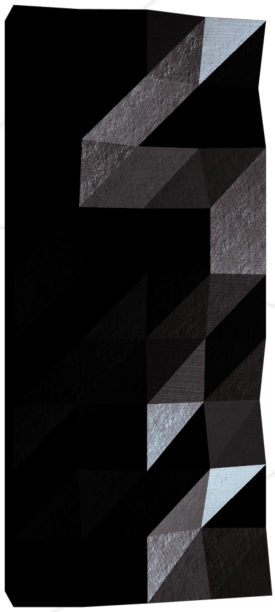


Red Tetris

Tetris Network with Red Pelicans Sauce

Summary: The objective of this project is to develop a networked multiplayer tetris game from a stack of software exclusively Full Stack Javascript

Contents

Chapter I

Foreword

Redpelicans is the sponsor of this project. You understand the trend strongly highlighted in red in the Tetris game - that we propose to build and flight some pelicans on your playgrounds in a forest of tetriminos.

Chapter II

Introduction

Everyone knows the Tetris Game and everyone knows Javascript, it only remains to build a Tetris in Javascript.
Yes, but ...
Your Tetris will be multiplayer and online. It will allow you to disturb intergalactic parties during your long coding nights (There are still some WIFI issues on some planets).
Your Tetris will use the latest technologiesJavascriptwhich are at the heart of a great intellectual, industrial and financial battle between Facebook and Google whose challenge is to be the master of the world.

Your Tetris will require a lot of brain juice to design the architecture, specify an asynchronous network protocol, implemented infunctional programming, create an algorithm of pieces' animation and display everything graphically in HTML!

Good game, good code ... and do not forget to test and retest !!

Chapter III

Objectives

The pedagogical objectives are multiple, but the main axis is to introduce the language Javascript, to discover its abundant ecosystem and to implement some of the principles, techniques and Flagship tools of Full Stack Javascript.

Everyone says they know Javascript, but very few people have a really precise knowledge of this multi- faceted language which is at the same time partially functional, completely prototype oriented, of a diabolically dynamic type, passionately asynchronous and frighteningly efficient.

Through the writing of a network Tetris game, you'll implement functional principles (which is required), asynchronous client and server (by nature of the language) and reagents (by nature of the game and GUI).

You will have to write unit tests that will have to be worthy of an industrial chain of continuous delivery.

Chapter IV

General Instructions

The project must be written totally in `Javascript` and using the latest versions available.

The client code (browser) must be written without a call to "this" in the purpose of pushing you to use functional constructs and not object. You have the choice of the functional library (lodash, ramda, ...) to use it or not.
The handling logic of the heap and pieces must be implemented as "pure functions".
An exception to this rule: "this" can be used to define its own subclasses of "Error".

On the opposite, the server code must use object-oriented programming (prototype).
We want to find there at least the Player, Piece and Game classes.

The client application must be built from any JS frameworks. HTML code must not use "<TABLE />" elements, but must be built exclusively from a grid or flexbox layout.

Prohibition to use:

- A DOM manipulation library like `jQuery`
- Canvas
- SVG (Scalable Vector Graphics)

There is no need to directly manipulate the DOM.

Unit tests must cover at least 70% of the statements, functions, lines and at least 50% of branches (see below).

Chapter V

Mandatory part

V.1 Tetris : the game

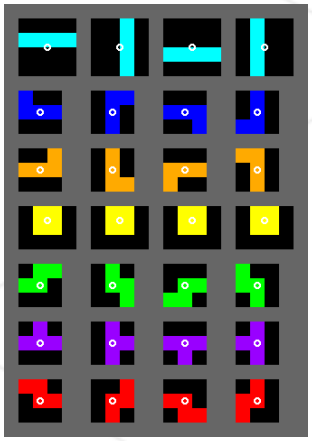
`Tetris` is a puzzle game (see Wikipedia), whose subject is to contain falling pieces as long as possible in a Playground. The game is over when the field no longer offers enough room for a new piece to fall. When one or more lines of land are complete, they disappear, allowing to postpone the expiry of the game.

The game you are going to build is based on these basics but is played between several players.

Each player has his own playing field, all players undergo the same series of pieces. As soon as a player destroys lines on his ground, the opposing players receive n - 1 lines in penalty, then indestructible, which fit at the bottom of their playground.

A terrain consists of 10 columns and 20 lines. Each player can graphically observe the list of his opponents (name) and the specter of their land. For each column, a spectrum indicates the first line occupied by a piece without providing any details about occupation of the following lines. As soon as the terrain is updated, all opponents must visualize the evolution of their spectrum.

The game takes the historical tetriminos and their principles of rotation:



There is no score, the last player of the game is the winner. The game must be multi-part, but must also allow to play solo.

V.1.1 Moving the pieces

The pieces "go down" at a constant speed and frequency. The pile of pieces placed on the lower part of the terrain is called a "pile". Except in the event of a fall, a piece sticks to the pile (stops being mobile) not at the moment of contact with the pile, but at the next step, this makes it possible to adjust its position in contact with the pile.

The movements initiated by the player for a piece are as follows:

Left and right arrows: Horizontal move to the right or left

Top arrow: Rotation (only one direction is enough)

Down arrow: Fall towards the pile

Spacebar: Vertical move to position a piece in a hole in the pile

V.2 Tetris : the technical

The game relies on a `client / server`. architecture. The client runtime environment is a browser (we recommend a version evergreen). The server will be written with `NodeJS`. Clients and server communicate via `http`.

The server will be in charge of:

- Management of games and players.
- Distribution of pieces for each game.
- Scattering of spectra

`Reminder: each player of the same game must receive, may be in different times, the same parts in the same positions and coordinates.`

The communication between the server and the clients is `event` et `bi-directional`, you will use socket.io for its implementation.

No data persistence is necessary.
You are encouraged to use functionnal components (see Hooks)
The client must implement a Single Page Application.

V.2.1 Game Management

Each player connects to a game via a hash-based url type :

- `http://<server_name_or_ip>:<port>/#<room>[<player_name>]`

room : name of the game to join

player_name : name of the player

The first to join a game, will be the person in charge, will have control of the game, he can launch it as he pleases. In the end, he will be the only one to be able to restart it. At the moment of starting, one of the remaining players will take this role.

A player can not join a game during the game. He must wait until the end, he can then join and participate when the leader decides to launch it.

A game is over when there is only one plater left, it's then the winner.

A game can be played with one player.

Several games can be organized simultaneously..

V.2.2 Server Construction

In the game, the server is in charge of the game management, of the coin distribution and `scattering the pieces` players' fields. We invite you to very precisely identify from the beginning the sharing of responsibilities between the clients and the server and specify the network protocol of the game.

Technically, the server is an asynchronous loop in charge of processing events issued by customers. Socket.io allows you to receive and send events to one or more players simultaneously for the same game.

It offers an HTTP service (in addition to socket.io) whose only purpose is to provide, at the launch of the connection from the client, the files index.html and bundle.js, and some additional resources.

V.2.3 Client Construction

The client runs within a browser in a `Single Page Application` type architecture:

- At the first request, the browser retrieves a file from the server `index.html` references a "<script />" tag to a file `Javascript` (bundle.js) which contains the entire code of the client application.
- The browser runs bundle.js and then there are no more exchanges of HTML files between server and client, the latter is totally standalone for graphical rendering and for application logic management. Only data will be exchanged with the server, bi-directional exchanges in our case are done via `socket.io`

We ask you to choose for the customer build:

- one JS framework like React,Vue... : This is the V of acronym MVC which will allow you to build the GUI modèle.

In addition to this library you can totally call upon the ecosystem of modules Javascript :

- `Fonctional` : lodash, ramda are very popular, but not essential, solutions, `ES6` offers as standard several set operators (map, reduce)
- `Dyssynchrony` : You can use a middleware to

V.2.4 Boilerplate

We propose you a starter kit which will help you avoid spending many hours setting up the configuration of base and allowing you to:

- Run the server
- Set up a bundle of JS files for the browser
- Run unit and coverage tests.

The `boilerplate` is available via the github repository red_tetris_boilerplate

The documentation is present in the Readme.

V.2.5 Tests

The object of the tests is:

- Increase the reliability of the delivered versions
- To reduce the "time to market" by facilitating / automating the recipe for each new version
- Reinforce customer satisfaction and the relevance of the delivered versions by allowing longer development cycles.

`Javascript` and its ecosystem are now fully mature to be at the heart of a company's strategy as well as
`.Net` ou `Java` in the past, we are talking about `Entreprise Javascript`. Un des éléments clef de la solution One of the key elements of the solution will be the definition of a `pipeline`of tests for rejecting within an automatic workflow a faulty software version.

We propose you to familiarize yourself with the unit tests (the first ones encountered in the pipeline) and impose as constraints that these tests must cover 70 of the lines of code.

More precisely, when running the tests you will get 4 metrics:

- `Statements`: statement coverage rate
- `Functions`: functions coverage rate
- `Lines`: coverage rate of lines of code
- `Branches`: coverage rate of code execution paths

Your goal is to cover at least 70% of the statements, functions, lines and at least 50% of the branches.
boilerplate includes a chain of measure of coverage and unit tests with 3 examples of unit tests (see documentation)

Chapter VI

Bonus part

As Red_tetris is, basically, a video game, the possibility of adding bonuses is great. We offer, without limitation, the following:

- Add a scoring system during the game.
- Have a persistence of these scores for each player.
- Have several game modes (invisible parts, increased gravity, etc ...)

Also, several technical passages have been imposed on you, including the use of `React` The objective was:

- To make you discover this technology that is very used and sought after in the professional environment
- To facilitate the project as well as its correction

An alternative solution would have been to use a library FRP (Functional Reactive Programming).Programming). Exciting paradigm to discover and perfectly adapted to the context. We invite you to discover flyd which is a minimalist library, but with a very interesting API

Chapter VII

Turn-in and peer-evaluation

Push your code to the GiT repository as usual. Only the work present on your depositwill be assessed in defense.

The game must be fully operational.