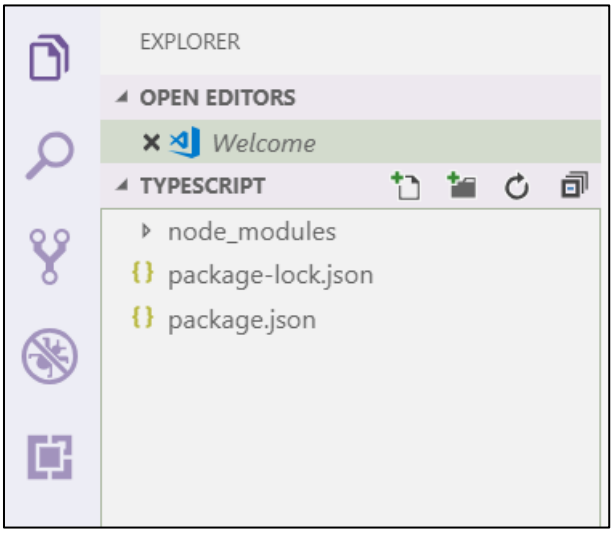
Lab: TypeScript Playground

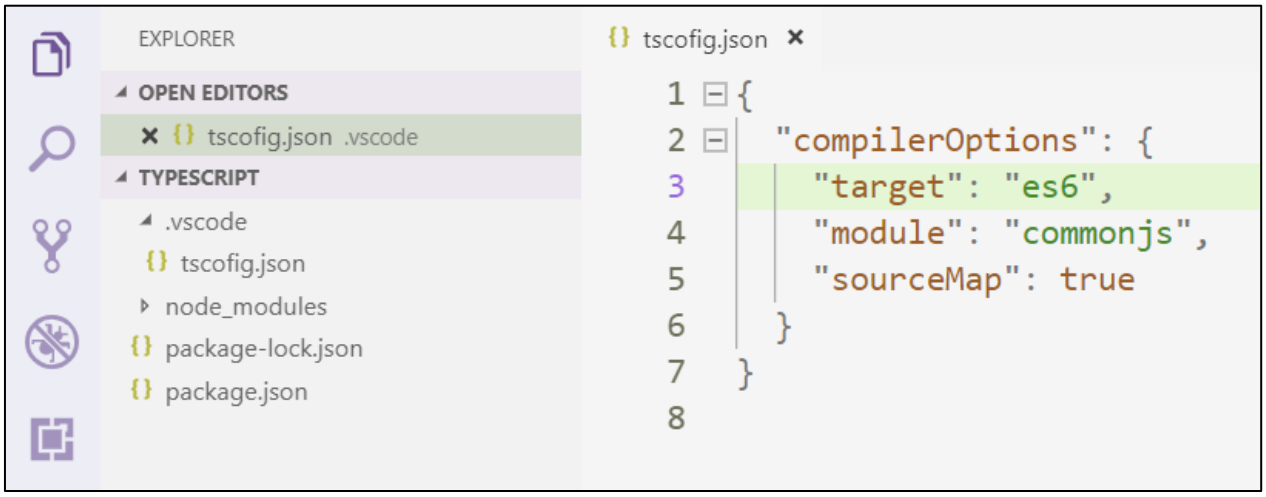
Run Typescript Code in VS Code

Install typescript with the **"npm install typescript -g"**



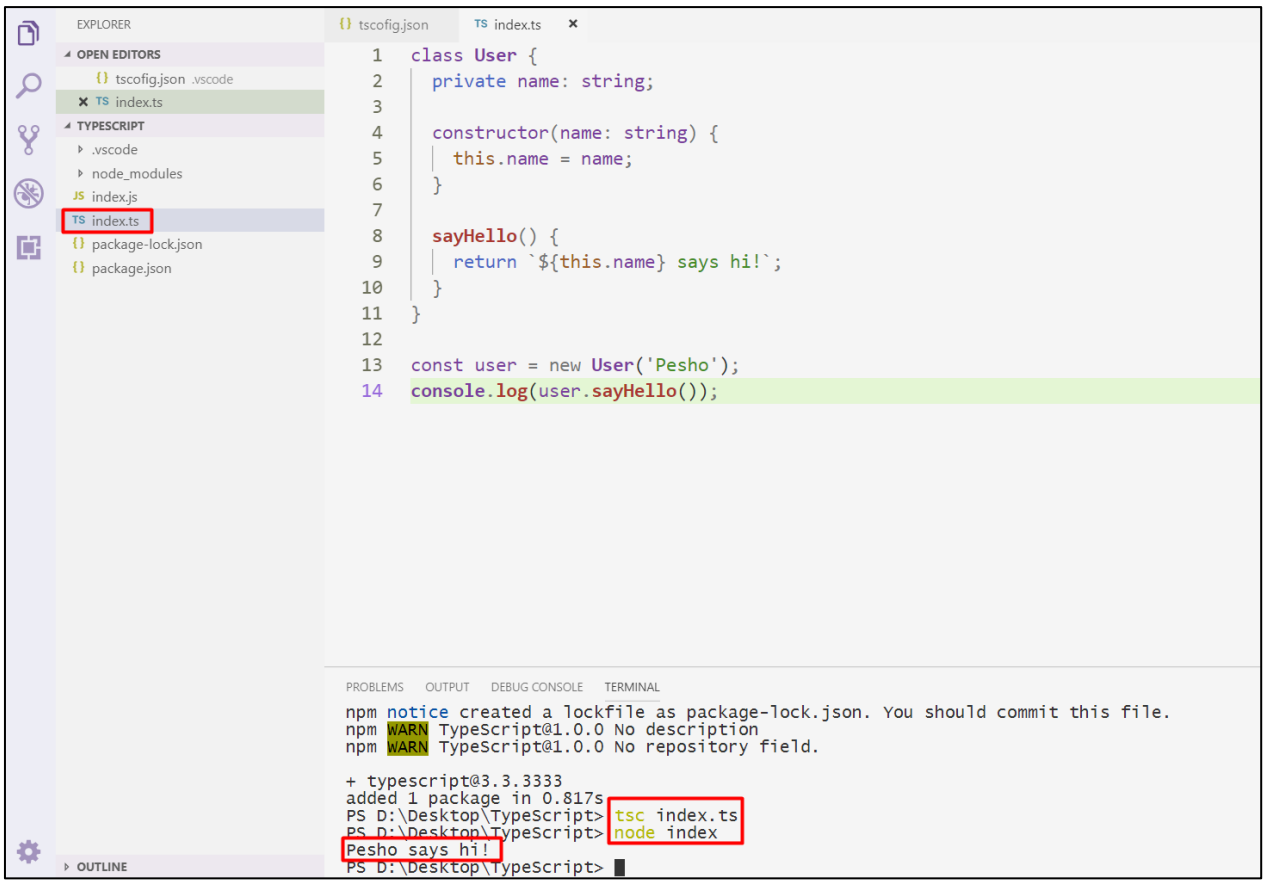
Create a **.vscode** folder and a **tsconfig.json** file with the following configuration:

```
'{
  "compilerOptions": {
    "target": "es6",
    "module": "commonjs",
    "sourceMap": true
  }
}'
```



After you have your **.ts** file, open the **terminal** and execute the **following commands:**

```
tsc {filename}.ts
node {filename}
```



1. Data Class

Write a TypeScript class that holds data about an HTTP request. It has the following properties:

- **method** (String)
- **uri** (String)
- **version** (String)
- **message** (String)
- **response** (String)
- **fulfilled** (Boolean)

The first four properties (**method**, **uri**, **version**, **message**) are set trough the **constructor**, in the listed order. The **response** property is initialized to **undefined** and the **fulfilled** property is initially set to **false**..

Examples

Sample Input	Resulting object

`let myData = new Data('GET', 'http://google.com', 'HTTP/1.1', '')`	`{ method: 'GET',`
	`uri: 'http://google.com',`
	`version: 'HTTP/1.1',`
	`message: '',`
	`response: undefined,`
	`fulfilled: false }`

2. Tickets

Write a program using TS that manages a database of tickets. A ticket has a **destination** (string)**,** a **price** (number) and a **status** (string). Your program will receive **two arguments** – the first is an **array of strings** for ticket descriptions and the second is a **string**, representing **sorting criteria**. The ticket descriptions have the following format:

`<destinationName>|<price>|<status>`

Store each ticket and at the end of execution **return** a sorted summary of all tickets, sorted by either **destination**, **price** or **status**, depending on the **second parameter** that your program received. Always sort in ascending order (default behavior for **alphabetical** sort). If two tickets compare the same, use order of appearance. See the examples for more information.

Input

Your program will receive two parameters – an array of strings and a single string.

Output

Return a **sorted array** of all the tickets that where registered.

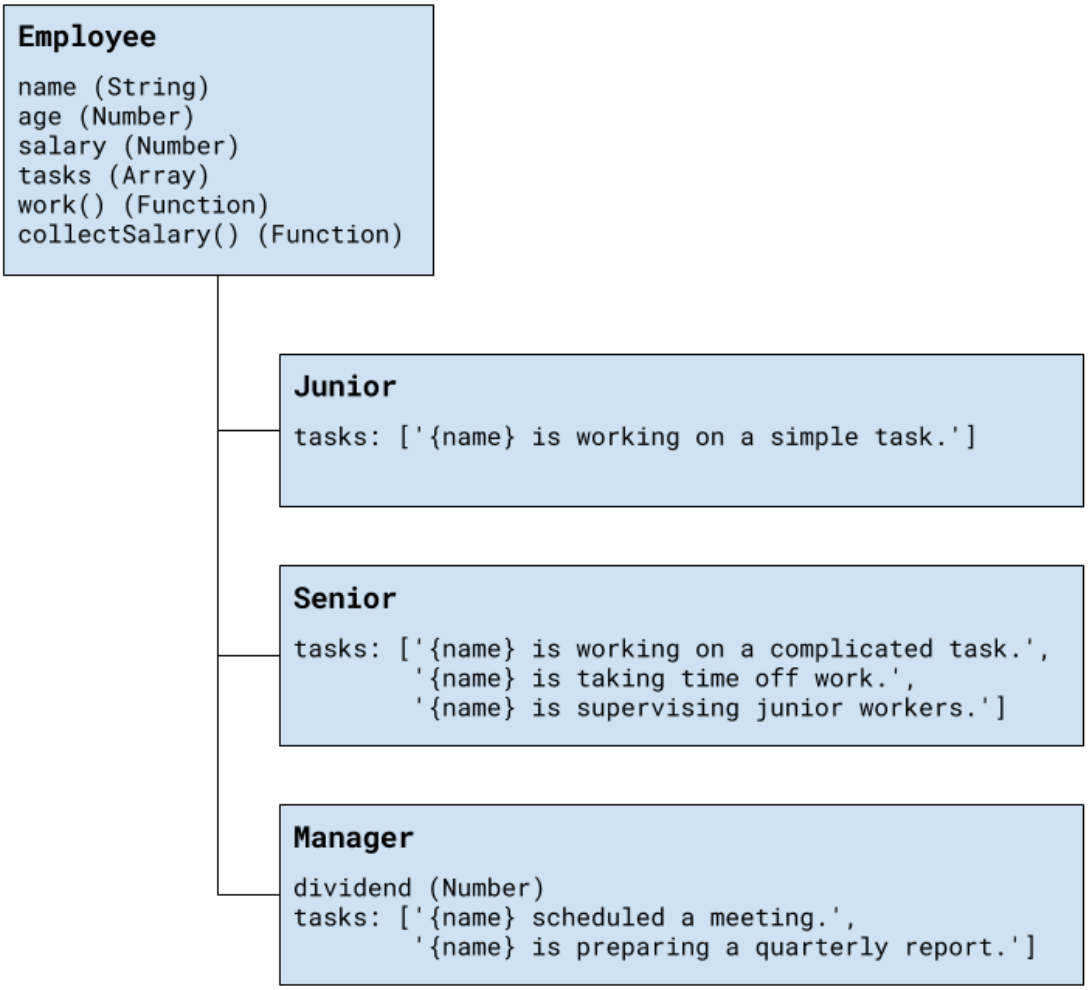
Examples

Sample Input	Output Array
`[ 'Philadelphia|94.20|available', 'New York City|95.99|available', 'New York City|95.99|sold', 'Boston|126.20|departed' ], 'destination'`	`[ Ticket { destination: 'Boston', price: 126.20, status: 'departed' }, Ticket { destination: 'New York City', price: 95.99, status: 'available' }, Ticket { destination: 'New York City', price: 95.99, status: 'sold' }, Ticket { destination: 'Philadelphia', price: 94.20, status: 'available' } ]`
`[ 'Philadelphia|94.20|available', 'New York City|95.99|available', 'New York City|95.99|sold', 'Boston|126.20|departed' ], 'status'`	`[ Ticket { destination: 'Philadelphia', price: 94.20, status: 'available' }, Ticket { destination: 'New York City', price: 95.99, status: 'available' }, Ticket { destination: 'Boston', price: 126.20, status: 'departed' },`

	`Ticket { destination: 'New York City',`
	`price: 95.99,`
	`status: 'sold' } ]`

3. People

Define several TS classes, that represent a company's employee records. Every employee has a **name** and **age**, a **salary** and a list of **tasks**, while every position has specific properties not present in the others. Place all common functionality in a **parent abstract** class. Follow the diagram bellow:



Every position has different tasks. In addition to all common properties, the manager position has a **dividend** he can collect along with his salary.

All employees have a **work** function that when called cycles trough the list responsibilities for that position and prints the current one. When all tasks have been printed, the list starts over from the beginning. Employees can also **collect salary**, which outputs the amount, plus any **bonuses**.

Your program needs to expose a module, containing the three classes **`Junior`**, **`Senior`** and **`Manager`**. The properties **`name`** and **`age`** are set trough the constructor, while the **`salary`** and a manager's **`dividend`** are initially set to zero and can be changed later. The list of **`tasks`** is filled by each position. The resulting objects also expose the functions **`work()`** and **`collectSalary()`**. When **`work()`** is called, one of the following lines is printed on the console, depending on the current task in the list:

{employee name} is working on a simple task.

{employee name} is working on a complicated task.

{employee name} is taking time off work.

{employee name} is supervising junior workers.

{employee name} scheduled a meeting.

{employee name} is preparing a quarterly report.

And when **collectSalary()** is called, print the following:

{employee name} received {salary + bonuses} this month.

Hints

We should begin by creating a parent class, that will hold all properties, shared among the different positions. Looking at the problem description, we see the following structure for out parent object:

TypeScript

```
{
  age: Number,
  name: String,
  salary: Number,
  tasks: [],
  work: Function,
  collectSalary: Function
}
```

Data variables will be part of the object attached to its local context with **this** inside the **constructor**. Any properties that need to be initialized at instantiation time are defined as function parameters. Functions are defined inside the class body. Why should the class be abstract ?

```typescript
abstract class Employee {
  public name: string;
  public age: number;
  public salary: number;
  public tasks: Array<string>;

  constructor(name: string, age: number) {
    this.name = name;
    this.age = age;
    this.salary = 0;
    this.tasks = [];
  }

  public work(): void {
    // TODO
  }

  public collectSalary(): void {
    // TODO
  }

  public getSalary(): number {
    return this.salary;
  }

}
```

The **`work()`** function has to cycle trough the list of tasks and print the current one. The easiest way to do this is to shift the first element from the array and push it at the end.

```typescript
  public work(): void {
    const currentTask = this.tasks.shift();
    this.tasks.push(currentTask);
    console.log(this.name + currentTask);
  }
```

Printing the salary is pretty straightforward. However, since the manager has an additional bonus to his salary, it's best to get the whole sum with an internal function, that the manager can **override**.

```typescript
  public collectSalary(): void {
    console.log(`${this.name} received ${this.getSalary()} this month.`);
  }

  public getSalary(): number {
    return this.salary;
  }
```

Now any objects that inherit from Employee will have all of its properties as well as anything new that's defined in their declaration. To inherit (extend) a class, a new class is defined with the **`extends`** keyword after its name. They also have to call the parent constructor from their own constructor, so the prototype chain is established. For **Junior** and **Senior**, the only difference from the parent **Employee** is the elements inside the tasks array, since they can use

the functions directly from the base class. Child classes will call the parent with any parameters that are needed and push their tasks directly to the array.

```
export class Junior extends Employee {
  constructor(name: string, age: number) {
    super(name, age);
    this.tasks.push(" is working on a simple task");
  }
}

export class Senior extends Employee {
  constructor(name: string, age: number) {
    super(name, age);
    this.tasks.push(" is working on a complicated task.");
    this.tasks.push(" is taking time off work.");
    this.tasks.push(" is supervising junior workers");
  }
}
```

The **Manager** is not much different, with the exception that his constructor has to attach a **`dividend`** property that is initially set to zero. His definition also needs to override the **`getSalary()`** function we added to the base class earlier, so it includes the bonus.

```
export class Manager extends Employee {
  public divident: number;

  constructor(name: string, age: number) {
    super(name, age);
    this.divident = 0;
    this.tasks.push(" scheduled a meeting.");
    this.tasks.push(" is preparing a quarterly meeting.");
  }

  public getSalary(): number {
    return this.salary + this.divident;
  }
}
```

4. The Elemelons

If Watermelons exist, Firemelons, Earthmelons and Airmelons should also exist. Create **classes** for **the 4 Elemelons**.

Create an **abstract class** for the Elemelons. Name it **`Melon`**.
The **`Melon`** class should be initialized with **`weight`** (Number), and **`melonSort`** (String). The 2 arguments should be **public members**.

Create classes **`Watermelon`**, **`Firemelon`**, **`Earthmelon`**, **`Airmelon`**. Each of them should **inherit** the **abstract class** **`Melon`** and its functionality. Aside from the abstract functionality, **each** of the **Elemelons** should have property **`elementIndex`** (Number), which is **equal** to its **`weight * `** the **string length** of its **`melonSort`**. The property should have only a **getter**.

All of the classes should hold a **`toString()`** function, which returns the following result for them:

“Element: {Water/Fire/Earth/Air}”
“Sort: {elemelonSort}”
“Element Index: {elemelonElementIndex}”

Create one more class which is called **Melolemonmelon**, which inherits **one** of the **4 elemelons**, **regardless of which**.
The Melolemonmelon **has no element**, but it can **morph** into any of the others. Implement a function **morph()**, which **changes the current element** of the Melolemonmelon, **each time** it is called.
Upon initialization, the **initial element** is **Water**. From then it should go in the following order: **Fire, Earth, Air, Water, Fire…** and so on.
The **toString()** function should remain the same as its parent class.

Example

scripts.ts

`let test : Melon = new Melon(100, "Test");`
`//Throws error`
 	
`let watermelon : Watermelon = new Watermelon(12.5, "Kingsize");`
`console.log(watermelon.toString());`
 	
`// Element: Water`
`// Sort: Kingsize`
`// Element Index: 100`

5. Boxes

Create a class Box<> that can store anything.

It should have two public methods and a getter:

- **add(element)**
- **remove()**
- **count - getter**

Adding should add on top of its contents. Remove should get the topmost element.

Example

Input	Output

`let box = new Box<Number>();`
`box.add(1);`
`box.add(2);`
`box.add(3);`
`console.log(box.count);`
	3

`let box = new Box<String>();`
`box.add("Pesho");`
`box.add("Gosho");`
`console.log(box.count);`
	2
	1

box.remove(); console.log(box.count);	

```
class Box<T> {
  private _boxes = [];

  public add(el: T) {
    // TODO
  }

  public remove() {
    // TODO
  }

  get count(): number {
    // TODO
  }
}

export default Box;
```

6. KeyValuePairs

Create a generic class which can store a key and value of any type. It should have the following public methods:

- **setKeyValue(key: T, value: U)**
- **display()** – log the key and the value in the following format: **'key = {key}, value = {value}'**

Example

Input	Output

let kvp = new KeyValuePair<number, string>();
kvp.setKeyValue(1, "Steve");
kvp.display();
	key = 1, value = Steve

```
class KeyValuePair<T, U>
{
  private key: T;
  private val: U;

  // TODO: Create setKeyValue function

  // TODO: Create display functions
}

export default KeyValuePair;
```