

What is TypeScript?

TypeScript (TS) is a **programming language** made by Microsoft.

- It is a **superset of JavaScript** → which means every JavaScript code is also valid TypeScript code.
- It adds **extra features** that JavaScript doesn't have, mainly **types**.

Think of it like **JavaScript + safety rules**.

Running TypeScript on a Windows PC is straightforward once you set up the right tools. Here's a clean, step-by-step guide:

1. Install Node.js

TypeScript runs on top of Node.js, so install it first:

- Go to the official site: <https://nodejs.org>
- Download the **LTS version**
- Install it with default settings

Verify installation in Command Prompt:

```
node -v  
npm -v
```

2. Install TypeScript

Use npm (comes with Node.js):

```
npm install -g typescript
```

Check it:

```
tsc -v
```

3. Create a TypeScript file

Create a file named:

hello.ts (Add some code):

```
const message: string = "Hello, TypeScript!";  
console.log(message);
```

4. Compile TypeScript to JavaScript

Run:

```
tsc hello.ts
```

This generates:

```
hello.js
```

5. Run the JavaScript file

```
node hello.js
```

You'll see:

```
Hello, TypeScript!
```

For example practice following code:-

Step 1:-

Create file if.ts (typescript):-

```
let age: number = 20;
```

```
if (age < 18) {
```

```
    console.log("You are a minor.");
```

```
} else if (age < 60) {
```

```
    console.log("You are an adult.");
```

```
} else {
```

```
    console.log("You are a senior.");
```

```
}
```

Step2:- to run this typescript file.

First install typescript :-

```
npm install -g typescript
```

```
D:\typescript>tsc if.ts
D:\typescript>node if.js
You are an adult.
```

Optional (Better workflow)

Use a config file

```
tsc --init
```

This creates `tsconfig.json` for project settings.

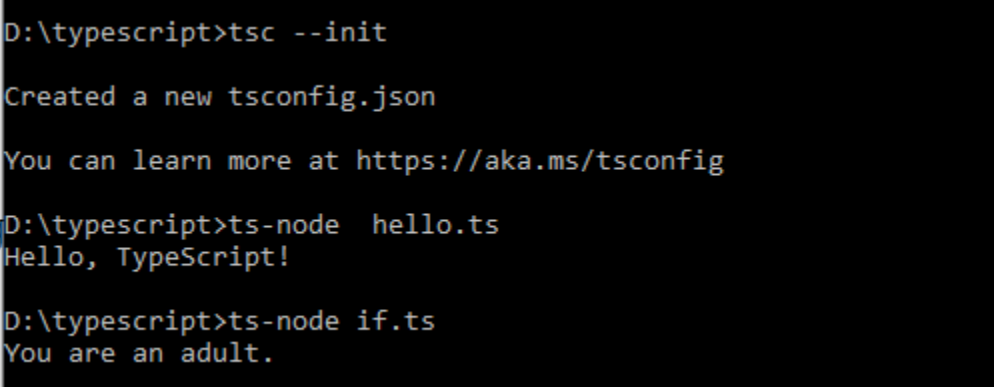
Run TypeScript directly (no manual compile)

Install:

```
npm install -g ts-node
```

Then run:

```
ts-node hello.ts
```



```
D:\typescript>tsc --init
Created a new tsconfig.json
You can learn more at https://aka.ms/tsconfig

D:\typescript>ts-node hello.ts
Hello, TypeScript!

D:\typescript>ts-node if.ts
You are an adult.
```

Recommended Editor

Use Visual Studio Code

It has built-in TypeScript support and makes everything easier.

You **can't run TypeScript directly inside HTML**—browsers only understand JavaScript. So you need to **compile TypeScript → JavaScript first**, then use it in your HTML.

Here's the correct way

🔗 Step 1: Write your TypeScript (script.ts)

```
function add(a: number, b: number): number {  
  return a + b;  
}  
  
const result = add(5, 10);  
console.log("Sum:", result);
```

🔗 Step 2: Compile it using TypeScript

```
tsc script.ts
```

This creates:

```
script.js
```

Step 3: Use it in HTML

```
<!DOCTYPE html>
<html>
<head>
  <title>TypeScript Example</title>
</head>
<body>

<h1>Check console for result</h1>

<script src="script.js"></script>

</body>
</html>
```

Output

Open the HTML file in your browser → open console (F12):

Sum: 15

Beginner Example(add1.ts)

```
function add(a: number, b: number): number {
  return a + b;
}

const result = add(5, 10);
console.log(result); // 15
```

- Here `a` and `b` **must be numbers**
- TypeScript prevents accidental mistakes like `add("5", 10)`

Basic Arrow Function(add2.ts)

```
const add = (a: number, b: number): number => {  
  return a + b;  
};
```

```
const result = add(5, 10);  
console.log("Sum:", result); // Sum: 15
```

□ Explanation:

- (a: number, b: number) → parameters with types
- : number after) → return type
- => → arrow function syntax