

Programming Assignment 1

Most Valuable Player

Due Tuesday 01/31 (before midnight)

Overview:

The learning objective of this project is for you to understand the purpose of parallel vectors and how to use them. In this assignment you will use the program that you wrote for the Lab Week 3 assignment in order to design and create data structures using parallel vectors to hold the data that was read in from the file and then process those vectors.

Description:

Just like in Lab Week 3, this program will read statistical data for basketball players, calculate shooting percentages and points per 48 minutes and output the data on the console. In addition to this processing you will add three additional functions to your programs:

void findTopOffensivePlayer()

This function will find and output the name of the player who has the highest offensive rating using the formula:

$$\text{Offensive Rating} = \text{Points per 48} + (\text{Offensive Rebounds per 48} * .4) + (\text{Assists per 48} * .4) - (\text{Turnovers per 48} * .4)$$

void findTopDefensivePlayer()

This function will find and output the name of the player who has the highest defensive rating using the formula:

$$\text{Defensive Rating} = (\text{Defensive Rebounds per 48} * .4) + (\text{Blocked Shots per 48} * .4) - (\text{Steals per 48} * .4) - \text{Personal Fouls per 48}$$

void findMostValuablePlayer()

This function will find and output the name of the player who has the highest MVP rating using the formula:

$$\text{MVP Rating} = (\text{Defensive Rating} * .67) + (\text{Offensive Rating} * .33)$$

Your output for this program will be the same:

Player Name	Min	FGA	FGM	PCT	3PA	3PM	PCT	FTA	FTM	PCT	OFF	DEF	TOT	STL	BLK	AST	TO	PF	PTS	P48
Abdul-Jabaar, Kareem	321	162	81	.500	0	0	---	40	32	.800	32	49	81	0	16	5	2	32	194	29.0
...																				
TOTAL	1920	810	341	.421	37	12	.324	192	133	.693	164	381	545	37	39	118	195	243	826	20.7

With the following additional lines:

```
Top Offensive Player:
23 Michael Jordan

Top Defensive Player:
6 Bill Russell

Most Valuable Player:
33 Kareem Abdul-Jabaar
```

The same four functions you were given for file reading will remain the same.

getPlayer:

This function will populate variables to hold the values for:

Player's uniform number
Player's first name
Player's last name
Minutes played

```
bool getPlayer(int& num, string& first, string& last, int& min)
{
    if(!infile.isOpen())
    {
        infile.open("lab3.dat");
    }

    infile >> num;
    if(infile.eof())
    {
        infile.close();
        return false;
    } else
    {
        assert(!infile.fail());
    }

    infile >> first;
    assert(!infile.fail());

    infile >> last;
    assert(!infile.fail());

    infile >> min;
    assert(!infile.fail());

    return true;
}
```

getShooting:

This function will populate variables to hold the values for the players' shooting statistics:

Field goal attempts (number of shots taken)
Field goals made (number of baskets made)
Three Point Attempts (3pt shots attempted – included in fga)
Three Pointers Made (3pt baskets made – include in fgm)
Free Throw attempts (number of foul shots taken)
Free Throws Made (number of foul shots made)

```
void getShooting(int& fga, int& fgm, int& tpa, int& tpm, int& fta, int& ftm)
{
    infile >> fga;
    assert(!infile.fail());

    infile >> fgm;
    assert(!infile.fail());

    infile >> tpa;
    assert(!infile.fail());

    infile >> tpm;
    assert(!infile.fail());

    infile >> fta;
    assert(!infile.fail());

    infile >> ftm;
    assert(!infile.fail());

    return;
}
```

getRebounds:

This function will populate variables to hold the values for the players' rebounding statistics:

Offensive rebounds (rebounds of team's missed shots)
Defensive rebounds (rebounds of opponents missed shots)

```
void getRebounds(int& off, int& def)
{
    infile >> off;
    assert(!infile.fail());

    infile >> def;
    assert(!infile.fail());

    return;
}
```

getOthers:

This function will populate variables to hold the values for miscellaneous players' statistics:

Steals (number of times a player forced an opponent turnover)
Blocked Shots
Assists (number of times a player's pass resulted in a basket)
Turnovers
Personal Fouls

```
void getOthers(int& stl, int& blk, int& ast, int& to, int& pf)
{
    infile >> stl;
    assert(!infile.fail());

    infile >> blk;
    assert(!infile.fail());

    infile >> ast;
    assert(!infile.fail());

    infile >> to;
    assert(!infile.fail());

    infile >> pf;
    assert(!infile.fail());

    return;
}
```

Calculations:

Field Goal % = Field Goals Made / Field Goals Attempted

Three Point % = Three Pointers Made / Three Pointers Attempts

Free Throw % = Free Throws Made / Free Throws Attempted

Totals Rebounds = Offensive Rebounds + Defensive Rebounds

Points = (2 * Field Goals Made) + Three Pointers Made + Free Throws Made

Points Per 48 = Points / (Minutes Played / 48)

Offensive Rebounds Per 48 = Offensive Rebounds / (Minutes Played / 48)

Defensive Rebounds Per 48 = Defensive Rebounds / (Minutes Played / 48)

Assists Per 48 = Assists / (Minutes Played / 48)

Turnovers Per 48 = Turnovers / (Minutes Played / 48)

Steals Per 48 = Steals / (Minutes Played / 48)

Personal Fouls Per 48 = Personal Fouls / (Minutes Played / 48)

Blocked Shots Per 48 = Blocked Shots / (Minutes Played / 48)

Put your program in a .zip file and upload it to the CS Portal.