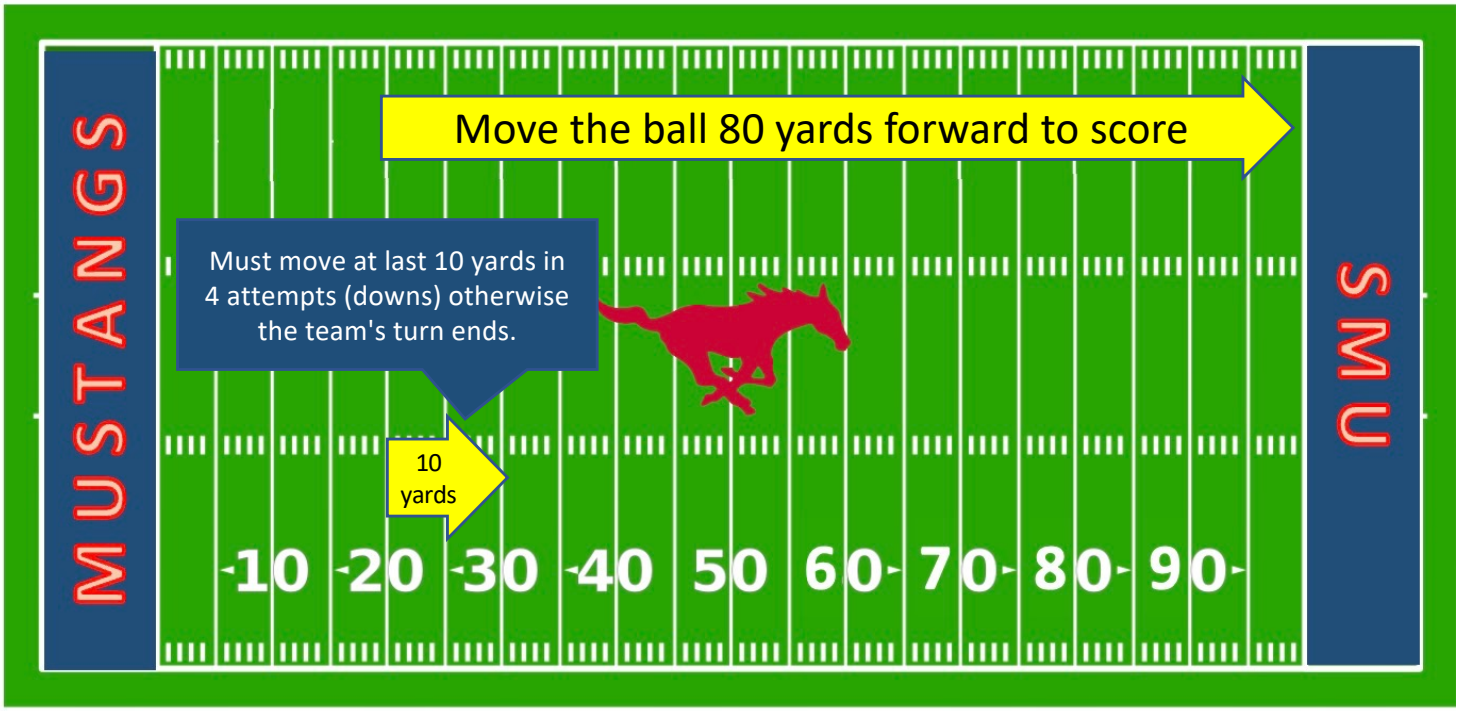
Program 4 - Football Scrimmage

CS 1342
Spring 2023

In this program you will use object-oriented programming to create a football scrimmage game. Each of the two teams take turns in the offense position, with the objective of moving the ball 80 yards to score a touchdown (for 6 points.) The modified football field below depicts the team starting their turn at the 20-yard line and attempting to reach the 100-yard line.



The offensive team has four attempts (called "downs") to move at least 10 yards at a time. If they successfully move 10 yards or more in four or fewer attempts, the downs counter resets to 1 and the next 10-yard objective starts from the location where the previous play ended. If the team fails to score, the other team takes over at the the 20-yard line and starts their turn.

The first team to make two touchdowns (12 points) is declared winner and the game ends.

The Programming Assignment is due April 3, 2023 at 6:00am CST

Each team's turn is comprised of one or more "*plays*". For each *play*, the team must decide whether to *pass* or *run*:

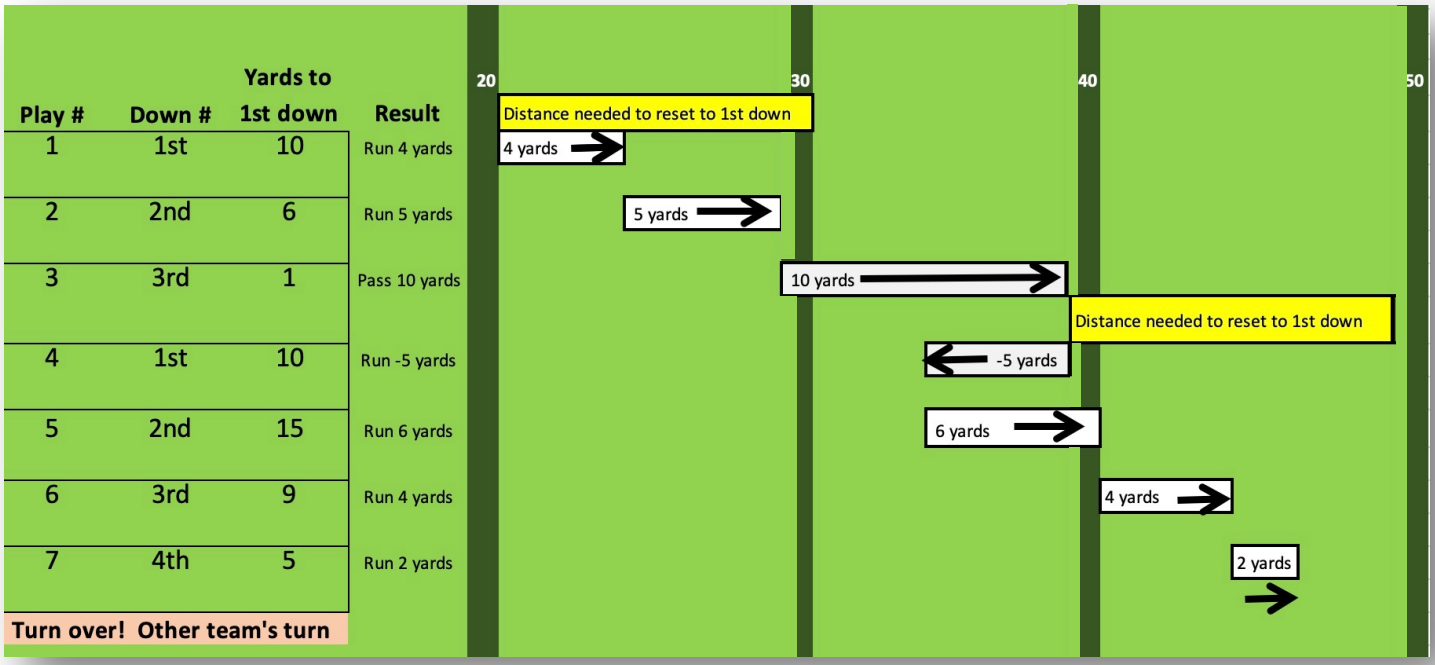
- A *pass play* can result in as many as 25 yards toward the goal. However, a *pass* play also increases the likelihood of getting tackled (sacked) before the ball is thrown, resulting in no forward progress or even moving backward from where you started. You will use a random number to select from a set of these 10 possible results:

  -10 -5 0 0 5 10 15 20 25 or 30

- A *run play* has a greater likelihood of making forward progress than with a *pass* play, however the distance traveled will be shorter. For a *run* play, you will use a random number to select from this set of 10 possible results:

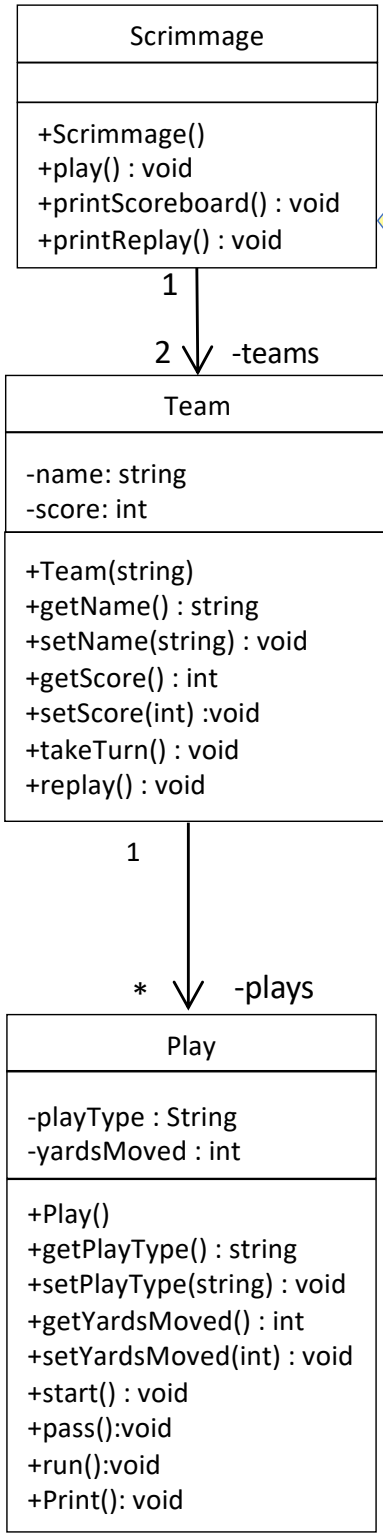
  -5 -3 -1 1 2 4 5 6 8 or 9

Example of one team's turn, playing until touchdown or end of its turn:



Program Design

Use the following GitHub link to set up your repository:
https://classroom.github.com/a/oX5znFIC



Scrimmage class:

Data members — 2 points
- Vector containing Team objects

Constructor — 4 points
- Prompt for the name of each team
- Create two team objects
- Add to the teams vector

Play function — 20 points
- Loop until game ends
  - Call takeTurn for each Team
  - Call printScoreboard after each team's turn
  - If the team's score is >= 12, declare winner and end game

PrintScoreboard function — 3 points
- Print the team name and score of each team

PrintReplay function — 3 points
- Call replay function for each team

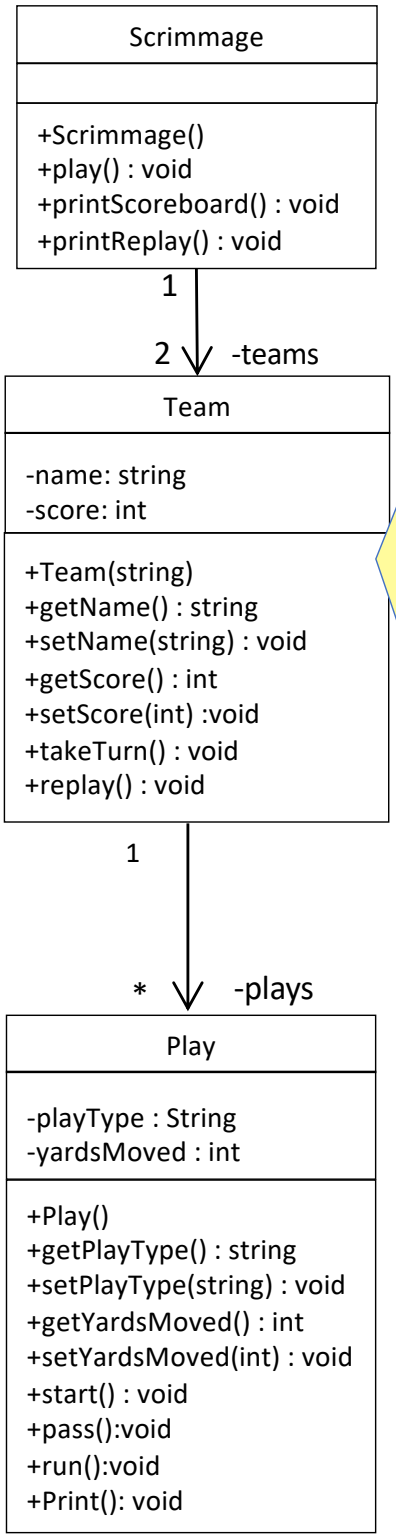
GRADING RUBRIC

+100 points- allocated by class/function in the instructions. n points

-10 points: missing comments (Get specific commenting expectations from your TA)

-10 points if contents are not split into separate main, header and function files.

Program Design



Team class:

Data members — 5 points
- Name
- Score
- Vector containing Play objects

Constructor — 5 points
- Set the team name to the string passed in as a parameter
- Set the score to 0

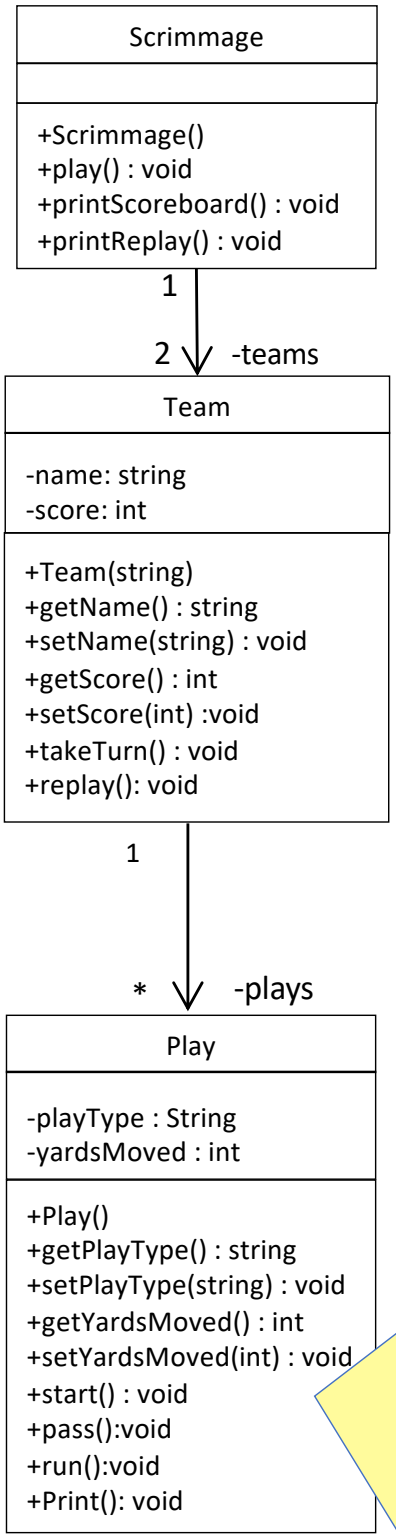
Getter and Setter functions for name and score — 4 points

TakeTurn function — 20 points
- Set location to 20 and down counter to 1
- Set target to location + 10
- Loop until turn ends
    - Print location and down counter
    - Create a Play object and add it to the plays vector
    - Send *start* to the Play object
    - When the *Play* ends, get its yardsMoved value
        - Print "Moved n yards", "Moved back n yards" or "no yards"
        - Add/subtract yardsMoved to location
        - If location >= 100, declare touchdown and add 6 points to the team's score
        - Otherwise,
            - if location < target, increment down counter. If down counter > 4, end the turn
            - If location >= target, set target = location + 10
    - Print yards needed for 1st down

Replay function
- Loop through and call Print for all Play objects in the vector

4 points

Program Design (continued)



Main

```
int main() {
    Scrimmage s;
    s.play();
    char ans;
    cout << "Print game replay (Y/N)? ";
    cin >> ans;
    if (toupper(ans) == 'Y')
        s.printReplay();
    return 0;
}
```

Play class:

Data members
- playType
- yardsMoved

4 points

Constructor
- Seed the random number generator
- Set yardsMoved to 0

5 points

Getter and Setter functions for playType and yardsMoved

4 points

Start function
- Prompt user for (P)ass or (R)un play
- Set playType to "Pass" or "Run"
- If "Pass", call *Pass* function
- If "Run", call *Run* function

5 points

Pass function
- Set yardsMoved to a random value from the following list:

-10,-5,0,0,5,10,15,20,25,30

5 points

Run function
- Set yardsMoved to a random value from the following list:

-5,-3,-1,1,2,4,5,6,8,9

5 points

Print function
- Print playType and yardsMoved

2 points

Sample Output

```
Enter name for team #1: Eagles
Enter name for team #2: Cowboys
Eagles turn
  Ball at: 20.   Down #1
  Run or Pass(R/P)? p
  Moved back 10 yards
  20 yards to 1st down
  Ball at: 10.   Down #2
  Run or Pass(R/P)? p
  Moved 5 yards
  15 yards to 1st down
  Ball at: 15.   Down #3
  Run or Pass(R/P)? p
  Moved back 5 yards
  20 yards to 1st down
  Ball at: 10.   Down #4
  Run or Pass(R/P)? p
  Moved 10 yards
  Turn over
SCOREBOARD
0     Eagles
0     Cowboys
Cowboys turn
  Ball at: 20.   Down #1
  Run or Pass(R/P)? p
  No yards
  10 yards to 1st down
  Ball at: 20.   Down #2
  Run or Pass(R/P)? p
  Moved back 5 yards
  15 yards to 1st down
  Ball at: 15.   Down #3
  Run or Pass(R/P)? p
  No yards
  15 yards to 1st down
  Ball at: 15.   Down #4
  Run or Pass(R/P)? p
  Moved 15 yards
  10 yards to 1st down
  Ball at: 30.   Down #1
  Run or Pass(R/P)? p
  Moved 20 yards
  10 yards to 1st down
  Ball at: 50.   Down #1
  Run or Pass(R/P)? p
  No yards
  10 yards to 1st down
  Ball at: 50.   Down #2
  Run or Pass(R/P)? p
  Moved 15 yards
  10 yards to 1st down
  Ball at: 65.   Down #1
  Run or Pass(R/P)? p
  Moved 20 yards
  10 yards to 1st down
  Ball at: 85.   Down #1
  Run or Pass(R/P)? r
  Moved 4 yards
  6 yards to 1st down
  Ball at: 89.   Down #2
Run or Pass(R/P)? r
  Moved 1 yards
  5 yards to 1st down
  Ball at: 90.   Down #3
  Run or Pass(R/P)? r
  Moved back 3 yards
  8 yards to 1st down
  Ball at: 87.   Down #4
  Run or Pass(R/P)? p
  Moved 20 yards
  Touchdown!
SCOREBOARD
0     Eagles
6   Cowboys

Eagles turn
  Ball at: 20.   Down #1
  Run or Pass(R/P)? p
  Moved 30 yards
  10 yards to 1st down
  Ball at: 50.   Down #1
  Run or Pass(R/P)? p
  No yards
  10 yards to 1st down
  Ball at: 50.   Down #2
  Run or Pass(R/P)? p
  Moved back 10 yards
  20 yards to 1st down
  Ball at: 40.   Down #3
  Run or Pass(R/P)? p
  Moved 20 yards
  10 yards to 1st down
  Ball at: 60.   Down #1
  Run or Pass(R/P)? p
  Moved 5 yards
  5 yards to 1st down
  Ball at: 65.   Down #2
  Run or Pass(R/P)? p
  Moved 25 yards
  10 yards to 1st down
  Ball at: 90.   Down #1
  Run or Pass(R/P)? p
  Moved 10 yards
  Touchdown!
SCOREBOARD
6     Eagles
6     Cowboys
Cowboys turn
  Ball at: 20.   Down #1
  Run or Pass(R/P)? p
  No yards
  10 yards to 1st down
  Ball at: 20.   Down #2
  Run or Pass(R/P)? p
  Moved back 10 yards
  20 yards to 1st down
  Ball at: 10.   Down #3
  Run or Pass(R/P)? p
  Moved 5 yards
  15 yards to 1st down
  Ball at: 15.   Down #4
Run or Pass(R/P)? p
  Moved 25 yards
  10 yards to 1st down
  Ball at: 40.   Down #1
  Run or Pass(R/P)? r
  Moved back 1 yards
  11 yards to 1st down
  Ball at: 39.   Down #2
  Run or Pass(R/P)? r
  Moved 2 yards
  9 yards to 1st down
  Ball at: 41.   Down #3
  Run or Pass(R/P)? r
  Moved 8 yards
  1 yards to 1st down
  Ball at: 49.   Down #4
  Run or Pass(R/P)? r
  Moved 9 yards
  10 yards to 1st down
  Ball at: 58.   Down #1
  Run or Pass(R/P)? p
  Moved 5 yards
  5 yards to 1st down
  Ball at: 63.   Down #2
  Run or Pass(R/P)? p
  Moved 10 yards
  10 yards to 1st down
  Ball at: 73.   Down #1
  Run or Pass(R/P)? p
  Moved 30 yards
  Touchdown!
SCOREBOARD
6     Eagles
12     Cowboys
 Cowboys won!! Game over

Print game replay (Y/N)? y
Play summary for Eagles:
Pass play for -10 yards
Pass play for 5 yards
Pass play for -5 yards
Pass play for 10 yards
Pass play for 30 yards
Pass play for 0 yards
Pass play for -10 yards
Pass play for 20 yards
Pass play for 5 yards
Pass play for 25 yards
Pass play for 10 yards

Play summary for Cowboys:
Pass play for 0 yards
Pass play for -5 yards
Pass play for 0 yards
Pass play for 15 yards
Pass play for 20 yards
Pass play for 0 yards
Pass play for 15 yards
Pass play for 20 yards
Run play for 4 yards
<<Remaining output ommitted
  due  to limited space>>
```