Web Programming

Vue.js example and CLI

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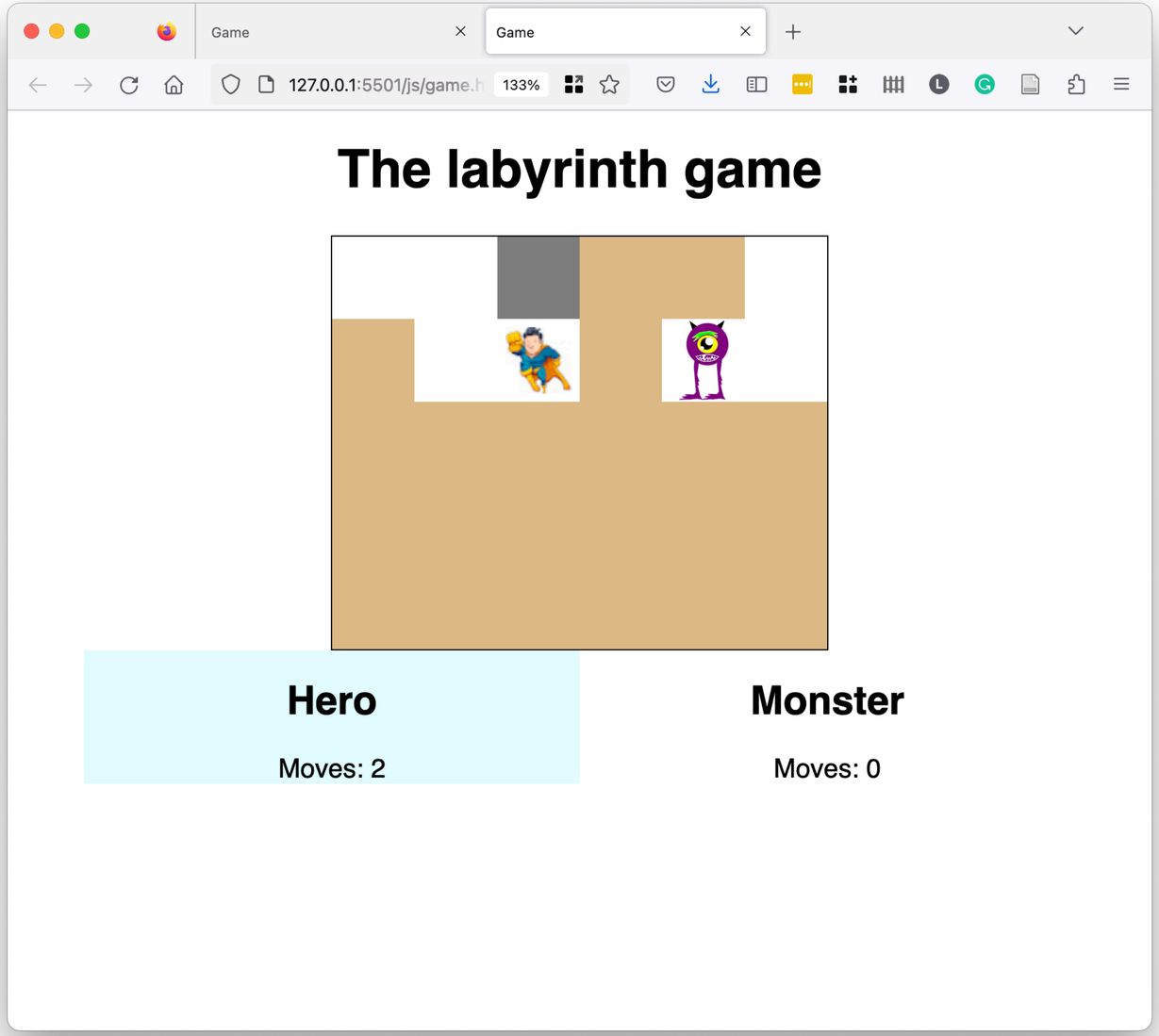
Example

Labyrinth game

- Two players take turns
  - but hero always moves twice
- Flexible labyrinth layout
  - Fields: free, wall, exit, pit
  - Fields are hidden first



Labyrinth Game - Step 1

Layout (HTML and CSS)

- Create a static HTML page

index.html

```
<body>
    <h1>The labyrinth game</h1>
    <main>
        <div>
        <div id="board">
            <div class="field">
                <img class="hero" src="hero.jpg" alt="hero">
                <img class="monster" src="monster.png">
            </div> ...

        </div>
    </div>
    <div id="stats">
        <div id="herostats" class="turn">
            <h2>Hero</h2>
            <div>Moves: <span class="movescount">0</span> </div>
        </div>
        <div id="monsterstats">
            <h2>Monster</h2>
            <div>Moves: <span class="movescount">0</span> </div>
        </div>
    </div>
    </main>
    <div id="winner">
        <h2 class="monster">The monster won!</h2>
        <h2 class="hero">The hero won!</h2>
    </div>
</body>
```

style.css

```
#board {
    margin: auto;
    display: flex;
    flex-wrap: wrap;
    width: 300px;
    border: 1px solid black;
}
.field {
    width: 50px;
    height: 50px;
    display: flex;
    align-items: center;
    justify-content: center;
}

.field.hidden {
    background-color: burlywood;
}
.wall {
    background-color: grey;
}
.pit {
    background-color: black;
}
.exit {
    background-color: yellow;
}
.field img {
    display: none;
}
.field img.monster {
    height: 48px;
}
```

Labyrinth Game - Step 1

Layout (HTML and CSS)

- Create a static HTML page
- Create classes for effects

```
.field img {
    display: none;
}
.hero img.hero {
    display: block;
}
.field.hidden {
    background-color: burlywood;
}
```

Move hero by moving the **hero** class

Show a field by removing the **hidden** class

Example #1

examples/js/labyrinth/htmlcss

index.html

```
<body>
    <h1>The labyrinth game</h1>
    <main>
        <div>
        <div id="board">
            <div class="field">
                <img class="hero" src="hero.jpg" alt="hero">
                <img class="monster" src="monster.png">
            </div> ...

        </div>
    </div>
    <div id="stats">
        <div id="herostats" class="turn">
            <h2>Hero</h2>
            <div>Moves: <span class="movescount">0</span> </div>
        </div>
        <div id="monsterstats">
            <h2>Monster</h2>
            <div>Moves: <span class="movescount">0</span> </div>
        </div>
    </div>
    </main>
    <div id="winner">
        <h2 class="monster">The monster won!</h2>
        <h2 class="hero">The hero won!</h2>
    </div>
</body>
```

style.css

```
#board {
    margin: auto;
    display: flex;
    flex-wrap: wrap;
    width: 300px;
    border: 1px solid black;
}
.field {
    width: 50px;
    height: 50px;
    display: flex;
    align-items: center;
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}

.field.hidden {
    background-color: burlywood;
}
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    background-color: grey;
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.pit {
    background-color: black;
}
.exit {
    background-color: yellow;
}
.field img {
    display: none;
}
.field img.monster {
    height: 48px;
}
```

Labyrinth Game - Step 2

Game logic

- Model logic as JS classes
- Model logic without thinking about HTML

  `class Game`

  - who's turn, moves, winner

  `class Board`

  - player positions and moving

  `class Field`

  - Field contains: wall?, exit?, pit?, hidden?, hero?, monster?

Labyrinth Game - Step 2

Game logic

`class Game`

- who's turn
- how many moves left
- is game ended
- who has won

```
class Game {
    constructor(){
        this.players=['hero','monster'];
        this.turn=0;
        this.heromoves = 2;
        this.monstermoves = 0;
        this.winner = "";
        this.ended = false;
           }
    player(){ //return player }
    move(){ //register move }
    eat(){ //monster wins }
    pit(){ //player looses }
    exit(){ //player wins }
    win(winner){ //set winner }
```

Labyrinth Game - Step 2

Game logic

`class Game`

- who's turn
- how many moves left
- is game ended
- who has won

```
class Game {
    constructor(){
        this.players=['hero','monster'];
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           }
    player(){ //return player }
    move(){ //register move }
    eat(){ //monster wins }
    pit(){ //player looses }
    exit(){ //player wins }
    win(winner){ //set winner }
```

Labyrinth Game - Step 2

Game logic

`class Field`

- type (wall, exit, pit, free)
- hero?
- monster?
- hidden?

Check for errors

```
class Field{
    constructor(type){
        let types = ['wall', 'free', 'exit', 'pit'];
        if (types.indexOf(type) == -1){
            throw “cannot create field with wrong type”;
        }
        this.type = type // 'wall','free', 'exit', or 'pit'
        this.hidden = true;
        this.hero = false;
        this.monster = false;
    }
    show(){
        this.hidden = false;
    }
    set(player){
        this[player]=true;
        this.hidden = false;
    }
    unset(player){
        this[player]=false;
    }
}
```

Labyrinth Game - Step 2

Game logic

board layouts

- Field type

`Math.random()` returns a random number between 0 and 1 in [0,1)

```
const board1 =
    ['free','free','wall','wall','wall','free',
     'wall','free','free','free','wall','free',
     'wall','free','wall','free','free','free',
     'wall','free','wall','wall','wall','exit',
     'wall','free','pit','free','wall','free'];
const board2 =  ...
const board3 =  …

function getRandomBoard(){
    // randomly pick 0, 1 or 2
    let r = Math.floor(Math.random()*3)
    // use r to pick a board
    let boards =[board1,board2,board3]
    return boards[r];
}
function generatefields(){ }
```

Labyrinth Game - Step 2

Game logic

`class Board`

- type (wall, exit, pit, free)
- hero?
- monster?
- hidden?

```
class Board{
    constructor(){
        this.heroXY = [0,0];    // x,y coordinates of hero
        this.monsterXY = [5,0]; // x,y coordinates of monster
        this.xmax=5;            // x ranges from 0 to 5
        this.ymax=4;            // y ranges from 0 to 4
        this.fields = []; // one Field for each position on the board
        this.game = new Game(); // Game instance
    }
    playerXY(){ // get hero or moster position }
    start(){ // generate fields set players to start positions }
    hasField(x,y){ // is (x,y) inside board? }
    getField(x,y){ // get correct Field }
    setplayer(x,y,player){ // move player, check exit&pit }
    trymove(x,y,player){ // check for turn&wall }
    moveright(player){ // x+1 }
    moveleft(player){ // x-1 }
    moveup(player){ // y-1 }
    movedown(player){ // y+1 }
}
```

Labyrinth Game - Step 2

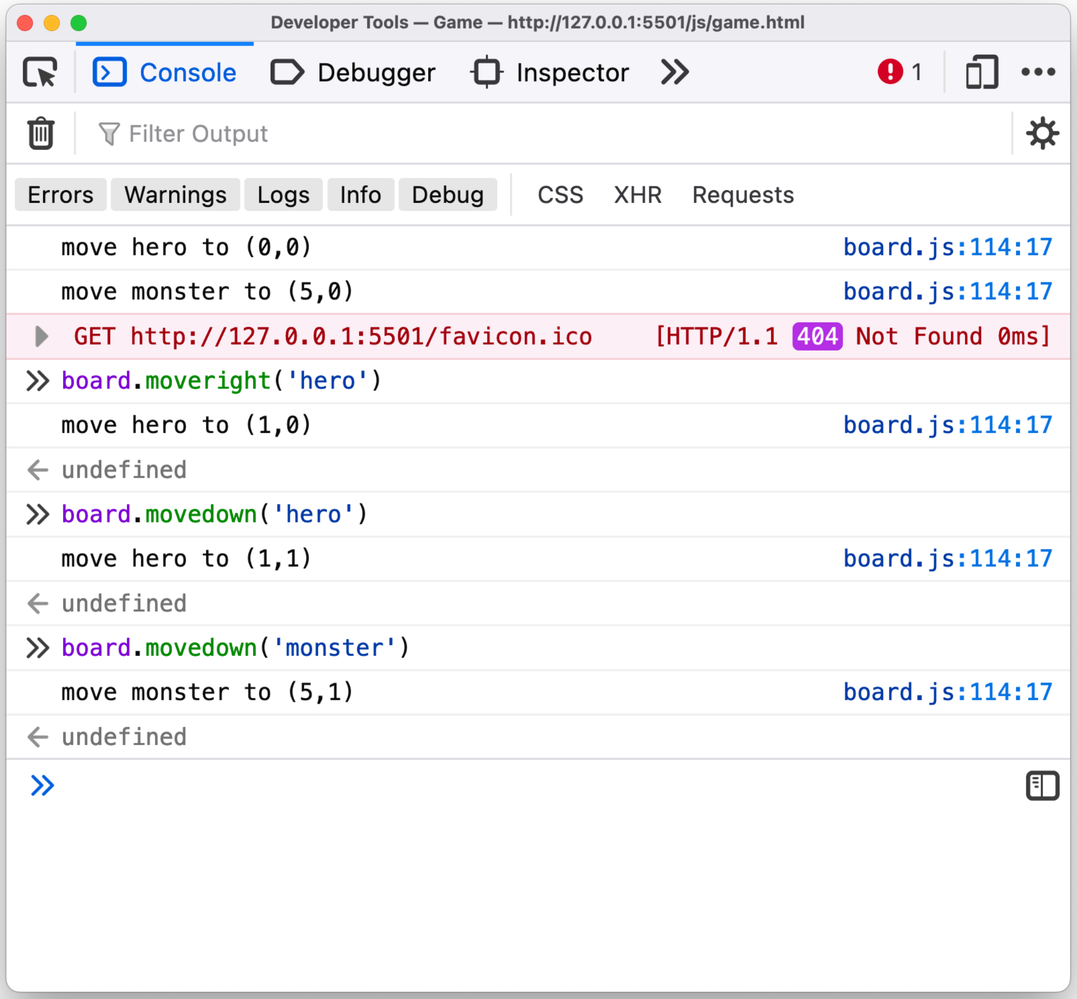
Game logic

- Create global object

```
let board = new Board();
```

- Test in console

```
console.log(`move ${player} to (${x},${y})`);
```



Labyrinth Game - Step 3

Event listeners

Can also be done after dynamic display!

- Add event listener

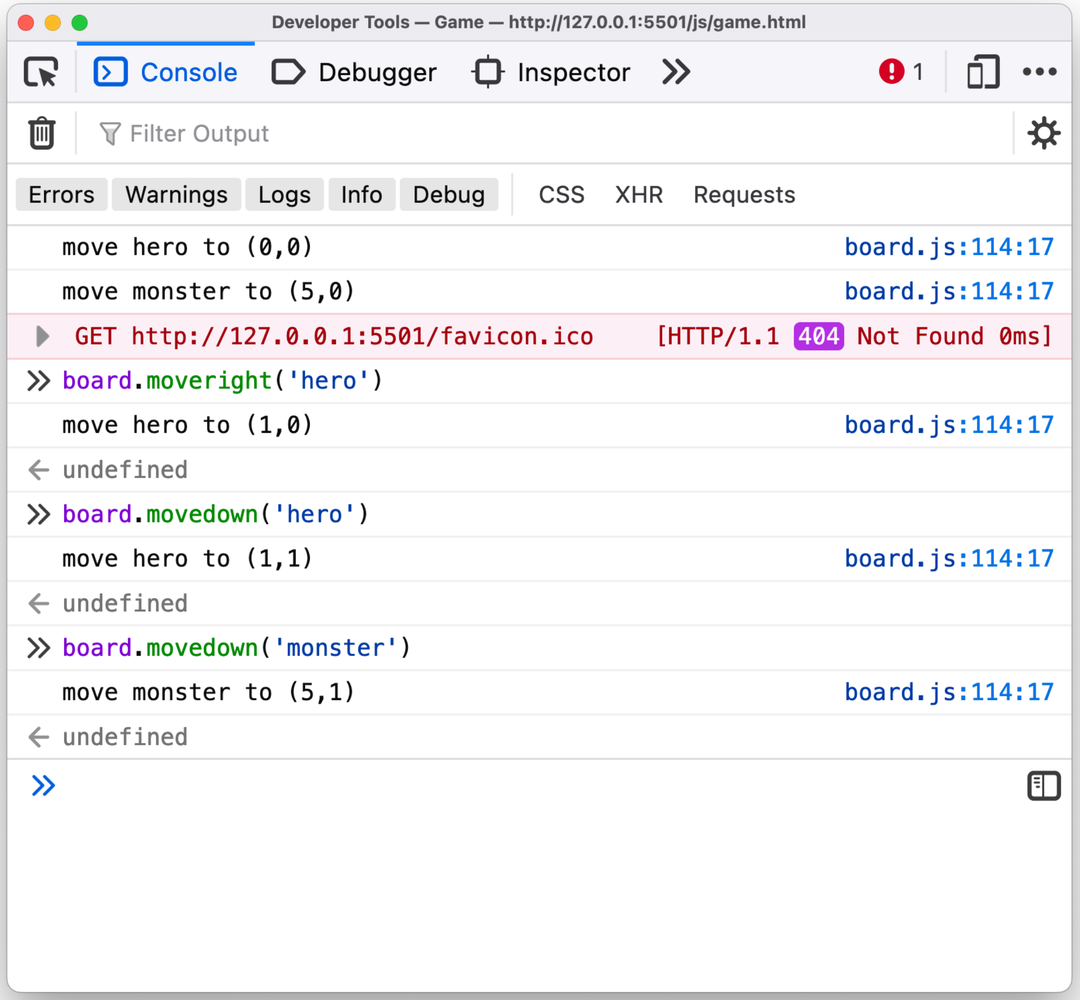
```
window.onload = function() {
    document.body.addEventListener("keyup", keyhandle);
}
```

- Handle correct keys

```
function keyhandle(event) {
    switch (event.keyCode) {
        case 37: // left
            board.moveleft('hero');
            break;
        case 65: // left
            board.moveleft('monster');
            break;
        ...
        default: // any other key
            // do nothing
            console.log(event.keyCode);
            break;
    }
}
```

Example #2

examples/js/labyrinth/jsonly



Labyrinth Game - Step 4 (pure JS)

Display

- Write turn and moves to Stats

```
if (this.turn == 0)
            document.getElementById("herostats").classList.add('turn');
document.querySelector("#herostats .movescount").textContent = this.heromoves;
```

- Apply classes to fields
- add object to Field

```
class Field{
    constructor(type, element){
        this.type = type
        this.hidden = true;
        this.hero = false;
        this.monster = false;
        this.element = element;
        this.settype();
        this.element.classList.add('hidden');

    }
    settype(){ }
}
```

Labyrinth Game - Step 4 (pure JS)

Display

- add object to Field

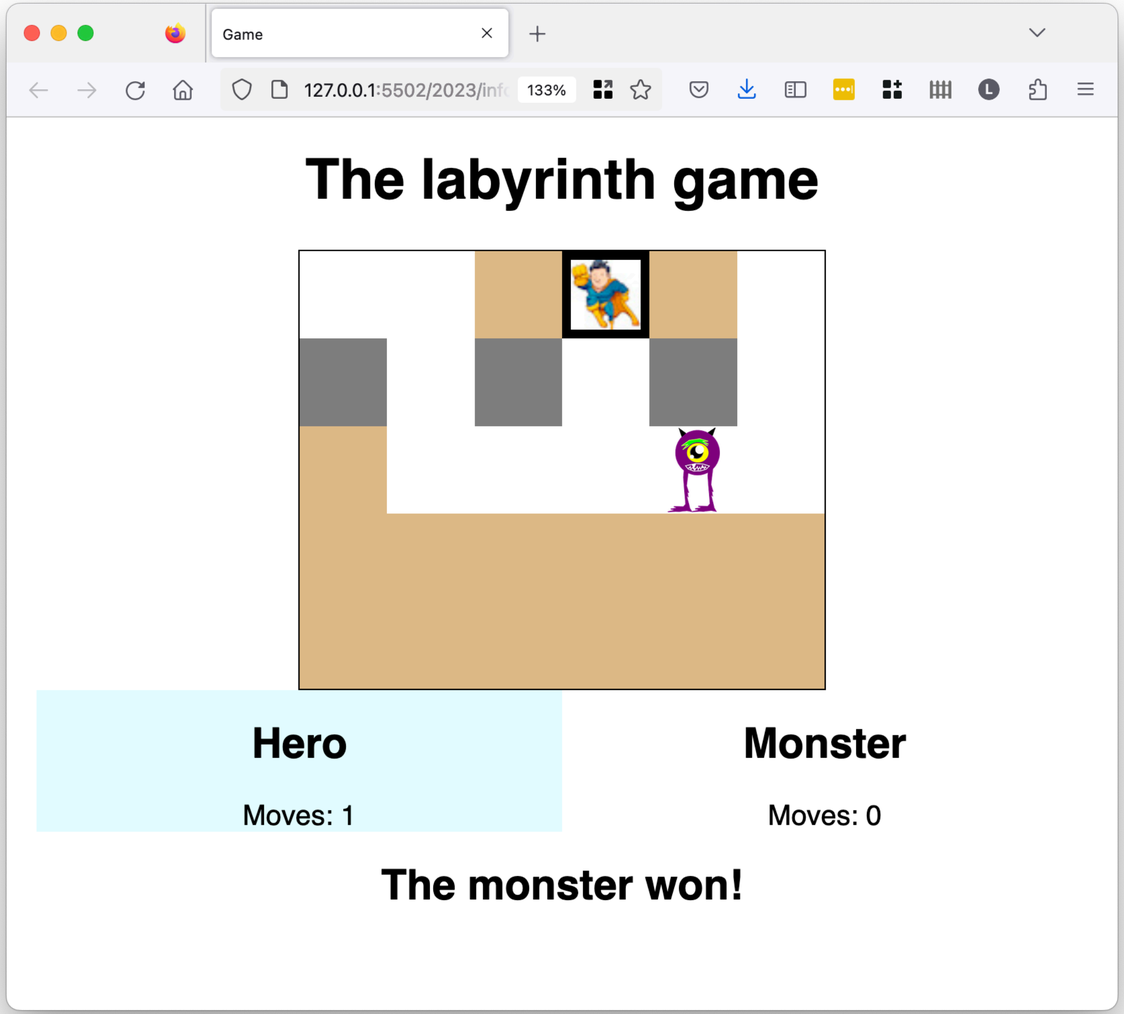
```
function generatefields(){
    let fields = [];
    let layout = getRandomBoard();

    let fieldelements = document.getElementsByClassName("field");
    if (fieldelements.length != layout.length){
        throw `Layout does not fit to page:
                ${fieldelements.length} field in html and
                ${layout.length} fields in layout.`
    }

    for (let i=0; i<layout.length; i++){
        fields.push(new Field(layout[i], fieldelements[i]));
    }
    return fields;
}
```

Example #3

examples/js/labyrinth/js



Labyrinth Game - Step 4 (Vue)

Display

- Create Board in data
- Handle keyup in methods

```
let app = Vue.createApp({
    data: function(){
        return {
            board: new Board()
        }
    },
    methods:{
        handle: function(event){
            switch (event.keyCode) {
                case 37: // left
                    this.board.moveleft('hero');
                    break;
...
```

- Listen to keyup

```
<main v-on:keyup="handle" tabindex="0">
```

tabindex="0" enables key events on not input elements.

Example #4

examples/js/labyrinth/vue