CS – 520   ADVANCED PROGRAMMING LANGUAGES

HOMEWORK – 1

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INPUT FILE: *hw1_abstract_gamedemo.cc*

```cpp
//Compiled using CC compiler

using namespace std;

#include <iostream>
#include <string>

class BatAndBallGames
{
protected:
int playersPerTeam;
string lengthOfGame;
string sportName;
int gameScore;

//Constructor of abstract class BatAndBallGames
BatAndBallGames()
{ playersPerTeam = 0;
  lengthOfGame = " ";
  sportName = " ";
  gameScore = 0;
}

public:

//functions display() and rulesSummary() are pure virtual functions
//In c++ a class is considered abstract only if it has at least 1 pure virtual
function

virtual void display() = 0;
virtual void rulesSummary() = 0;

/* Function initializeGame() takes game name and score as the input
 * It initializes either cricket game or baseball game based on the game name passed
 */
void initializeGame(string game,int score)
{
 sportName = game;
 gameScore = score;

 if(sportName == "Cricket")
 {
   playersPerTeam = 11;
   lengthOfGame = "50 overs per innings";
   cout << sportName + " Game Initialized!" << endl;
 }
 else if (sportName == "Baseball")
 {
   playersPerTeam = 9;
   lengthOfGame = "9 innings";
   cout << sportName + " Game Initialized!" << endl;
 }
 else
 cout<< "Invalid sport name , valid entry : Cricket & Baseball" << endl;
```

```cpp
 cout << endl;

}

/* The function viewHallOfFame() displays some of the members of hall of fame
 * in cricket game and baseball game
 * it takes game name as the input and displays the respective hall of fame
 */
void viewHallOfFame(string game)
{
        cout << endl;
        if(game == "Cricket")
          {
            cout << "Let's see some of the members of Hall of Fame" << endl;
            cout << endl;
            cout << game +" Game : Hall Of Fame" << endl;
            cout << "    INDUCTEE              TEAM    " << endl;
            cout << "_____      _____" << endl;
            cout << "1. Brian Lara           West Indies " << endl;
            cout << "2. Curtly Ambrose       West Indies " << endl;
            cout << "3. Enid Bakewell        England    " << endl;
            cout << "4. Sydney Barnes        England    " << endl;
            cout << "5. Ken Barrington       England    " << endl;
            cout << "6. Bishan Singh Bedi    India      " << endl;
            cout << "7. Alec Bedser          England    " << endl;
            cout << "8. Richie Benaud        Australia  " << endl;
            cout << "9. Allan Border         Australia  " << endl;
            cout << "10.Ian Botham           England    " << endl;
            cout << "11.Kapil Dev            India      " << endl;
            cout << "12.Sunil Gavaskar       India      " << endl;
            cout << endl;
          }
        else if(game == "Baseball")
          {
            cout << "Let's see some of the members of Hall of Fame" << endl;
            cout << endl;
            cout << game +" Game : Hall Of Fame" << endl;
            cout << "    NAME                 PRIMARY TEAM    " << endl;
            cout << "_____     _____" << endl;
            cout << "1.Ty Cobb            Detroit Tigers     " << endl;
            cout << "2.Babe Ruth          New York Yankees   " << endl;
            cout << "3.Bob Feller         Cleveland Indians  " << endl;
            cout << "4.Ted Williams       Boston Red Sox     " << endl;
            cout << "5.Stan Musial        St. Louis Cardinals " << endl;
            cout << "6.Josh Gibson        Homestead Grays    " << endl;
            cout << "7.Johnny Bench       Cincinnati Reds    " << endl;
            cout << "8.Reggie Jackson     Oakland Athletics  " << endl;
            cout << "9.George Brett       Kansas City Royals " << endl;
            cout << "10.Nolan Ryan        California Angels   " << endl;
            cout << "11.Tony Gwynn        San Diego Padres   " << endl;
            cout << "12.Bobby Cox         Atlanta Braves     " << endl;
            cout << endl;
          }
        else
          {
            cout << "Invalid sport name. Valid entry : Cricket and Baseball" << endl;
          }
}};
```

```cpp
class Cricket:public BatAndBallGames
{
protected:

string manOfTheMatch;
string winningTeam;

public:

//Constructor of Cricket class
Cricket()
{
 manOfTheMatch = " ";
 winningTeam   = " ";
 cout << "        CRICKET      " << endl;
 cout << "********************" << endl;
}

/* void display() fuction - extended from the abstract class BatAndBallGames
 * This function displays the basic information about cricket game
 * It displays information such as sport name, length of the game
 * players per each team and game score if the match has started else zero
 */

void display()
  {
    cout << "Inside display method of Cricket class" << endl;
    cout << "Sport Name:" + sportName << endl;
    cout << "Players Per Team:" + playersPerTeam << endl;
    cout << "length of Game:" + lengthOfGame << endl;
     if(gameScore == 0)
       cout << "Match yet to start" << endl;
     else
       cout << "Match Score:" + gameScore <<endl;
  }


/* void rulesSummary() function-extended from the abstract class BatAndBallGames
 * This function displays the basic rules in cricket match
 */

void rulesSummary()
  {
    cout << "Cricket Rules" << endl << endl;
    cout << "Cricket is played by two teams of eleven on a level, closely cut" <<
endl;
    cout << "At each wicket stands a batsman. If the opposing bowler,";
    cout << " delivering the ball from near the opposing wicket, knocks down the
bails";
    cout << " of the batmasn's wicket, the batsman is retired." << endl;
    cout << endl;
    cout << "After six bowls to one batsman, an umpire calls over and another
bowler";
    cout << " begins bowling to the batsman's partner at the opposing wicket.";
    cout << " The players in the fiels shift position according tothe batsmen." <<
endl << endl;
```

```cpp
      cout << "If the batsman hits the ball with his bat far enough so that both
batsman";
      cout << " may run to exchange places, a run is scored." << endl << endl;
      cout << "However, if the opposing team recovers the ball and uses it to knock
down";
      cout << "the bails of a wicket before the batsman reaches it, the batsman is out
"<< endl << endl;
      cout << "A batsman is also retired if an opposing team fielder catches a batted
ball on the fly, or for any of several more technical reasons."<< endl << endl;
      cout << "A game usually consists of two innings; in one innings all players on
each team bat once in a fixed order." << endl << endl;
  }


/* function setManOfTheMatch takes input from the user and sets it to the player of
the match
 * The player of the match team is also considered the winner and the team name is
assigned to wi
nningTeam accordingly
 */

void setManOfTheMatch(string playerName)
{
   cout << "Setting the cricket match result: Deciding on the Man of The Match" <<
endl;
   manOfTheMatch = playerName;

   if(manOfTheMatch == "Kohli")
     { winningTeam = "India";
       cout << "Man Of The Match is Decided" << endl;
     }
   else if (manOfTheMatch == "Clarke")
     { winningTeam = "Australia";
       cout << "Man Of The Match is Decided" << endl;
     }
   else
       cout << "Invalid Entry" << endl;

}


//This function displays the man of the match long with the winning team

void viewMatchResult()
{
    if(gameScore == 0)
       cout << "Match yet to start" << endl;
    else
      {
        cout << "The result of the cricket match is as follows" << endl;
        cout << "Winner:" + winningTeam << endl;
        cout << "Winning Score" + gameScore << endl;
        cout << "Man of The Match:" + manOfTheMatch << endl;
      }
}};
/*Class Baseball implements the abstract class BatAndBallGames methods and data
 *Along with it , it has 2 additional data members and member functions
 *2 new data members : 1)leagueType 2)location
```

```
 *2 new member functions : 1)viewPitchTypes 2)displayMLBTeams
 */

class Baseball:public BatAndBallGames
{
protected :

string leagueType;
int location;

public:

//Constructor of Baseball class
Baseball()
{
 leagueType =" ";
 location = 0;
 cout << "        BASEBALL       " << endl;
 cout << "********************" << endl;
}




//this function displays the basic details of baseball game
//display() function is implemented from the abstract class BatAndBallGames
void display()
  {
    cout << "Inside display method of Baseball class" << endl;
    cout << "Sport Name:" + sportName << endl;
    cout << "Players Per Team:" + playersPerTeam << endl;
    cout << "length of Game:" + lengthOfGame << endl;
     if(gameScore == 0)
       cout << "Match yet to start" << endl;
     else
       cout << "Match Score:" + gameScore <<endl;
  }




//This function display the basic rules of a baseball match
//rulesSummary() function is implemented from the abstract class BatAndBallGames
void rulesSummary()
  {
    cout << "Baseball Rules" << endl << endl;
    cout << "Baseball is a game between two teams of nine players each, played on an";
    cout << " enclosed field." << endl << endl;
    cout << "THE PLAYING FIELD.The infield shall be a 90-foot square.The outfield";
    cout << " shall be the area between two foul lines formed by extending two sides";
    cout << " of the square from home plate. The infield and outfield, including";
    cout << " the boundary lines, are fair territory and all other areas is";
    cout << " foul territory."<< endl << endl;
    cout << "The ball is a sphere formed by yarn wound around a small core of cork,";
    cout << " rubber or similar material, covered with two stripes of white";
    cout << " horshide or cowhide, tighltly stitched together.";
    cout << " It weighs 5 1/4 ounces ."<< endl << endl;
```

6

```cpp
    cout << "Each fielder, may use or wear a leather glove. A FIELDER is any";
    cout << " defensive player."<< endl << endl;
    cout << "The objective of each team is to win by scoring more runs than the";
    cout << " opponent." << endl << endl;
    cout << "A RUN (or SCORE) is the score made by an offensive player who advances";
    cout << " from batter to runner and touches first, second, third and home bases in that";
    cout << " order. The order of the bases is in a counter-clockwise direction around the";
    cout << " square from home to first, etc." << endl << endl;
    cout << "A BATTER is an offensive player who takes his position in the batter's";
    cout << " box and attempts to hit a ball thrown to him by the pitcher." << endl << endl;
    cout << "A PITCHER is the fielder designated to deliver the pitch to the batter.";
    cout << " The pitcher pitches the ball to the batter and the batter attempts to hit the";
    cout << " pitch and become a runner. The defense attempts to catch the ball after it is";
    cout << " hit and put the batter and/or runners out." << endl << endl;
    cout << "A PITCH is a ball delivered to the batter by the pitcher." << endl << endl;
    cout << "A RUNNER is an offensive player who is advancing toward, or touching,";
    cout <<" or returning to any base." << endl << endl;
    cout << "The winner of the game shall be that team which shall have scored, in";
    cout << " accordance with these rules, the greater number of runs at the conclusion of a";
    cout << " regulation game." << endl << endl;
}




//This function displays the 12 various pitch types in baseball game
void viewPitchTypes()
{
    cout << endl;
    cout << "     Pitch Types " << endl;
    cout << "1. Four-seam fastball" << endl;
    cout << "2. Two-seam fastball" << endl;
    cout << "3. Cut-fastball" << endl;
    cout << "4. Split-finger fastball" << endl;
    cout << "5. Change-up" << endl;
    cout << "6. Curveball" << endl;
    cout << "7. Knuckleball" << endl;
    cout << "8. Slider" << endl;
    cout << "9. Forkball" << endl;
    cout << "10.Screwball" << endl;
    cout << "11.Slurve" << endl;
    cout << "12.Palmball" << endl;
    cout << endl;
}



/* This function display the various teams present in the MLB league
 * There are totally 30 teams
 * 2 Major leagues - National League and American League
```

```cpp
 * 3 locations - East,West and Central
 * This function takes in the league type and location from the user
 * display the teams present in that category
 */
void displayMLBTeams(string league,int loc)
{
   leagueType = league;
   location = loc;

   if(leagueType == "National")
    {
    switch (location){
    case 1:
                cout << "National League - East - Teams" << endl;
                cout << "1.Atlanta Braves" << endl;
                cout << "2.Miami Marlins" << endl;
                cout << "3.New York Mets" << endl;
                cout << "4.Philadelphia Phillies" << endl;
                cout << "5.Washington Nationals" << endl;
                break;
     case 2:
                cout << "National League - Central - Teams" << endl;
                cout << "1.Chicago Cubs" << endl;
                cout << "2.Cincinnati Reds" << endl;
                cout << "3.Milwaukee Brewers" << endl;
                cout << "4.Pittsburgh Pirates" << endl;;
                cout << "5.St.Louis Cardinals" << endl;
                break;
     case 3:
                cout << "National League - West - Teams" << endl;
                cout << "1.Arizona Diamondbacks" << endl;
                cout << "2.Colorado Rockies" << endl;
                cout << "3.Los Angeles Dodgers" << endl;
                cout << "4.San Diego Padres" << endl;
                cout << "5.San Francisco Giants" << endl;
                break;
     default:
                cout << "Invalid location" << endl;
                break;
     }
     }

     else if(leagueType == "American")
     {
     switch (location){
     case 1:
                cout << "American League - East - Teams" << endl;
                cout << "1.Baltimore Orioles" << endl;
                cout << "2.Boston Red Sox " << endl;
                cout << "3.New York Yankees" << endl;
                cout << "4.Tampa Bay Rays " << endl;
                cout << "5.Toronto Blue Jays " << endl;
                break;
     case 2:
                cout << "American League - Central - Teams" << endl;
                cout << "1.Chicago White Sox" << endl;
                cout << "2.Cleveland Indians" << endl;
                cout << "3.Detroit Tigers" << endl;
```

```cpp
                    cout << "4.Kansas City Royals" << endl;
                    cout << "5.Minnesota Twins" << endl;
                    break;
        case 3:
                    cout << "American League - West - Teams" << endl;
                    cout << "1.Houston Astros" << endl;
                    cout << "2.Oakhland Athletics" << endl;
                    cout << "3.Los Angeles of Anaheim" << endl;
                    cout << "4.Seatlle Mariners " << endl;
                    cout << "5.Texas Rangers" << endl;
                    break;
        default:
                    cout << "Invalid location" << endl;
                    break;
        }
        }
        else
        {
         cout << "Invalid Entry - Valid entries for league type : National & American" <<
endl;
          cout << "Valid entries for location:Enter 1 for  East,2 for Central & 3 for
West" << endl;
        }


    }
};

int main()
{
BatAndBallGames *game;
Cricket c;
Baseball b;

cout << "Manipulating functions using object of Cricket class c" << endl;
cout << endl;

int score;
cout << "Press any key to continue" << endl;
cin.get();

cout << "Enter a game score to initialize cricket game" << endl;
cin >> score;
c.initializeGame("Cricket",score);
cout << "Press any key to continue" << endl;
cin.get();

c.rulesSummary();
cout << "Press any key to continue" << endl;
cin.get();

c.viewHallOfFame("Cricket");
cout << "Press any key to continue" << endl;
cin.get();

c.display();
cout << "Press any key to continue" << endl;
cin.get();
```

```cpp
cout<< "Choose the man of the match : 1) Kohli or 2) Clarke" << endl;
cout << "Enter your choice" << endl;
string player;
cin >> player;
c.setManOfTheMatch(player);
cout << "Press any key to continue" << endl;
cin.get();


c.viewMatchResult();
cout << "Press any key to continue" << endl;
cin.get();


cout << "Manipulating functions using object Baseball class b" << endl;
cout << endl;
cout << "Enter a game score to initialize baseball game" << endl;
cin >> score;
b.initializeGame("Baseball",score);
cout << "Press any key to continue" << endl;
cin.get();


b.rulesSummary();
cout << "Press any key to continue" << endl;
cin.get();


b.viewHallOfFame("Baseball");
cout << "Press any key to continue" << endl;
cin.get();


b.display();
cout << "Press any key to continue" << endl;
cin.get();


b.viewPitchTypes();
cout << "Press any key to continue" << endl;
cin.get();


string league;
int loc;
cout << "To view the current teams in MLB : Enter the league type and location" <<
endl;
cout << "Note all options are case sensitive. Enter options exactly as they appear" <<
endl;
cout << "Enter league type : options - 1)American 2) National" << endl;
cin >> league;
cout << endl;
cout << "Enter location : For East Enter 1,For Central Enter 2, For West Enter 3" <<
endl;
cin >> loc;
cout << endl;
b.displayMLBTeams(league,loc);
cout << "Press any key to continue" << endl;
cin.get();


cout << "Manipulating functions using object of abstract class pointing to cricket
class" << endl
;
```

```cpp
game = &c; //Object pointing to the cricket class
cout << "Enter a game score to initialize baseball game" << endl;
cin >> score;
game->initializeGame("Cricket",score);
cout << "Enter your choice" << endl;
string player;
cin >> player;
c.setManOfTheMatch(player);
cout << "Press any key to continue" << endl;
cin.get();


c.viewMatchResult();
cout << "Press any key to continue" << endl;
cin.get();


cout << "Manipulating functions using object Baseball class b" << endl;
cout << endl;
cout << "Enter a game score to initialize baseball game" << endl;
cin >> score;
b.initializeGame("Baseball",score);
cout << "Press any key to continue" << endl;
cin.get();


b.rulesSummary();
cout << "Press any key to continue" << endl;
cin.get();


b.viewHallOfFame("Baseball");
cout << "Press any key to continue" << endl;
cin.get();


b.display();
cout << "Press any key to continue" << endl;
cin.get();


b.viewPitchTypes();
cout << "Press any key to continue" << endl;
cin.get();


string league;
int loc;
cout << "To view the current teams in MLB : Enter the league type and location" <<
endl;
cout << "Note all options are case sensitive. Enter options exactly as they appear" <<
endl;
cout << "Enter league type : options - 1)American 2) National" << endl;
cin >> league;
cout << endl;
cout << "Enter location : For East Enter 1,For Central Enter 2, For West Enter 3" <<
endl;
cin >> loc;
cout << endl;
b.displayMLBTeams(league,loc);
cout << "Press any key to continue" << endl;
cin.get();
```

```cpp
cout << "Manipulating functions using object of abstract class pointing to cricket
class" << endl
;
game = &c; //Object pointing to the cricket class
cout << "Enter a game score to initialize baseball game" << endl;
cin >> score;
game->initializeGame("Cricket",score);
game->rulesSummary();
game->viewHallOfFame("Cricket");
game->display();

/*Uncommenting the following lines will produce error
 *Error: setManOfTheMatch is not a member of BatAndBallGames.
 * Error: viewMatchResult is not a member of BatAndBallGames.
 */
//We cannot access exclusive methods inside derived class using object of abstract
class

//game->setManOfTheMatch(player);
//game->viewMatchResult();

cout<< "Manipulating functions using object of abstract class pointing to baseball
class" << endl
;
game = &b; //Object pointing to the  baseball class
cout << "Enter a game score to initialize baseball game" << endl;
cin >> score;
game->initializeGame("Baseball",score);
game->rulesSummary();
game->viewHallOfFame("Baseball");
game->display();

/*Uncommenting the following lines will produce error
 *Error: viewPitchTypes is not a member of BatAndBallGames.
 *Error: displayMLBTeams is not a member of BatAndBallGames.
 */
//We cannot access exclusive methods inside derived class using object of abstract
class

//game->viewPitchTypes();
//game->displayMLBTeams(league,loc);

}
```

OUTPUT FILE: *hw1_cplusplus_output*

```
> vi hw1_cplusplus_output
"hw1_cplusplus_output"^H discarded
                              267 lines, 10786 characters
Script started on Mon Sep 28 15:26:30 2015
> CC hw1_abstract_gamedemo.cc
> a.out
      CRICKET
********************
Manipulating functions using object of Cricket class c


Press any key to continue


Enter a game score to initialize cricket game
345
Cricket Game Initialized!


Press any key to continue
Cricket Rules


Cricket is played by two teams of eleven on a level, closely cut
At each wicket stands a batsman. If the opposing bowler, delivering the ball from near
the opposing wicket, knocks down the bails of the batmasn's wicket, the batsman is
retired.

After six bowls to one batsman, an umpire calls over and another bowler begins bowling
to the batsman's partner at the opposing wicket. The players in the fiels shift
position according to the batsmen.

If the batsman hits the ball with his bat far enough so that both batsman may run to
exchange places, a run is scored.

However, if the opposing team recovers the ball and uses it to knock downthe bails of
a wicket before the batsman reaches it, the batsman is out

A batsman is also retired if an opposing team fielder catches a batted ball on the
fly, or for any of several more technical reasons.

A game usually consists of two innings; in one innings all players on each team bat
once in a fixed order.


Press any key to continue



Let's see some of the members of Hall of Fame


Cricket Game : Hall Of Fame
     INDUCTEE              TEAM
_____    _____
1. Brian Lara           West Indies
2. Curtly Ambrose       West Indies
3. Enid Bakewell        England
4. Sydney Barnes        England
5. Ken Barrington       England
6. Bishan Singh Bedi    India
7. Alec Bedser          England
8. Richie Benaud        Australia
```

```
9. Allan Border          Australia
10.Ian Botham            England
11.Kapil Dev             India
12.Sunil Gavaskar        India
```

Press any key to continue

Inside display method of Cricket class
Sport Name:Cricket
Players per Team:11
length of Game:50 overs per innings
Match Score:345
Press any key to continue

Choose the man of the match : 1) Kohli or 2) Clarke
Enter your choice
Kohli
Setting the cricket match result: Deciding on the Man of The Match
Man Of The Match is Decided
Press any key to continue

The result of the cricket match is as follows
Winner:India
Winning Score345
Man of The Match:Kohli
Press any key to continue

*   BASEBALL*
****
Manipulating functions using object Baseball class b

Enter a game score to initialize baseball game
24
Baseball Game Initialized!

Press any key to continue
Baseball Rules

Baseball is a game between two teams of nine players each, played on an enclosed field.

THE PLAYING FIELD.The infield shall be a 90-foot square.The outfield shall be the area between two foul lines formed by extending two sides of the square from home plate. The infield and outfield, including the boundary lines, are fair territory and all other areas is foul territory.

The ball is a sphere formed by yarn wound around a small core of cork, rubber or similar material, covered with two stripes of white horshide or cowhide, tighltly stitched together. It weighs 51/4 ounces .

Each fielder, may use or wear a leather glove. A FIELDER is any defensive player.

The objective of each team is to win by scoring more runs than the opponent.

A RUN (or SCORE) is the score made by an offensive player who advances from batter to runner and touches first, second, third and home bases in that order. The order of the bases is in a counter-clockwise direction around the square from home to first, etc.

A BATTER is an offensive player who takes his position in the batter's box and attempts to hit a ball thrown to him by the pitcher.

A PITCHER is the fielder designated to deliver the pitch to the batter. The pitcher pitches the ball to the batter and the batter attempts to hit the pitch and become a runner. The defense attempts to catch the ball after it is hit and put the batter and/or runners out.

A PITCH is a ball delivered to the batter by the pitcher.

A RUNNER is an offensive player who is advancing toward, or touching, or returning to any base.

The winner of the game shall be that team which shall have scored, in accordance with these rules, the greater number of runs at the conclusion of a regulation game.

Press any key to continue

Let's see some of the members of Hall of Fame

Baseball Game : Hall Of Fame

NAME	PRIMARY TEAM
1.Ty Cobb	Detroit Tigers
2.Babe Ruth	New York Yankees
3.Bob Feller	Cleveland Indians
4.Ted Williams	Boston Red Sox
5.Stan Musial	St. Louis Cardinals
6.Josh Gibson	Homestead Grays
7.Johnny Bench	Cincinnati Reds
8.Reggie Jackson	Oakland Athletics
9.George Brett	Kansas City Royals
10.Nolan Ryan	California Angels
11.Tony Gwynn	San Diego Padres
12.Bobby Cox	Atlanta Braves

Press any key to continue

Inside display method of Baseball class
Sport Name:Baseball
Players Per Team:9
length of Game:9 innings
Match Score:24
Press any key to continue

Pitch Types
1. Four-seam fastball
2. Two-seam fastball
3. Cut-fastball
4. Split-finger fastball
5. Change-up
6. Curveball
7. Knuckleball
8. Slider
9. Forkball
10.Screwball
11.Slurve
12.Palmball

Press any key to continue

To view the current teams in MLB : Enter the league type and location
Note all options are case sensitive. Enter options exactly as they appear
Enter league type : options - 1)American 2) National
American

Enter location : For East Enter 1,For Central Enter 2, For West Enter 3
3

American League - West - Teams
1.Houston Astros
2.Oakhland Athletics
3.Los Angeles of Anaheim
4.Seatlle Mariners
5.Texas Rangers
Press any key to continue

Manipulating functions using object of abstract class pointing to cricket class

Enter a game score to initialize cricket game
345
Cricket Game Initialized!

Cricket Rules

Cricket is played by two teams of eleven on a level, closely cut
At each wicket stands a batsman. If the opposing bowler, delivering the ball from near
the opposing wicket, knocks down the bails of the batmasn's wicket, the batsman is
retired.

After six bowls to one batsman, an umpire calls over and another bowler begins bowling
to the batsman's partner at the opposing wicket. The players in the fiels shift
position according to the batsmen.

If the batsman hits the ball with his bat far enough so that both batsman may run to
exchange places, a run is scored.

However, if the opposing team recovers the ball and uses it to knock downthe bails of
a wicket before the batsman reaches it, the batsman is out

A batsman is also retired if an opposing team fielder catches a batted ball on the
fly, or for any of several more technical reasons.

A game usually consists of two innings; in one innings all players on each team bat
once in a fixed order.

Let's see some of the members of Hall of Fame

Cricket Game : Hall Of Fame

INDUCTEE	TEAM
1. Brian Lara	West Indies
2. Curtly Ambrose	West Indies
3. Enid Bakewell	England
4. Sydney Barnes	England
5. Ken Barrington	England

```
6. Bishan Singh Bedi     India
7. Alec Bedser           England
8. Richie Benaud         Australia
9. Allan Border          Australia
10.Ian Botham            England
11.Kapil Dev             India
12.Sunil Gavaskar        India
```

Inside display method of Cricket class
Sport Name:Cricket
Players per Team:11
length of Game:50 overs per innings
Match Score:345

Manipulating functions using object of abstract class pointing to baseball class

Enter a game score to initialize baseball game
34
Baseball Game Initialized!

Baseball Rules

Baseball is a game between two teams of nine players each, played on an enclosed field.

THE PLAYING FIELD.The infield shall be a 90-foot square.The outfield shall be the area between two foul lines formed by extending two sides of the square from home plate. The infield and outfield, including the boundary lines, are fair territory and all other areas is foul territory.

The ball is a sphere formed by yarn wound around a small core of cork, rubber or similar material, covered with two stripes of white horshide or cowhide, tighltly stitched together. It weighs 51/4 ounces .

Each fielder, may use or wear a leather glove. A FIELDER is any defensive player.

The objective of each team is to win by scoring more runs than the opponent.

A RUN (or SCORE) is the score made by an offensive player who advances from batter to runner and touches first, second, third and home bases in that order. The order of the bases is in a counter-clockwise direction around the square from home to first, etc.

A BATTER is an offensive player who takes his position in the batter's box and attempts to hit a ball thrown to him by the pitcher.

A PITCHER is the fielder designated to deliver the pitch to the batter. The pitcher pitches the ball to the batter and the batter attempts to hit the pitch and become a runner. The defense attempts to catch the ball after it is hit and put the batter and/ or runners out.

A PITCH is a ball delivered to the batter by the pitcher.

A RUNNER is an offensive player who is advancing toward, or touching, or returning to any base.

The winner of the game shall be that team which shall have scored, in accordance with these rules, the greater number of runs at the conclusion of a regulation game.

Let's see some of the members of Hall of Fame

Baseball Game : Hall Of Fame

NAME	PRIMARY TEAM
1.Ty Cobb	Detroit Tigers
2.Babe Ruth	New York Yankees
3.Bob Feller	Cleveland Indians
4.Ted Williams	Boston Red Sox
5.Stan Musial	St. Louis Cardinals
6.Josh Gibson	Homestead Grays
7.Johnny Bench	Cincinnati Reds
8.Reggie Jackson	Oakland Athletics
9.George Brett	Kansas City Royals
10.Nolan Ryan	California Angels
11.Tony Gwynn	San Diego Padres
12.Bobby Cox	Atlanta Braves

Inside display method of Baseball class
Sport Name:Baseball
Players Per Team:9
length of Game:9 innings
Match Score:34
> ^Dexit

script done on Mon Sep 28 15:28:00 2015

INPUT FILE: **GameDemo2.java**

```
> vi GameDemo2.java
"GameDemo2.java" 490 lines, 22377 characters
/*class GameDemo2 is used to demonstrate Abstract class concept
 *Here class BatAndBallGames is the abstract class
 *class Cricket and Baseball are its derived classes
 *In the Main class game1 is the object for class Baseball
 *game2 is the object for class Cricket
 */

import java.io.*;
public class GameDemo2{
    public static void main(String[] args) throws IOException{
            String key = "";
            BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
            Baseball game1 = new Baseball();
            System.out.println("Enter a score to initialize baseball game");
            int b_score = Integer.parseInt(br.readLine());
            game1.initializeGame("Baseball",b_score);
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game1.display();
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game1.viewHallOfFame("Baseball");
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game1.rulesSummary();
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game1.viewPitchTypes();
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            System.out.println("Enter League Type and location to view teams");
            System.out.println("League Types : National & American");
            System.out.println("Location : East ,West , Central");
            System.out.println("Enter League : Valid Entry - National & American");
            String leagueType = br.readLine();
            System.out.println("Enter Location : Valid Entry - East,West,Central");
            String location = br.readLine();
            game1.displayMLBTeams(leagueType,location);


            Cricket game2 = new Cricket();
            System.out.println("Press Any key to continue");
            key = br.readLine();
```

```java
            System.out.println("");

            System.out.println("Enter a score to initialize cricket game");
            int c_score = Integer.parseInt(br.readLine());
            game2.initializeGame("Cricket",c_score);
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game2.display();
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game2.viewHallOfFame("Cricket");
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game2.rulesSummary();
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            System.out.println("Match over : Select The Man of the match");
            System.out.println("1) Kohli 2)Clarke");
            System.out.println("Enter Your choice");
            String player = br.readLine();
            game2.setManOfTheMatch(player);
            System.out.println("Press Any key to continue");
            key = br.readLine();
            System.out.println("");

            game2.viewMatchResult();

          /* Uncommenting the following lines leads to following error
           * error: BatAndBallGames is abstract; cannot be instantiated
           * BatAndBallGames game = new BatAndBallGames();
           * 1 error
           */
          // System.out.println("Creating an object for abstract class - Test");
          // BatAndBallGames game = new BatAndBallGames();
    }
}

/*Abstract class BatAndBallGames has 4 data members and 4 member functions
 *Data Members are 1)playersPerTeam 2)lengthOfGame 3)sportName 4)gameScore
 *Member Functions are1)display 2)rulesSummary 3)initializeGame 4)viewHallOfFame
*/

   abstract class BatAndBallGames
   {
     protected int playersPerTeam;
     protected String lengthOfGame;
     protected String sportName;
     protected int gameScore;
```

```java
//these functions are implemented in the derived classes

    public abstract void display();
    public abstract void rulesSummary();

/*This function initializes the game with basic data like
 *sport name,players per team, length of game
 *it takes in score as the input to assign to gameScore
 */
    public void initializeGame(String game, int score)
     {
        sportName = game;
        gameScore = score;
        if(sportName.equals("Cricket"))
          {
            playersPerTeam = 11;
            lengthOfGame = "50 overs per innings";
            System.out.println();
            System.out.println(sportName +" Game Initialized!");
          }
        else if(sportName.equals("Baseball"))
          {
            playersPerTeam = 9;
            lengthOfGame = "9 innings";
            System.out.println();
            System.out.println(sportName +" Game Initialized!");
          }
        else
          {
            System.out.println();
            System.out.println("Invalid sport name. Valid entry : Cricket and
Baseball");
          }
      }


/*This function displays some of the members of hall of fame in cricket and baseball
 *It takes the sportname as the input and prints the hall of fame accordingly
 *It displays the player name along with teh team name
 */
    public void viewHallOfFame(String sportName)
      {
        System.out.println("");
        if(sportName.equals("Cricket"))
          {
            System.out.println("Let's see some of the members of Hall of Fame");
            System.out.println(" ");
            System.out.println(sportName +" Game : Hall Of Fame");
            System.out.println("    INDUCTEE         " + "    TEAM    ");
            System.out.println("_____ " + "_____");
            System.out.println("1. Brian Lara        " + "West Indies ");
            System.out.println("2. Curtly Ambrose    " + "West Indies ");
            System.out.println("3. Enid Bakewell      " + "England     ");
            System.out.println("4. Sydney Barnes      " + "England     ");
            System.out.println("5. Ken Barrington     " + "England     ");
            System.out.println("6. Bishan Singh Bedi" + "India       ");
            System.out.println("7. Alec Bedser        " + "England     ");
            System.out.println("8. Richie Benaud      " + "Australia    ");
```

```java
        System.out.println("9. Allan Border      " + "Australia     ");
        System.out.println("10.Ian Botham        " + "England       ");
        System.out.println("11.Kapil Dev         " + "India         ");
        System.out.println("12.Sunil Gavaskar    " + "India         ");
        System.out.println("");
      }
   else if(sportName.equals("Baseball"))
     {
        System.out.println("Let's see some of the members of Hall of Fame");
        System.out.println(" ");
        System.out.println(sportName +" Game : Hall Of Fame");
        System.out.println("    NAME          " + "    PRIMARY TEAM    ");
        System.out.println("_____   " + "_____   ");
        System.out.println("1.Ty Cobb         " + "Detroit Tigers      ");
        System.out.println("2.Babe Ruth       " + "New York Yankees    ");
        System.out.println("3.Bob Feller      " + "Cleveland Indians   ");
        System.out.println("4.Ted Williams    " + "Boston Red Sox      ");
        System.out.println("5.Stan Musial     " + "St. Louis Cardinals ");
        System.out.println("6.Josh Gibson     " + "Homestead Grays     ");
        System.out.println("7.Johnny Bench    " + "Cincinnati Reds     ");
        System.out.println("8.Reggie Jackson" + "Oakland Athletics   ");
        System.out.println("9.George Brett    " + "Kansas City Royals  ");
        System.out.println("10.Nolan Ryan     " + "California Angels    ");
        System.out.println("11.Tony Gwynn     " + "San Diego Padres    ");
        System.out.println("12.Bobby Cox      " + "Atlanta Braves      ");
        System.out.println("");
      }
   else
     {
        System.out.println("Invalid sport name. Valid entry : Cricket and
Baseball");
      }

   }
 }


/* Cricket class extends the abstract class BatAndBallGames
 * In addition to the data members and member functions present in the abstract class,
cricket ha
s additionally 2 new data members and 2 new mmber functions
 * 2 New Data Members: 1) manOfTheMatch 2) winningTeam
 * 2 New Member Functions: 1) setManOfTheMatch 2) viewMatchResult
 */

 class Cricket extends BatAndBallGames
 {
   String winningTeam;
   String manOfTheMatch;

   //Constructor of the Cricket class
   Cricket()
   {
     System.out.println("");
     System.out.println("    CRICKET    ");
     sportName = " ";
     playersPerTeam = 0;
     lengthOfGame = " ";
```

```java
      gameScore = 0;
      manOfTheMatch = " ";
      winningTeam = " ";
      System.out.println("Cricket Game not started yet");
    }

/* setManOfTheMatch takes input from the user and sets it to the player of the match
   * The player of the match team is also considered the winner and the team name is
assigned to w
inningTeam accordingly
   */
     public void setManOfTheMatch(String playerName)
     {
     System.out.println("Setting the cricket match result: Deciding on the Man of The
Match");
     manOfTheMatch = playerName;
     if(manOfTheMatch.equals("Kohli"))
       winningTeam = "India";
     else if (manOfTheMatch.equals("Clarke"))
       winningTeam = "Australia";
     else
       System.out.println("Invalid Entry");
     System.out.println("Man Of The Match is Decided");
     }


/* display function displays the basic information about the cricket game
 * It provides the information such as sportName,gameScore,length Of the Match and
players playin
g per each team
 */
  public void display()
  {
    System.out.println();
    System.out.println("Basic Information about Cricket Game");
    System.out.println("Sport Name:" + sportName);
    System.out.println("Players Per Team:" + playersPerTeam);
    System.out.println("length of Game:" + lengthOfGame);
     if(gameScore == 0)
       System.out.println("Match yet to start");
     else
       System.out.println("Match Score:" + gameScore);
  }



// rulesSummary function displays the basic rules of a one day cricket match
  public void rulesSummary()
  {
    System.out.println("Inside rulesSummary method of Cricket class");
    System.out.println(" Rules of Cricket Match");
    System.out.println("1. Cricket is played by two teams of eleven on a level,
closely cut oval pitch preferably measuring about 525 ft  by about 550 ft.");
    System.out.println("");
    System.out.println("2. Two wickets are placed 66 ft apart near the middle of the
field. A wicket consists of two wooden crosspieces - bails resting on three wooden
stumps 28 in. high.");
    System.out.println("");
```

```java
    System.out.println("3. At each wicket stands a batsman. If the opposing bowler,
delivering the ball from near the opposing wicket, knocks down the bails of the
batsman's wicket, the batsman is retired.");
    System.out.println("");
    System.out.println("4.In delivering the hard, leather-covered ball, the bowler
throws overarm but may not bend the arm, and the ball usually approaches the batsman
on one bounce.");
    System.out.println("");
    System.out.println("5.After six bowls to one batsman, an umpire calls over and
another bowler begins bowling to the batsman's partner at the opposing wicket.");
    System.out.println("");
    System.out.println("6.The players in the field shift position according to the
batsmen.");
    System.out.println("");
    System.out.println("7.If the batsman hits the ball with his willow paddle-shaped
bat far enough so that both batsmen may run to exchange places, a run is scored.");
    System.out.println("");
    System.out.println("8.When the ball is hit a long distance in any direction,
since there are no foul lines, up to four exchanges or runs may be made.");
    System.out.println("");
    System.out.println("9.If the ball crosses the boundary of the field on the
ground, four runs are scored automatically; if it clears the boundary in the air, six
are scored.");
    System.out.println("");
    System.out.println("10.However, if the opposing team recovers the ball and uses
it to knock down the bails of a wicket before the batsman reaches it, the batsman is
out.");
    System.out.println("");
    System.out.println("11.A batsman is also retired if an opposing fielder catches a
batted ball on the fly , or for any of several more technical reasons.");
    System.out.println("");
    System.out.println("12.An outstanding turn at bat may result in more than 100
runs, a century.");
    System.out.println("");

  }


//This function displays the man of the match long with the winning team
  public void viewMatchResult()
  {
    if(gameScore == 0)
        System.out.println("Match yet to start");
    else
      { System.out.println("The result of the cricket match is as follows");
        System.out.println("Winner:" + winningTeam);
        System.out.println("Winning Score" + gameScore);
        System.out.println("Man of The Match:" + manOfTheMatch);
      }
  }

}



/*Class Baseball extends the abstract class BatAndBallGames methods and data
 *Along with it , it has 2 additional data members and member functions
 *2 new data members : 1)leagueType 2)location
 *2 new member functions : 1)viewPitchTypes 2)displayMLBTeams
```

```java
 */
class Baseball extends BatAndBallGames
{
  String leagueType;
  String location;

//Constructor of Baseball class
  Baseball()
  {
    System.out.println("BASEBALL");

System.out.println("************************************************************");
    sportName = " ";
    playersPerTeam = 0;
    lengthOfGame = " ";
    gameScore = 0;
    System.out.println("Baseball Game not started yet");
  }

//this function displays the basic details of baseball game
  public void display()
  {
    System.out.println();
    System.out.println("Basic Information about Baseball game");
    System.out.println("Sport Name:" + sportName);
    System.out.println("Players Per Team:" + playersPerTeam);
    System.out.println("length of Game:" + lengthOfGame);
     if(gameScore == 0)
       System.out.println("Match yet to start");
     else
       System.out.println("Match Score:" + gameScore);
 }

//This function display the basic rules of a baseball match
  public void rulesSummary()
  {
    System.out.println(" RULES OF BASEBALL GAME");

System.out.println("************************************************************
**************");
     System.out.println("1. Baseball is a game between two teams of nine players each,
played onan enclosed field");
     System.out.println("");
     System.out.println("2. THE PLAYING FIELD.The infield shall be a 90-foot
square.The outfield shall be the area between two foul lines formed by extending two
sides of the square from home plate.The infield and outfield, including the boundary
lines, are fair territory and all other area is foul territory.");
     System.out.println("");
     System.out.println("3. The ball is a sphere formed by yarn wound around a small
core of cork, rubber or similar material, covered with two stripes of white horsehide
or cowhide, tightly stitched together. It weighs 5 1/4 ounces avoirdupois and is 9 1/4
inches in circumference.");
     System.out.println("");
     System.out.println("4. The bat is a smooth, round stick not more than 2 3/4
inches in diameter at the thickest part and not more than 42 inches in length. The
most common length used is 35 inches.");
     System.out.println("");
```

```java
    System.out.println("5. Each fielder, may use or wear a leather glove. A FIELDER
is any defensive player.");
    System.out.println("");
    System.out.println("6. The objective of each team is to win by scoring more runs
than the opponent.");
    System.out.println("");
    System.out.println("7. A RUN (or SCORE) is the score made by an offensive player
who advances from batter to runner and touches first, second, third and home bases in
that order. The order of the bases is in a counter-clockwise direction around the
square from home to first, etc.");
    System.out.println("");
    System.out.println("8. A BATTER is an offensive player who takes his position in
the batter's box and attempts to hit a ball thrown to him by the pitcher.");
    System.out.println("");
    System.out.println("9. A PITCHER is the fielder designated to deliver the pitch
to the batter. The pitcher pitches the ball to the batter and the batter attempts to
hit the pitch and become a runner. The defense attempts to catch the ball after it is
hit and put the batter and/or runners out.");
    System.out.println("");
    System.out.println("10. A PITCH is a ball delivered to the batter by the
pitcher.");
    System.out.println("");
    System.out.println("11. The CATCHER is the fielder who takes his position back of
the home base and catches the pitcher's pitch when the batter does not hit the
pitch.");
    System.out.println("");
    System.out.println("12. A RUNNER is an offensive player who is advancing toward,
or touching, or returning to any base.");
    System.out.println("");
    System.out.println("13. The winner of the game shall be that team which shall
have scored,in accordance with these rules, the greater number of runs at the
conclusion of a regulation game.");
    System.out.println("");
    System.out.println("14) A regulation game consists of nine INNINGS, unless
extended because of a tie score, or shortened (1) because the home team needs none of
its half of the ninth inning or only a fraction of it.");
  }


//This function displays the 12 various pitch types in baseball game
  public void viewPitchTypes()
  {
    System.out.println("");
    System.out.println("     Pitch Types ");
    System.out.println("1. Four-seam fastball");
    System.out.println("2. Two-seam fastball");
    System.out.println("3. Cut-fastball");
    System.out.println("4. Split-finger fastball");
    System.out.println("5. Change-up");
    System.out.println("6. Curveball");
    System.out.println("7. Knuckleball");
    System.out.println("8. Slider");
    System.out.println("9. Forkball");
    System.out.println("10.Screwball");
    System.out.println("11.Slurve");
    System.out.println("12.Palmball");
    System.out.println("");
  }
```

```java
/* This function display the various teams present in the MLB league
 * There are totally 30 teams
 * 2 Major leagues - National League and American League
 * 3 locations - East,West and Central
 * This function takes in the league type and location from the user
 * display the teams present in that category
 */
 public void displayMLBTeams(String leagueType, String location)
 {
    if(leagueType.equals("National"))
    {
    switch (location){
    case "East":
                System.out.println("National League - East - Teams");
                System.out.println("1.Atlanta Braves");
                System.out.println("2.Miami Marlins");
                System.out.println("3.New York Mets");
                System.out.println("4.Philadelphia Phillies");
                System.out.println("5.Washington Nationals");
                break;
    case "Central":
                System.out.println("National League - Central - Teams");
                System.out.println("1.Chicago Cubs");
                System.out.println("2.Cincinnati Reds");
                System.out.println("3.Milwaukee Brewers");
                System.out.println("4.Pittsburgh Pirates");
                System.out.println("5.St.Louis Cardinals");
                break;
    case "West":
                System.out.println("National League - West - Teams");
                System.out.println("1.Arizona Diamondbacks");
                System.out.println("2.Colorado Rockies");
                System.out.println("3.Los Angeles Dodgers");
                System.out.println("4.San Diego Padres");
                System.out.println("5.San Francisco Giants");
                break;
    default:
                System.out.println("Invalid location");
                break;
    }
    }
    else if(leagueType.equals("American"))
    {
    switch (location){
    case "East":
                System.out.println("American League - East - Teams");
                System.out.println("1.Baltimore Orioles");
                System.out.println("2.Boston Red Sox ");
                System.out.println("3.New York Yankees");
                System.out.println("4.Tampa Bay Rays ");
                System.out.println("5.Toronto Blue Jays ");
                break;
    case "Central":
                System.out.println("American League - Central - Teams");
                System.out.println("1.Chicago White Sox");
                System.out.println("2.Cleveland Indians");
```

```java
                System.out.println("3.Detroit Tigers");
                System.out.println("4.Kansas City Royals");
                System.out.println("5.Minnesota Twins");
                break;
    case "West":
                System.out.println("American League - West - Teams");
                System.out.println("1.Houston Astros");
                System.out.println("2.Oakhland Athletics");
                System.out.println("3.Los Angeles of Anaheim");
                System.out.println("4.Seatlle Mariners ");
                System.out.println("5.Texas Rangers");
                break;
    default:
                System.out.println("Invalid location");
                break;
    }
    }
    else
    {
     System.out.println("Invalid Entry - Valid entries for league type : National &
American");
     System.out.println("Valid entries for location : East, West & Central");
    }
  }
}
```

OUTPUT FILE: *hw1_java_output*

```
> vi hw1_java_output
"hw1_java_output"^H discarded
                          196 lines, 7298 characters
Script started on Mon Sep 28 02:29:07 2015
> javac GameDemo2.java
> java GameDemo2
BASEBALL
************************************************************
Baseball Game not started yet
Enter a score to initialize baseball game
42

Baseball Game Initialized!
Press Any key to continue


Basic Information about Baseball game
Sport Name:Baseball
Players Per Team:9
length of Game:9 innings
Match Score:42
Press Any key to continue



Let's see some of the members of Hall of Fame

Baseball Game : Hall Of Fame
    NAME              PRIMARY TEAM

_____
1.Ty Cobb         Detroit Tigers
2.Babe Ruth       New York Yankees
3.Bob Feller      Cleveland Indians
4.Ted Williams    Boston Red Sox
5.Stan Musial     St. Louis Cardinals
6.Josh Gibson     Homestead Grays
7.Johnny Bench    Cincinnati Reds
8.Reggie JacksonOakland Athletics
9.George Brett    Kansas City Royals
10.Nolan Ryan     California Angels
11.Tony Gwynn     San Diego Padres
12.Bobby Cox      Atlanta Braves

Press Any key to continue


 RULES OF BASEBALL GAME
**********************************************************************
1. Baseball is a game between two teams of nine players each, played on an enclosed
field

2. THE PLAYING FIELD.The infield shall be a 90-foot square.The outfield shall be the
area between two foul lines formed by extending two sides of the square from home
plate.The infield and outfield, including the boundary lines, are fair territory and
all other area is foul territory.
```

3. The ball is a sphere formed by yarn wound around a small core of cork, rubber or similar material, covered with two stripes of white horsehide or cowhide, tightly stitched together. It weighs 5 1/4 ounces avoirdupois and is 9 1/4 inches in circumference.

4. The bat is a smooth, round stick not more than 2 3/4 inches in diameter at the thickest part and not more than 42 inches in length. The most common length used is 35 inches.

5. Each fielder, may use or wear a leather glove. A FIELDER is any defensive player.

6. The objective of each team is to win by scoring more runs than the opponent.

7. A RUN (or SCORE) is the score made by an offensive player who advances from batter to runner and touches first, second, third and home bases in that order. The order of the bases is in a counter-clockwise direction around the square from home to first, etc.

8. A BATTER is an offensive player who takes his position in the batter's box and attempts to hit
 a ball thrown to him by the pitcher.

9. A PITCHER is the fielder designated to deliver the pitch to the batter. The pitcher pitches the ball to the batter and the batter attempts to hit the pitch and become a runner. The defense attempts to catch the ball after it is hit and put the batter and/ or runners out.

10. A PITCH is a ball delivered to the batter by the pitcher.

11. The CATCHER is the fielder who takes his position back of the home base and catches the pitcher's pitch when the batter does not hit the pitch.

12. A RUNNER is an offensive player who is advancing toward, or touching, or returning to any base.

13. The winner of the game shall be that team which shall have scored,in accordance with these rules, the greater number of runs at the conclusion of a regulation game.

14) A regulation game consists of nine INNINGS, unless extended because of a tie score, or shortened (1) because the home team needs none of its half of the ninth inning or only a fraction of it.

Press Any key to continue

*   Pitch Types*
1. Four-seam fastball
2. Two-seam fastball
3. Cut-fastball
4. Split-finger fastball
5. Change-up
6. Curveball
7. Knuckleball
8. Slider
9. Forkball
10.Screwball
11.Slurve
12.Palmball

Press Any key to continue

Enter League Type and location to view teams
League Types : National & American
Location : East ,West , Central
Enter League : Valid Entry - National & American
National
Enter Location : Valid Entry - East,West,Central
West
National League - West - Teams
1.Arizona Diamondbacks
2.Colorado Rockies
3.Los Angeles Dodgers
4.San Diego Padres
5.San Francisco Giants

    CRICKET
Cricket Game not started yet
Press Any key to continue

Enter a score to initialize cricket game
321

Cricket Game Initialized!
Press Any key to continue

Basic Information about Cricket Game
Sport Name:Cricket
Players Per Team:11
length of Game:50 overs per innings
Match Score:321
Press Any key to continue

Let's see some of the members of Hall of Fame

Cricket Game : Hall Of Fame
    INDUCTEE   TEAM

―――――――――――――――――――――――
1. Brian Lara   West Indies
2. Curtly Ambrose West Indies
3. Enid Bakewell   England
4. Sydney Barnes   England
5. Ken Barrington England
6. Bishan Singh BediIndia
7. Alec Bedser   England
8. Richie Benaud   Australia
9. Allan Border   Australia
10.Ian Botham   England
11.Kapil Dev   India
12.Sunil Gavaskar India

Press Any key to continue

Inside rulesSummary method of Cricket class
 Rules of Cricket Match
1. Cricket is played by two teams of eleven on a level, closely cut oval pitch preferably measuring about 525 ft by about 550 ft.

2. Two wickets are placed 66 ft apart near the middle of the field. A wicket consists of two wooden crosspieces - bails resting on three wooden stumps 28 in. high.

3. At each wicket stands a batsman. If the opposing bowler, delivering the ball from near the opposing wicket, knocks down the bails of the batsman's wicket, the batsman is retired.

4.In delivering the hard, leather-covered ball, the bowler throws overarm but may not bend the arm, and the ball usually approaches the batsman on one bounce.

5.After six bowls to one batsman, an umpire calls over and another bowler begins bowling to the batsman's partner at the opposing wicket.

6.The players in the field shift position according to the batsmen.

7.If the batsman hits the ball with his willow paddle-shaped bat far enough so that both batsmen may run to exchange places, a run is scored.

8.When the ball is hit a long distance in any direction, since there are no foul lines, up to four exchanges or runs may be made.

9.If the ball crosses the boundary of the field on the ground, four runs are scored automatically; if it clears the boundary in the air, six are scored.

10.However, if the opposing team recovers the ball and uses it to knock down the bails of a wicket before the batsman reaches it, the batsman is out.

11.A batsman is also retired if an opposing fielder catches a batted ball on the fly , or for any of several more technical reasons.

12.An outstanding turn at bat may result in more than 100 runs, a century.

Press Any key to continue

Match over : Select The Man of the match
1) Kohli 2)Clarke
Enter Your choice
Kohli
Setting the cricket match result: Deciding on the Man of The Match
Man Of The Match is Decided
Press Any key to continue

The result of the cricket match is as follows
Winner:India
Winning Score321
Man of The Match:Kohli
> ^Dexit

script done on Mon Sep 28 02:30:22 2015

STRUCTURE OF EACH CLASS : DATA MEMBERS AND FUNCTIONS INSIDE EACH CLASS

(i) class BatAndBallGames -> ABSTRACT CLASS

    <u>*DATA MEMBERS*</u> *: 1)sportName*
                    2)playersPerTeam
                    3)lengthOfGame
                    4)gameScore

 <u>*MEMBER FUNCTIONS*</u> *: 1)display()   - Declared in the abstract class & Implemented*
                                        inside the derived class
                  2)rulesSummary() - Declared in the abstract class & Implemented
                                        inside the derived class
                  3)initializeGame() - Implemented in the abstract class itself
                  4)viewHallOfFame() - Implemented in the abstract class itself

(ii) class Cricket -> DERIVED CLASS OF BatAndBallGames class

    This class derives all the data members and member functions present in the class BatAndBallGames.

    In addition it has 2 new data members and 2 new member functions

<u>*ADDITIONAL DATA MEMBERS*</u>   *: 1) manOfTheMatch*
                              2) winningTeam

<u>*ADDITIONAL MEMBER FUNCTIONS*</u> *: 1) setManOfTheMatch*
                                2) viewMatchResult

(iii) class Baseball -> DERIVED CLASS OF BatAndBallGames class

    This class derives all the data members and member functions present in the class BatAndBallGames.

    In addition it has 2 new data members and 2 new member functions

<u>*ADDITIONAL DATA MEMBERS*</u>   *: 1) leagueType*
                              2) location

<u>*ADDITIONAL MEMBER FUNCTIONS*</u> *: 1) viewPitchTypes*
                                2) displayMLBTeams

ACCESSING FUNCTIONS USING OBJECT OF ABSTRACT CLASS TYPE:

1) *IN C++ :*

   functions declared inside the abstract class can be accessed using this object.
  But error occurs, if we try to access functions declared exclusively inside the derived class.

  Example:
*BatAndBallGames *game;*
game->setManOfTheMatch(player);

Error: setManOfTheMatch is not a member of BatAndBallGames.

2) *IN Java :*

   We cannot instantiate an abstract class.

   The following error occurs if we try to do so:

       error: BatAndBallGames is abstract; cannot be instantiated
       BatAndBallGames game = new BatAndBallGames();
       1 error