.cpp
[layman806@layman806-pc C3]$ ./a.out

Alpha? 15

Number of platters? 3

Generated platter values to black (0) or white (1) randomly on both sides of platters.
Platter number(from 0)? 2

Side(0 or 1)? 1

Sector data: 0 1 0 0 1 1 0 1 0 1 1 1 0 0 1 0 0 1 1 1 1 0 1 1
Platter number(from 0)? 0

Side(0 or 1)? 0

Sector data: 1 0 1 0 1 0 0 1 1 0 0 1 1 1 1 0 0 1 1 1 1 1 1 1
Platter number(from 0)? 5
[layman806@layman806-pc C3]$ exit
```

fin