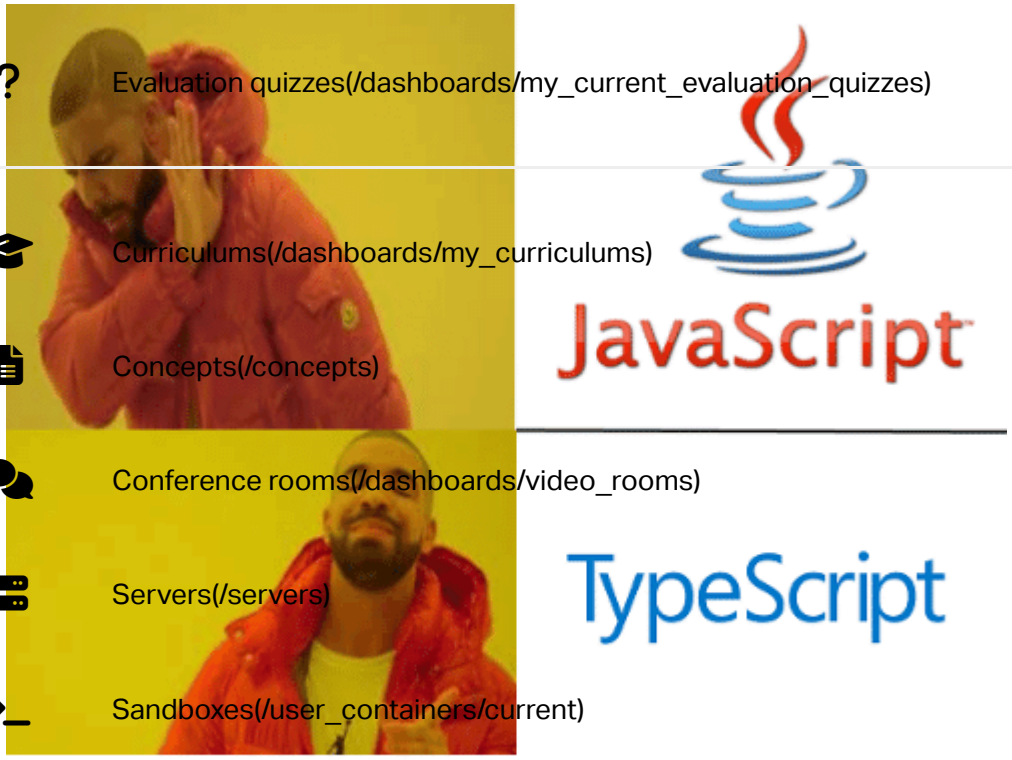
0x04. Typescript

JavaScript TypeScript

Weight: 1

Project over - took place from Jul 3, 2024 6:00 AM to Jul 4, 2024 6:00 AM



Resources

Read or watch:

- TypeScript in 5 minutes (/rltoken/iRzgJkkaCRQdVlrERbY1Og)
- TypeScript documentation (/rltoken/U2ehqajGPvrABFnDyF0tvQ)

Learning Objectives

At the end of this project, you are expected to be able to explain to anyone (/rltoken/4qhNVhVqu7TeC7ucdi01Rw), **without the help of Google**:

- Basic types in Typescript
- Interfaces, Classes, and functions
- How to work with the DOM and Typescript

- Generic types
- How to use namespaces
- How to merge declarations
- How to use an ambient Namespace to import an external library
- Basic nominal typing with Typescript

Requirements

- Allowed editors: `vi`, `vim`, `emacs`, `Visual Studio Code`
- All your files should end with a new line
- All your files will be transpiled on Ubuntu 18.04
- Your TS scripts will be checked with `jest` (version 24.9.*)
- A `README.md` file, at the root of the folder of the project, is mandatory
- Your code should use the `.ts` extension when possible
- The Typescript compiler should not show any warning or error when compiling your code

Configuration Files

Please use these files for the following tasks

`package.json`

Click to show/hide file contents

`.eslintrc.js`

Click to show/hide file contents

`tsconfig.json`

Click to show/hide file contents

`webpack.config.js`

Click to show/hide file contents

Tasks

Creating an interface for a student

mandatory

Copy the following configuration files (provided above) into the `task_0` directory: `package.json`, `.eslintrc.js`, `tsconfig.json`, `webpack.config.js`

Write your code in the `main.ts` file:

- Write an interface named Student that accepts the following elements: `firstName(string)`, `lastName(string)`, `age(number)`,and `location(string)`
- Create two students, and create an array named `studentsList` containing the two variables

- Using Vanilla Javascript, render a table and for each elements in the array, append a new row to the table
- Each row should contain the first name of the student and the location

Requirements:

- When running, Webpack should return `No type errors found.`
- Every variable should use TypeScript when possible.

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_0/js/main.ts, task_0/package.json, task_0/.eslintrc.js, task_0/tsconfig.json, task_0/webpack.config.js`

Get a sandbox

1. Let's build a Teacher interface

mandatory

Create a directory `task_1` and copy these configuration files into this folder: `package.json`, `tsconfig.json`, `webpack.config.js`

- `firstName(string)` and `lastName(string)`. These two attributes should only be modifiable when a Teacher is first initialized
- `fullTimeEmployee(boolean)` this attribute should always be defined
- `yearsOfExperience(number)` this attribute is optional
- `location(string)` this attribute should always be defined
- Add the possibility to add any attribute to the Object like `contract(boolean)` without specifying the name of the attribute

Example:

```
const teacher3: Teacher = {
  firstName: 'John',
  fullTimeEmployee: false,
  lastName: 'Doe',
  location: 'London',
  contract: false,
};

console.log(teacher3);
// should print
// Object
// contract: false
// firstName: "John"
// fullTimeEmployee: false
// lastName: "Doe"
// location: "London"
```

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_1/js/main.ts, task_1/webpack.config.js, task_1/tsconfig.json, task_1/package.json`

2. Extending the Teacher class

mandatory

Write an interface named `Directors` that extends `Teacher`. It requires an attribute named `numberOfReports(number)`

Example:

```
const director1: Directors = {
  firstName: 'John',
  lastName: 'Doe',
  location: 'London',
  fullTimeEmployee: true,
  numberOfReports: 17,
};
console.log(director1);

// should print
// Object
// firstName: "John"
// fullTimeEmployee: true
// lastName: "Doe"
// location: "London"
// numberOfReports: 17
```

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_1/js/main.ts`

3. Printing teachers

mandatory

Write a function `printTeacher`:

- It accepts two arguments `firstName` and `lastName`
- It returns the first letter of the firstName and the full lastName
- Example: `printTeacher("John", "Doe") -> J. Doe`

Write an interface for the function named `printTeacherFunction`.

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_1/js/main.ts`

4. Writing a class

mandatory

Write a Class named `StudentClass` :

- The constructor accepts `firstName(string)` and `lastName(string)` arguments
- The class has a method named `workOnHomework` that return the string `Currently working`
- The class has a method named `displayName` . It returns the firstName of the student
- The constructor of the class should be described through an Interface
- The class should be described through an Interface

Requirements:

- You can reuse the Webpack configuration from the previous exercise to compile the code.
- When running `npm run build`, no TypeScript error should be displayed.
- Every variable should use TypeScript when possible.

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_1/js/main.ts`

5. Advanced types Part 1

mandatory

Create the `DirectorInterface` interface with the 3 expected methods:

- `workFromHome()` returning a string
- `getCoffeeBreak()` returning a string
- `workDirectorTasks()` returning a string

Create the `TeacherInterface` interface with the 3 expected methods:

- `workFromHome()` returning a string
- `getCoffeeBreak()` returning a string
- `workTeacherTasks()` returning a string

Create a class `Director` that will implement `DirectorInterface`

- `workFromHome` should return the string `Working from home`
- `getToWork` should return the string `Getting a coffee break`

- `workDirectorTasks` should return the string `Getting to director tasks`

Create a class `Teacher` that will implement `TeacherInterface`

- `workFromHome` should return the string `Cannot work from home`
- `getCoffeeBreak` should return the string `Cannot have a break`
- `workTeacherTasks` should return the string `Getting to work`

Create a function `createEmployee` with the following requirements:

- It can return either a `Director` or a `Teacher` instance
- It accepts 1 arguments:
  - `salary` (either number or string)
- if `salary` is a number and less than 500 - It should return a new `Teacher`. Otherwise it should return a `Director`

Expected result:

```
console.log(createEmployee(200));
Teacher
console.log(createEmployee(1000));
Director
console.log(createEmployee('$500'));
Director
```

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_2/js/main.ts, task_2/webpack.config.js, task_2/tsconfig.json, task_2/package.json`

6. Creating functions specific to employees

mandatory

Write a function `isDirector`:

- it accepts `employee` as an argument
- it will be used as a type predicate and if the employee is a director

Write a function `executeWork`:

- it accepts `employee` as an argument
- if the employee is a Director, it will call `workDirectorTasks`
- if the employee is a Teacher, it will call `workTeacherTasks`

Expected result:

```
executeWork(createEmployee(200));
Getting to work
executeWork(createEmployee(1000));
Getting to director tasks
```

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_2/js/main.ts`

7. String literal types

mandatory

Write a String literal type named `Subjects` allowing a variable to have the value `Math` or `History` only.
Write a function named `teachClass`:

- it takes `todayClass` as an argument
- it will return the string `Teaching Math` if `todayClass` is `Math`
- it will return the string `Teaching History` if `todayClass` is `History`

Expected result:

```
teachClass('Math');
Teaching Math
teachClass('History');
Teaching History
```

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_2/js/main.ts`

Get a sandbox

8. Ambient Namespaces

mandatory

Create a directory called `task_3` and copy these configuration files into it: `package.json`, `webpack.config.js`, `tsconfig.json`

The first part of will require that you build an `interface` and a `type`. Inside a file named `interface.ts`:

- Create a type `RowID` and set it equal to `number`
- Create an interface `RowElement` that contains these 3 fields:
  - `firstName: string`
  - `lastName: string`
  - `age?: number`

You are building the next part of the application architecture. The goal is to save the entities to a database. Because of time constraints, you can't write a connector to the database, and you decided to download a library called `crud.js`. Copy this file into the `task_3/js` directory.

Here it is

```
export function insertRow(row) {
  console.log('Insert row', row);
  return Math.floor(Math.random() * Math.floor(1000));
}

export function deleteRow(rowId) {
  console.log('Delete row id', rowId);
  return;
}

export function updateRow(rowId, row) {
  console.log(`Update row ${rowId}`, row);
  return rowId;
}
```

Write an ambient file within `task_3/js`, named `crud.d.ts` containing the type declarations for each crud function. At the top of the file import `RowID` and `RowElement` from `interface.ts`.

In `main.ts`

- At the top of the file create a triple slash directive (/rltoken/B4p_xR_SfvDoTgMInmd5cA) that includes all the dependencies from `crud.d.ts`
- Import the `rowID` type and `rowElement` from `interface.ts`
- Import everything from `crud.js` as `CRUD`

Create an object called `row` with the type `RowElement` with the fields set to these values:

- `firstName`: `Guillaume`
- `lastName`: `Salva`

Create a `const` variable named `newRowID` with the type `RowID` and assign the value the `insertRow` command.

Next, create a `const` variable named `updatedRow` with the type `RowElement` and update `row` with an `age` field set to `23`

Finally, call the `updateRow` and `deleteRow` commands.

Expected result:

```
const obj = {firstName: "Guillaume", lastName: "Salva"};
CRUD.insertRow(obj)
// Insert row {firstName: "Guillaume", lastName: "Salva"}

const updatedRow: RowElement = { firstName: "Guillaume", lastName: "Salva", age: 23 };
CRUD.updateRow(newRowID, updatedRow);
// Update row 125 {firstName: "Guillaume", lastName: "Salva", age: 23}

CRUD.deleteRow(125);
// Delete row id 125
```

Requirements:

- When running `npm run build`, no TypeScript error should be displayed.
- Every variable should use TypeScript when possible.
- The main file and the ambient file should both import the types defined in the interface file.
- You can easily test your ambient file by looking at the Intellisense of your IDE when using the 3rd party functions.

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_3/js/main.ts, task_3/js/interface.ts, task_3/js/crud.d.ts`

9. Namespace & Declaration merging

mandatory

Create a new directory `task_4` and copy the above `tsconfig.json` and put this `package.json` in there

```
{
  "name": "task_4",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "devDependencies": {
    "@typescript-eslint/eslint-plugin": "^2.4.0",
    "@typescript-eslint/parser": "^2.4.0",
    "typescript": "^3.6.4"
  }
}
```

In `task_4/js/subjects`:

- Create a file `Teacher.ts` and write a `Teacher` interface in a namespace named `Subjects`.

- the interface requires `firstName` and `lastName` as string

- Create a file `Subject.ts` and write a `Subject` class in the same namespace named `Subjects`.
  - the class has one attribute `teacher` that implements the `Teacher` interface
  - the class has one setter method `setTeacher` that accepts a `teacher` in argument (and as setter, set the instance attribute `teacher` with it)
- Create a file `Cpp.ts` and make the following modifications in the same namespace.
  - Using declaration merging, add a new optional attribute `experienceTeachingC` (number) to the `Teacher` interface
  - Create a class `Cpp` extending from `Subject`
  - Write a method named `getRequirements` that will return a string `Here is the list of requirements for Cpp`
  - Write a method named `getAvailableTeacher` that will return a string `Available Teacher: <first name of teacher>`
  - If the teacher doesn't have any experience in teaching C, then the method should return a string `No available teacher`
- Create a file `React.ts` and write a `React Class` in the same namespace.
  - Add a new attribute `experienceTeachingReact?` (number) to the `Teacher` interface
  - In the class, write a method named `getRequirements` that will return a string `Here is the list of requirements for React`
  - Write a method named `getAvailableTeacher` that will return a string `Available Teacher: <first name of teacher>`
  - If the teacher doesn't have any experience in teaching React, then the method should return a string `No available teacher`
- Create a file `Java.ts` and write a `Java class` in the same namespace.
  - Add a new attribute `experienceTeachingJava?` (number) to the `Teacher` interface
  - In the class, write a method named `getRequirements` that will return a string `Here is the list of requirements for Java`
  - Write a method named `getAvailableTeacher` that will return a string `Available Teacher: <first name of teacher>`
  - If the teacher doesn't have any experience in teaching Java, then the method should return a string `No available teacher`

Repo:

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_4/package.json, task_4/tsconfig.json, task_4/js/subjects/Cpp.ts, task_4/js/subjects/Java.ts, task_4/js/subjects/React.ts, task_4/js/subjects/Subject.ts, task_4/js/subjects/Teacher.ts`

10. Update task_4/js/main.ts

mandatory

- create and export a constant `cpp` for Cpp Subjects
- create and export a constant `java` for Java Subjects

- create and export a constant `react` for React Subjects
- create and export one Teacher object `cTeacher` with `experienceTeachingC = 10`
- for Cpp subject, log to the console `C++`, set `cTeacher` as the teacher, call the two methods `getRequirements` and `getAvailableTeacher` and print the strings they return
- for Java subject, log to the console `Java`, set `cTeacher` as the teacher, call the two methods `getRequirements` and `getAvailableTeacher`, and print the strings they return
- for React subject, log to the console `React`, set `cTeacher` as the teacher, call the two methods `getRequirements` and `getAvailableTeacher`, and print the strings they return

Repo: Projects(/projects/current)

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_4/js/main.ts`

Evaluation quizzes(/dashboards/my_current_evaluation_quizzes)

11. Brand convention & Nominal typing

mandatory

Create a directory `task_5` and copy these configuration files into the root of `task_5`: `package.json`, `tsconfig.json`, `webpack.config.js`

Create two interfaces `MajorCredits` and `MinorCredits` in `task_5/js/main.ts`:

- Each interface defines a number named `credits`
- Add a brand property to each interface in order to uniquely identify each of them

Create two functions named `sumMajorCredits` and `sumMinorCredits` in `task_5/js/main.ts`:

- Each function takes two arguments `subject1` and `subject2`
- `sumMajorCredits` returns `MajorCredits` value and `sumMinorCredits` returns `MinorCredits` value
- Each function sums the credits of the two subjects

Repo: Tools(/dashboards/my_tools)

- GitHub repository: `alx-frontend-javascript`
- Directory: `0x04-TypeScript`
- File: `task_5/js/main.ts, task_5/package.json, task_5/webpack.config.js, task_5/tsconfig.json`

Peers(/users/peers)

Discord(https://discord.com/app)

My Profile(/users/my_profile)

(/)

Home(/)

My Planning(/planning/me)

Projects(/projects/current)

QA Reviews I can make(/corrections/to_review)

Evaluation quizzes(/dashboards/my_current_evaluation_quizzes)

Curriculums(/dashboards/my_curriculums)

Concepts(/concepts)

Conference rooms(/dashboards/video_rooms)

Servers(/servers)

Sandboxes(/user_containers/current)

Tools(/dashboards/my_tools)

Video on demand(/dashboards/videos)

Peers(/users/peers)

Discord(https://discord.com/app)

My Profile(/users/my_profile)