

Sure, I can provide you with 10 basic TypeScript programs along with instructions on how to run them. To run TypeScript programs, you need to have Node.js and TypeScript installed on your machine.

Setting Up Your Environment:

1. **Install Node.js**:

- Download and install Node.js from nodejs.org.

2. **Install TypeScript**:

- Open a terminal (command prompt, terminal, etc.) and run the following command to install TypeScript globally:

```
```shell
npm install -g typescript
```
```

3. **Create a Directory**:

- Create a new directory for your TypeScript projects:

```
```shell
mkdir typescript-projects
cd typescript-projects
```
```

4. **Create a TypeScript File**:

- Create a new file with a `.ts` extension for each of the programs.`

5. **Compile and Run TypeScript Programs**:

- To compile a TypeScript file to JavaScript, run:

```
```shell
tsc filename.ts
```
```

- This will generate a JavaScript file (`filename.js`)` in the same directory.

- To run the compiled JavaScript file, use Node.js:

```
```shell
node filename.js
```
```

Programs:

1. **Hello World**:

```
```typescript
console.log("Hello, TypeScript!");
```
```

2. **Type Annotations**:

```
``typescript
let name: string = "Alice";
let age: number = 30;
console.log(`Name: ${name}, Age: ${age}`);
``
```

3. **Function**:

```
``typescript
function add(x: number, y: number): number {
    return x + y;
}
```

```
console.log(add(5, 3)); // Output: 8
``
```

4. **Interfaces**:

```
``typescript
interface Person {
    name: string;
    age: number;
}
```

```
const person: Person = { name: "Alice", age: 30 };
console.log(`Name: ${person.name}, Age: ${person.age}`);
``
```

5. **Classes**:

```
``typescript
class Car {
    model: string;

    constructor(model: string) {
        this.model = model;
    }

    drive() {
        console.log(`Driving a ${this.model}`);
    }
}
```

```
const myCar = new Car("Toyota");
myCar.drive(); // Output: Driving a Toyota
``
```

6. ****Generics****:

```
```typescript
function reverseArray<T>(arr: T[]): T[] {
 return arr.reverse();
}

const numbers = [1, 2, 3, 4];
const reversedNumbers = reverseArray(numbers);
console.log(reversedNumbers);
```
```

7. ****Union Types****:

```
```typescript
let value: string | number;

value = "Hello";
console.log(value); // Output: Hello

value = 42;
console.log(value); // Output: 42
```
```

8. ****Intersection Types****:

```
```typescript
interface Bird {
 fly(): void;
}

interface Fish {
 swim(): void;
}

type FlyingFish = Bird & Fish;

const flyingFish: FlyingFish = {
 fly: () => console.log("Flying"),
 swim: () => console.log("Swimming")
};

flyingFish.fly();
flyingFish.swim();
```
```

9. **Type Assertions**:

```
```typescript
let value: any = "This is a string";
let strLength: number = (value as string).length;
console.log(`Length of string: ${strLength}`);
```
```

10. **Enum**:

```
```typescript
enum Color {
 Red,
 Green,
 Blue
}

let favoriteColor: Color = Color.Green;
console.log(`My favorite color is: ${Color[favoriteColor]}`);
```
```

How to Run the Programs:

1. **Create a new file**:

- Create a new file with a `.ts`` extension (e.g., `hello-world.ts``) for each program.

2. **Copy and Paste the Code**:

- Copy and paste the code for each program into the corresponding `.ts`` file.

3. **Compile the TypeScript File**:

- In your terminal, navigate to the directory where the `.ts`` files are located.
- Run the following command to compile the TypeScript file to JavaScript:

```
```shell
tsc hello-world.ts
```
```

4. **Run the Compiled JavaScript File**:

- After compilation, a `.js`` file (e.g., `hello-world.js``) will be generated in the same directory.
- Run the compiled JavaScript file using Node.js:

```
```shell
node hello-world.js
```
```

You can repeat these steps for each of the programs provided. This way, you can practice writing TypeScript code and running it to see the output.