MODULE 03

TYPESCRIPT TYPES AND OPERATORS

MODULE TOPICS

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TYPESCRIPT COMMENTS

TypeScript supports the traditional C based comments

```
// Single Line Comment
/* Multi
   Line
   Comment
*/
```

TYPESCRIPT COMMENTS

TypeScript Compiler can strip comments with removeComments compiler option

```
tsc complete.ts --removeComments
tsconfig.json
   { "compilerOptions": { "removeComments": true } }
```

TYPESCRIPT COMMENTS

TypeScript Triple-Slash Directives instruct the compiler to include additonal files in the compilation process

```
/// <reference lib="es2017.string" />
/// <amd-module name="NamedModule"/>
```

Triple-Slash Directives are only valid at the top of a TS file
If preceeded by a statement, they are treated as a single line commment

TYPESCRIPT COMMENTS

TSDoc is a Microsoft proposal to standardize doc comments for TypeScript

```
https://github.com/Microsoft/tsdoc
```

TYPESCRIPT COMMENTS

Similar to JSDoc without as much type annotations since TypeScript is strongly typed

```
/**
 * Returns the average of two numbers.
 *
 * @remarks
 * This method is part of the {@link core-library#Statistics | Statistics subsystem}.
 *
 * @param x - The first input number
 * @param y - The second input number
 * @returns The arithmetic mean of `x` and `y`
 *
 * @beta
 */
public getAverage(x: number, y: number): number { return (x + y) / 2.0; }
```

STRONG TYPING WITH TYPESCRIPT

JavaScript is a dynamically typed language
Variables, parameters, etc do not have a specific type
Types are inferred based on the current value

```
var variable1 = 10;             // number
variable1 = "10";               // string
variable1 = true;               // boolean
```

JAVASCRIPT DATA TYPES

boolean
number
string
object
null
undefined

New to ES6 / ES2015

symbol

COERCION

In JavaScript, type conversions are called "coercion"

"Explicit Coercion" is a forced conversion using functions such as Number(), String(), or .toString()

```
console.log( typeof "42" );                // Returns string
console.log( typeof Number( "42" ) );      // Returns number
```

"Impicit Coercion" are done automatically

```
console.log( "99.99" == 99.99 );     // Returns true, loosely equals
console.log( "99.99" === 99.99 );    // Returns false, strict equals
```

TYPESCRIPT DATA TYPES

boolean
number
string
object
null
undefined
symbol

Array
Tuple
enum

any / unknown

void

never

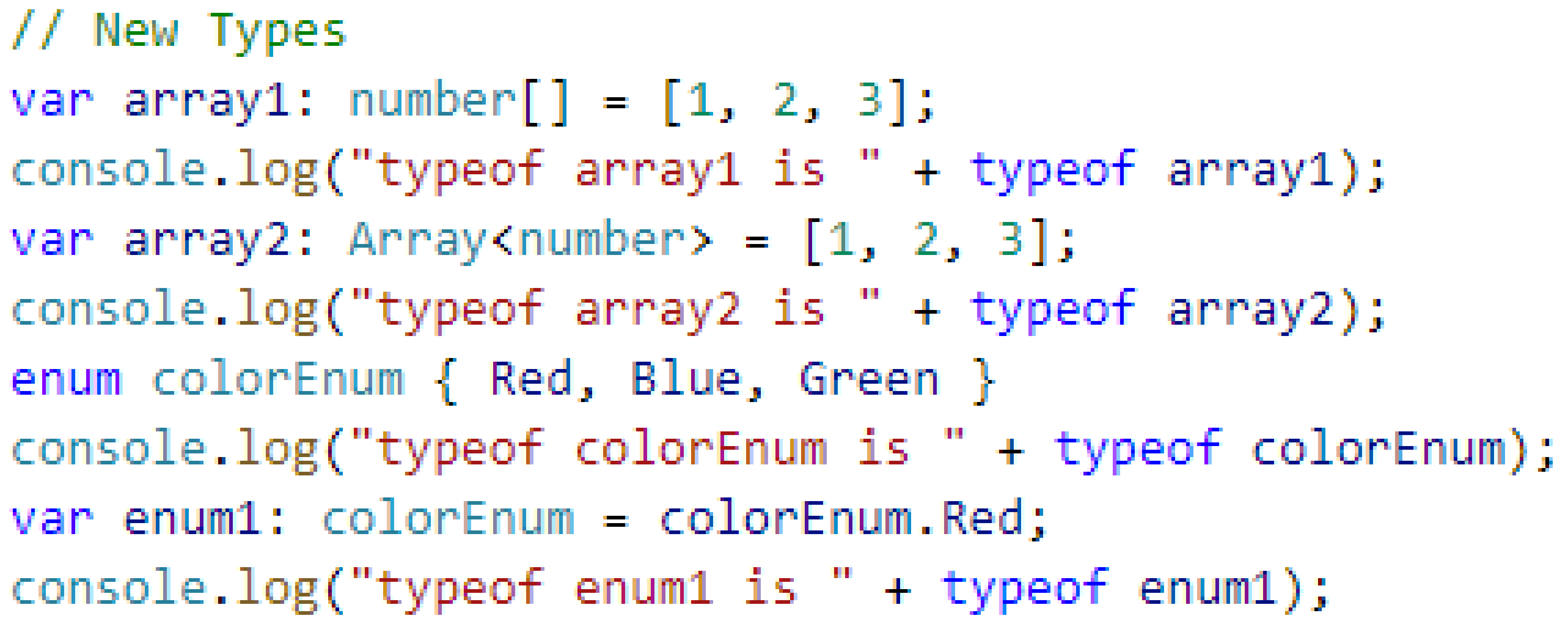
TYPE ANNOTATIONS

TypeScript's static data typing is implemented using Type Annotations

Variables, parameters, return types, etc can be typed when they are declared

```
var boolean1: boolean = true;
var number1: number = 5;
var string1: string = "string";
var object1: object = null;
var array1: Array<number> = [1, 2, 3];
```

WALKTHRU



```
// New Types
var array1: number[] = [1, 2, 3];
console.log("typeof array1 is " + typeof array1);
var array2: Array<number> = [1, 2, 3];
console.log("typeof array2 is " + typeof array2);
enum colorEnum { Red, Blue, Green }
console.log("typeof colorEnum is " + typeof colorEnum);
var enum1: colorEnum = colorEnum.Red;
console.log("typeof enum1 is " + typeof enum1);
```

TypeScript Types

TYPE ASSERTIONS

Casting in TypeScript is done with a "Type Assertion"
Two different syntaxes for a type assertions are available

as Syntax

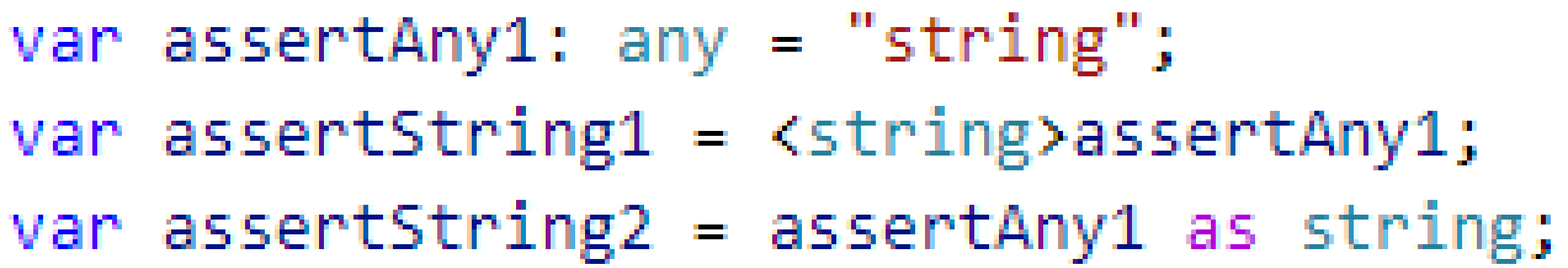
```
var assertAsString = assertAny1 as string;
```

Angle-bracket Syntax

```
var assertString1 = <string>assertAny1;
```

WALKTHRU

Type Assertions



```
var assertAny1: any = "string";
var assertString1 = <string>assertAny1;
var assertString2 = assertAny1 as string;
```

TYPESCRIPT OPERATORS

Operators	Types	Rules
Math - * / % + --	any, number, enum	Normal order of precedence
Add / Concat +	any, string, number, enum	Either is string, result is string
		Both or number or enum, result is number
		Either is any and no strings, result is any
Not !	all	Result is boolean
Comparison == !=	compatible types	Result is boolean, values compared
Comparison === !==	matching types	Result is boolean, values & types compared

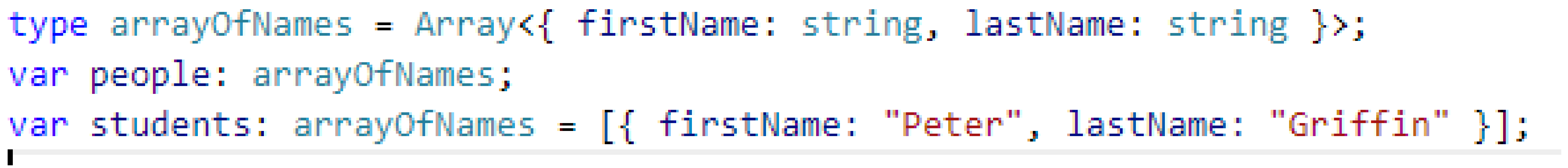
TYPE ALIASES

Type Aliases are resuable custom data types in TypeScript

```
type arrayOfNames = Array<{ firstName: string, lastName: string }>;
var people: arrayOfNames;
```

WALKTHRU

Type Aliases



```
type arrayOfNames = Array<{ firstName: string, lastName: string }>;
var people: arrayOfNames;
var students: arrayOfNames = [{ firstName: "Peter", lastName: "Griffin" }];
```

INFERRED TYPING

TypeScript can infer the data type based on its assigned value
This type will be applied as if it was an actual Type Annotation

```
var inferredString = "string";
var inferredNumber = 5;
```

TYPE SHAPES AND COMPATIBILITY

Type compatibility in TypeScript is based on structural subtyping

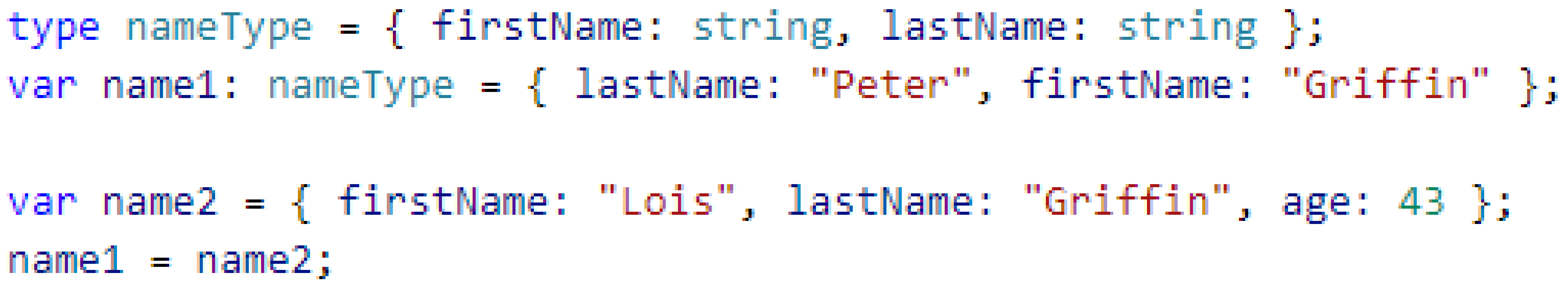
Structural typing is a way of relating types based solely on their members

```
interface Named { name: string; }

class Person { name: string; }

// OK, because of structural typing
var p: Named = new Person();
```

In nominally-typed languages like C# or Java, the equivalent code would be an error because the Person class does not implement the Named interface

WALKTHRU

Type Inference, Shapes, and Duplicate Identifiers



```
type nameType = { firstName: string, lastName: string };
var name1: nameType = { lastName: "Peter", firstName: "Griffin" };

var name2 = { firstName: "Lois", lastName: "Griffin", age: 43 };
name1 = name2;
```

ANY QUESTIONS?