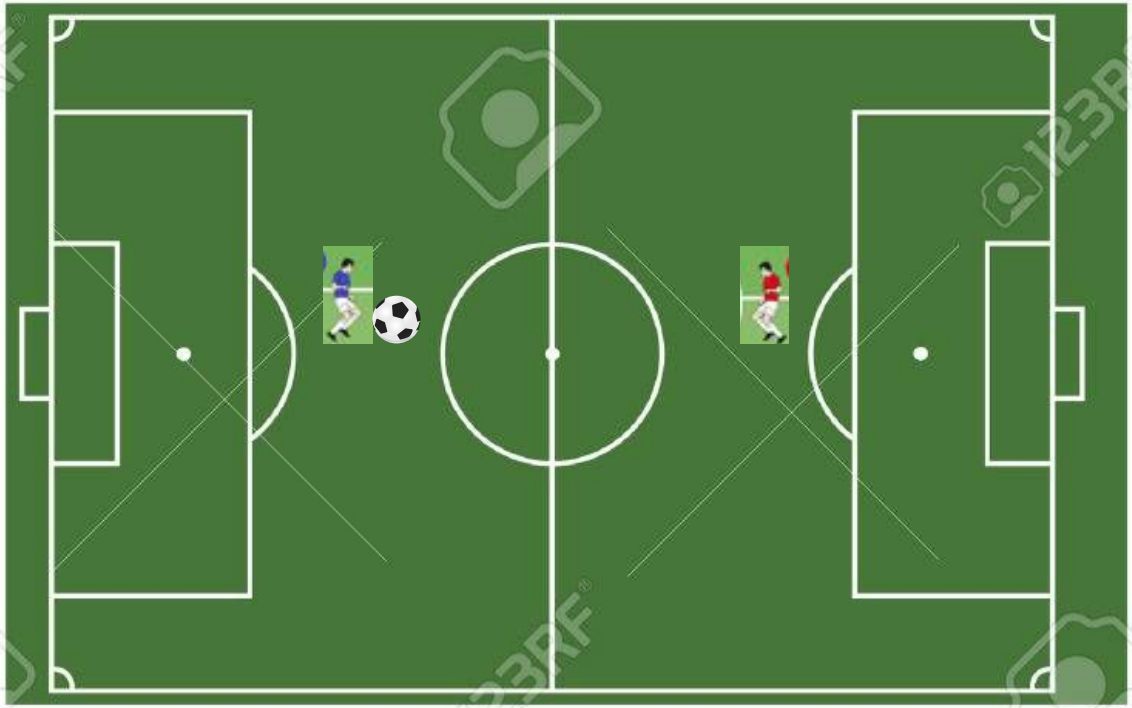
**1st Midterm:**
11 September 2019
Wednesday

# **Development** and Research Project

Ten groups, every group with four people.

# Soccer Game



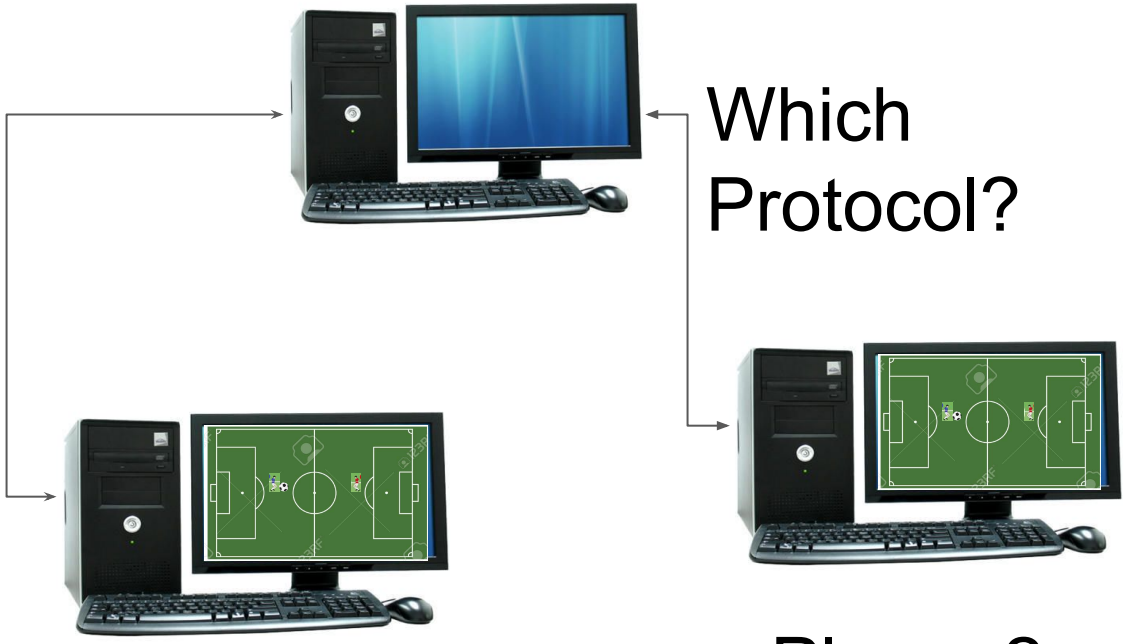
You work for one of the best software development company. One of the most important clients asks you to build an Interactive soccer game. It's a challenging development project but the client trust in your coding skills.

Some of the requirements of your client are the next ones:

- Develop a Java Server which manages and orchestrate the soccer matches.
- Your server should be able to accept multiple players at the time, but every match just starts when two players arrive.
- Use a connection-oriented protocol to ensure that all the player movements are well transmitted between clients.

Example:

Which Protocol?



Which Protocol?

Player 1:

Player 2:

# Stage 1: Requirements

- Develop a Java Server which manages and orchestrate the soccer matches.
- Your server should be able to accept multiple players at the time, but every match just starts when two players arrive.
- Use a connection-oriented protocol to ensure that all the player movements are well transmitted between clients.
- Use the mouse or the keys events to manage the ball path and the “kick” action (**Your choice, give us a surprise :3**)
- Your client specifies that every player must have at least one soccer player, but didn't specify anything about the maximum number of team members (**Your choice, give us a surprise :3)**
- The client claims: is your decision to implement or not some restriction about the soccer midline (**Your choice, give us a surprise :3)**
  - Will the players be able to cross the midline or don’t?

# Stage 1: What we expect?

1. One server application (No GUI required) 10/100
2. One client application with GUI to show the player and ball movements in the soccer field. 10/100
3. The client running must be able to make a tcp connection to the server 15/100
4. The server must be able to manage/orchestrate network connections. 20/100
5. In a soccer match, every client must reproduce the other team movements in the GUI. 10/100
6. When every client connects to the server, the client should ask for a username. 5/100
7. The Java client GUI will have a scoreboard to show the points annotated. 5/100
8. Every client it’s free to leave the match at any time. The other client waits for other player to start a new game. 5/100
9. Every soccer match has two periods, every period with a one-minute duration. 4/100
10. If a client exits the game accidentally, could use the username to enter again in the current match. 4/100
11. Every client must move the player and "kick" the ball with mouse or keyboard events. 4/100
12. When every player kicks the ball, the ball must move while 2 seconds following a valid path (include rebounds) 4/100
13. When a soccer match finished a summary screen must be shown. This summary should show the winner team and some relevant events in the soccer match (e.g. annotations per period, annotations per player, time-related to an annotation) 4/100

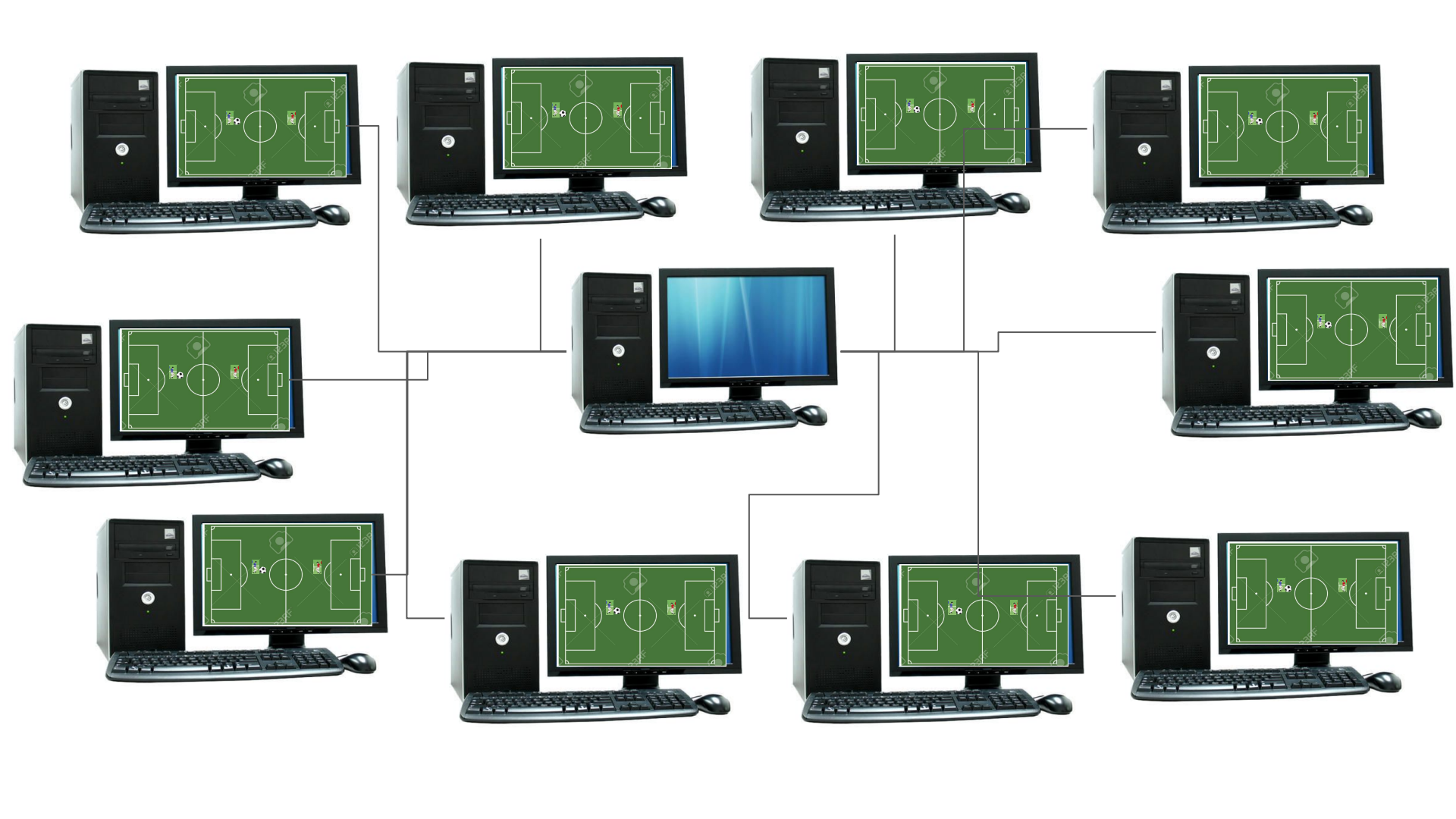
# Stage 1: What we expect?

| Item | value |
|---|---|
| 1 | 10 |
| 2 | 10 |
| 3 | 15 |
| 4 | 20 |
| 5 | 10 |
| 6 | 5 |
| 7 | 5 |
| 8 | 5 |
| 9 | 4 |
| 10 | 4 |
| 11 | 4 |
| 12 | 4 |
| 13 | 4 |
| **Total** | **100** |

# Stage 1: And the plus?

- Use the mouse or the keys events to manage the ball path and the “kick” action
  - A plus for the 1st midterm (0.2) by developing a way to manage the shot power
  - A plus for the 1st midterm (0.2) if the player could move in diagonals or with jumps
- Your client specifies that every player must have at least one soccer player, but didn't specify anything about the maximum number of team members
  - A plus for the 1st midterm (0.2) for having two functionally and interchangeable soccer player, by every client.
  - A plus for the 1st midterm (0.5) for having three functionally and interchangeable soccer player, by every client. Using a dynamic player selector
- The client claims: is your decision to implement or not some restriction about the soccer midline
  - A plus for the 1st midterm (0.2) by allowing every soccer player to cross the line
  - A plus for the 1st midterm (0.2) by including the attack action to allow the opponent to kick the ball.

What if arrives multiple clients?



# Stage 2: Requirements

# Development and **Research** Project

# Define your project!

1. Metrics and Performance
2. Detect DoS
3. Compression algorithms
4. Bot players

# Define your project!

**Metrics and Performance**

a. Read about the most relevant hardware metrics to measure the impact performance on the java server/web server, the most common uses, **etc**...
b. Using minimum 5 of the found metrics, measure the impact performance on the java server:
    i. When the first match starts
    ii. During the 1st soccer match
    iii. Then, when every player gets connected
    iv. During multiple soccer match
    v. When every client gets disconnected
c. Write a paper describing your findings, follow the IEEE academic paper format

# Define your project!

**Detect DoS**

a. Read about the DoS, how to detect these attacks, how to protect your Java Server (How to shield a web server is a plus), **etc**...
b. Shield your java server implementing the detection and protection mechanism found
c. Test your implementation using an external tool
d. Write a paper describing your findings, follow the IEEE academic paper format

# Define your project!

**Compression algorithms**

a. Read about the most know compression algorithms used to transmit content (audio or video), advantages and disadvantages, etc...
b. With the aim of improving the transmission rate inside your soccer game, implement in your code or propose a variation of some of the compression algorithms founded, measure the times and networks resources used to:
    i. Encoding/Decoding a “low” audio/video file
    ii. Send a low size file
    iii. Encoding/Decoding a “big” audio/video file
    iv. Sending a big audio/video file
c. Write a paper describing your findings, follow the IEEE academic paper format

# Define your project!

**Bots players**

a. Read about bots (artificial intelligence), the most common usages for bots in the industry, advantages, disadvantages, **etc....**
b. Implement, at least, two algorithms for AI bots
c. With both algorithms you need to make two difficulties (Easy/Normal) for the game
d. Write a paper describing the process you follow to make the algorithms, follow the IEEE academic paper format.

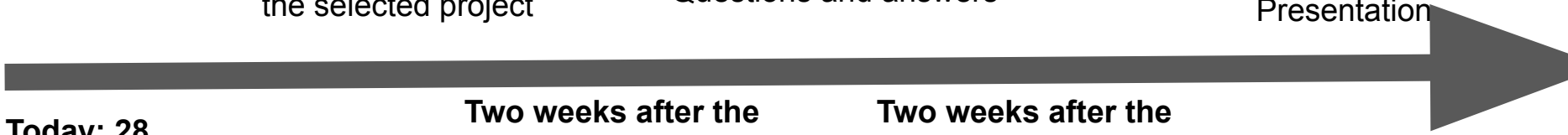
# Stage 3: Requirements

# Times?

**Session 12**
Research:
Read and know about
the selected project

**Session 22**
Research:
Questions and answers

**Maybe**
**Session 33**
Development:
Stage 3 Finished
Research:
Presentation



**Today: 28 August**
Let's talk about
the project

**Two weeks after the 1st midterm**
Development:
Stage 1

**Two weeks after the 2st midterm**
Development:
Stage 2

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