Chapter 6 – Advanced Object Types

1. Introduction
   1. One of the challenges of writing TypeScript is knowing how to apply types in every situation we’ll encounter within our code
   2. we’ll learn how to use types with object-oriented programming patterns, how to use types together to create combined types
2. Interfaces and Types
   1. there’s another way to define types with the interface keyword.
   2. The syntaxes for type and interface are slightly different, since interface does not require an equals sign (=) before the typed object

Example

|  |
| --- |
| type Mail = {  postagePrice: number;  address: string;  }    const catalog: Mail = ... |

Example 2

|  |
| --- |
| interface Mail {  postagePrice: number;  address: string;  }    const catalog: Mail = ... |

Exercise

|  |
| --- |
| // Write an interface here  interface Run {  miles: number  }  function updateRunGoal(run: Run) {  console.log(`  Miles left: ${50 - run.miles}  Percent of goal: ${(run.miles / 50) \* 100}% complete  `)  }  updateRunGoal({  miles: 5,  }) |

1. Interfaces and Classes
   1. The interface keyword in TypeScript is especially good for adding types to a class
      1. interface is constrained to typed objects
      2. class is a way to program with objects

Example

|  |
| --- |
| interface Robot {  identify: (id: number) => void;  }    class OneSeries implements Robot {  identify(id: number) {  console.log(`beep! I'm ${id.toFixed(2)}.`);  }    answerQuestion() {  console.log('42!');  }  } |

* 1. interface named Robot and a class named OneSeries. The implements keyword is then used to apply the type Robot to OneSeries
  2. implements and interface allow us to create types that match a variety of class patterns, which makes interface a good tool for use on object-oriented programs.

Exercise

|  |
| --- |
| // Write an interface here  interface Directory {  addFile: (name: string) => void  }  class DesktopDirectory implements Directory {  addFile(name: string) {  console.log(`Adding file: ${name}`);  }  showPreview(name: string) {  console.log(`Opening preview of file: ${name}`);  }  }  const Desktop = new DesktopDirectory();  Desktop.addFile('lesson-notes.txt');  Desktop.showPreview('lesson-notes.txt'); |

1. Deep Types
   1. As our programs grow and become more complex, we’ll need to add more methods and properties to our objects to accommodate more features.
   2. TypeScript allows us to infinitely nest objects so that we can describe data correctly.
      1. interface is constrained to typed objects
      2. class is a way to program with objects

Example

|  |
| --- |
| interface Robot {  about: {  general: {  id: number;  name: string;  };  };  getRobotId: () => string;  }  class OneSeries implements Robot {  about;    constructor(props: { general: { id: number; name: string; } }) {  this.about = props;  }    getRobotId() {  return `ID: ${this.about.general.id}`;  }  } |

Exercise

|  |
| --- |
| interface Directory {  addFile: (name: string) => void;  // Define a config type member here  config: {  default: {  encoding: string,  permissions: string  }  }  }  class DesktopDirectory implements Directory {  config = {  default: {  encoding: 'utf-8',  permissions: 'drw-rw-rw-',  }  }  addFile(name: string) {  console.log(`Adding file: ${name}`);  }  showPreview(name: string) {  console.log(`Opening preview of file: ${name}`);  }  }  const Desktop = new DesktopDirectory();  console.log(Desktop.config); |

1. Composed Types
   1. As our data gets nested deeper, we’ll start to have typed objects that become unwieldy to write and read. Take the following type:

Example

|  |
| --- |
| interface About {  general: {  id: number;  name: string;  version: {  versionNumber: number;  }  }  } |

* 1. TypeScript allows us to compose types
  2. We can define multiple types and reference them inside other types.

Example

|  |
| --- |
| interface About {  general: General;  }    interface General {  id: number;  name: string;  version: Version;  }    interface Version {  versionNumber: number;  } |

Exercise

|  |
| --- |
| interface Directory {  addFile: (name: string) => void;  config: Config  }  interface Config {  default: DefaultConfig  }  interface DefaultConfig {  encoding: string;  permissions: string;  }  class DesktopDirectory implements Directory {  config = {  default: {  encoding: 'utf-8',  permissions: 'drw-rw-rw-',  }  }  addFile(name: string) {  console.log(`Adding file: ${name}`);  }  showPreview(name: string) {  console.log(`Opening preview of file: ${name}`);  }  }  const Desktop = new DesktopDirectory();  console.log(Desktop.config); |

1. Extending Interfaces
   1. In TypeScript, it’s not always enough to be able to compose types together. Sometimes it’s convenient to copy all the type members from one type into another type.
   2. We can accomplish this with the extends keyword

Example

|  |
| --- |
| interface Shape {  color: string;  }    interface Square extends Shape {  sideLength: number;  }    const mySquare: Square = { sideLength: 10, color: 'blue' }; |

Exercise

|  |
| --- |
| interface Developer extends Human {  code: () => void;  }  // Add your interface here  interface Human {  name: string,  hobbies: string[]  }  const me: Developer = {  code: () => console.log('Headphones on. Coffee brewed. Editor open.'),  name: 'Corrina',  hobbies: ['Building rockets']  }  me.code(); |

1. Index Signatures
   1. it’s useful to write an object type that allows us to include a variable name for the property name

Example

|  |
| --- |
| {  '40.712776': true;  '41.203323': true;  '40.417286': false;  } |

Example 2

|  |
| --- |
| import { getBudgetAsync } from './api';  // Write an interface here  interface Budget {  [category: string]: number  }  async function getBudget() {  const result: Budget = await getBudgetAsync();  console.log(result);  }  getBudget(); |

1. Optional Type Members
   1. Every interface within this lesson so far assumes that every type member is required
   2. TypeScript allows us to make some type members optional
   3. it’s useful to write an object type that allows us to include a variable name for the property name

Example

|  |
| --- |
| interface OptionsType {  name: string;  size?: string;  }    function listFile(options: OptionsType) {  let fileName = options.name;    if (options.size) {  fileName = `${fileName}: ${options.size}`;  }    return fileName;  } |

Exercise

|  |
| --- |
| // Write an interface here  interface UserNameOptions {  firstName?: string,  lastName?: string,  username: string  }  function getUserName(options: UserNameOptions) {  if (options.firstName && options.lastName) {  return console.log(`${options.firstName} ${options.lastName}`);  }  return console.log(options.username);  }  getUserName({  firstName: 'Mr.',  lastName: 'Oshiro',  username: 'hotelowner304'  })  getUserName({  firstName: 'Madeline',  username: 'mountainClimber'  }) |

Quiz

1. When typing an object in TypeScript, what is the limit of nested objects (objects inside other objects) we are allowed to define?

Graphical user interface, text, application, email, website

Description automatically generated

1. B
2. Compose the types below by matching similarly typed property names and interface names.

Text

Description automatically generated

1. What code snippet below will result in no TypeScript errors when calling the getGroceries() function?

Graphical user interface

Description automatically generated

1. C
2. Complete the code below, where every key should be of type number and every value should be of type boolean.

Graphical user interface, application

Description automatically generated

1. [ticket: number]
2. Boolean
3. Which keyword below applies the Candy type to the ButterSnicker class?

A screenshot of a computer

Description automatically generated

1. Implements
2. Based on the types declared below, which property could we successfully access on the photos variable?

Graphical user interface

Description automatically generated

1. B
2. Based on the types below, what type members will the Bus type enforce?

Graphical user interface

Description automatically generated

1. A
2. Why would we use interface over the type keyword to define a type?

Graphical user interface, text, application

Description automatically generated

1. D