# **Lab: TypeScript**

Let's practice TypeScript by creating classes for rocket cargo calculations.

## **1. Starter Code**

Use the terminal to navigate into the **Hands On Assignments\TypeScript Lab** folder, then into the **exercises** subfolder.

$ dir

TypeScript Exercises TypeScript Lab

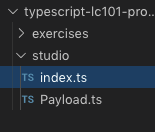
$ cd **TypeScript Lab**

$ cd **ts\_files**

$ dir

index.ts Payload.ts tsconfig.json

From the file tree in VSCode, open the **index.ts** file.



## **2. Requirements**

1. Create classes for **Astronaut**, **Cargo**, and **Rocket**. (Details below).
   1. All classes should be defined in their own files.
2. Use the new classes to run a simulation in the **index.ts** file.

In the starter code, you will notice that an interface named **Payload** has been declared. This interface ensures that any class that implements it will have a **massKg** property.

## **3. Classes**

1. Create three new files---**Astronaut.ts**, **Cargo.ts**, and **Rocket.ts**. To do this in VSCode, click the "New File" button and enter the file name. Another option is to run the command **touch new\_file\_name** in the terminal.

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1. Define each class (**Astronaut**, **Cargo**, **Rocket**) in a separate file. Each class should be exported using **export**.

**export** **class** Astronaut {

*// properties and methods*}

1. As needed, the classes can be imported using **import**.

**import** { Astronaut } from './Astronaut';

### **3.1. Astronaut Class**

1. Defined in **Astronaut.ts**
2. Implements the **Payload** interface
3. Properties
   1. **massKg** should be a number.
   2. **name** should be a string.
4. Constructor
   1. Parameter **massKg** should be a number.
   2. Parameter **name** should be string.
   3. Sets value of **this.massKg** and **this.name**.

### **3.2. Cargo Class**

1. Defined in **Cargo.ts**
2. Implements the **Payload** interface
3. Properties
   1. **massKg** should be a number.
   2. **material** should be a string.
4. Constructor
   1. Parameter **massKg** should be a number.
   2. Parameter **material** should be a string.
   3. Sets value of **this.massKg** and **this.material**

### **3.3. Rocket Class**

1. Defined in **Rocket.ts**.
2. Properties:
   1. **name** should be a string.
   2. **totalCapacityKg** should be a number.
   3. **cargoItems** should be an array of **Cargo** objects.

* Should be initialized to an empty array **[]**
  1. **astronauts** should be an array of **Astronaut** objects.
* Should be initialized to an empty array **[]**

1. Constructor:
   1. Parameter **name** should be a string.
   2. Parameter **totalCapacityKg** should be a number.
   3. Sets value of **this.name** and **this.totalCapacityKg**
2. Methods:
   1. **sumMass( items: Payload[] ): number**

* Returns the sum of all **items** using each item's **massKg** property
  1. **currentMassKg(): number**
* Uses **this.sumMass** to return the combined mass of **this.astronauts** and **this.cargoItems**
  1. **canAdd(item: Payload): boolean**
* Returns **true** if **this.currentMassKg() + item.massKg <= this.totalCapacityKg**
  1. **addCargo(cargo: Cargo): boolean**
* Uses **this.canAdd()** to see if another item can be added.
* If **true**, adds **cargo** to **this.cargoItems** and returns **true**.
* If **false**, returns **false**.
  1. **addAstronaut(astronaut: Astronaut): boolean**
* Uses this.canAdd() to see if another astronaut can be added.
* If true, adds astronaut to this.astronauts and returns true.
* If false, returns false.

## **4. Simulation in index.ts**

Type the code shown below into **index.ts**.

## 

## **5. Compile and Run index.ts**

1. Use the terminal in VSCode to compile your **index.ts** file. This will also compile the modules you imported into the file (**Astronaut.ts**, **Rocket.ts**, etc.).
2. Use the command **node index.js** to run the JavaScript file created during the build process.

$ dir

Astronaut.ts Cargo.ts Payload.ts Rocket.ts index.ts

$ tsc index.ts

$ dir

Astronaut.js Cargo.js Payload.js Rocket.js index.js

Astronaut.ts Cargo.ts Payload.ts Rocket.ts index.ts

$ node index.js

### **5.1. Expected Console Output**

Mae: On board

Sally: On board

Charles: On board

Satellite: Loaded

Space Probe: Loaded

Water: Loaded

Food: Loaded

Tesla Roadster: Not loaded

Final cargo and astronaut mass: 5656.78 kg.

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