Training TypeScript

Module: Type Queries

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We know the `typeof` operator

Types in plain JavaScript :

```
console.log(typeof 123); // 'number'
console.log(typeof 'this is a string'); // 'string'
console.log(typeof [10, 20, 30]); // 'object'
console.log(typeof {}); // 'object'
```

In TypeScript we can use `typeof` in a slightly different manner

```
// Lets say we have a type/object literal as such
const employee = {
  name: 'Boris',
  age: 27
};
```

```typescript
// we can now QUERY the employee object and assign it's properties
// to the Person type.
type Person = typeof employee;

let person: Person = {
  name: 'Brandon',
  age: 19
};
```

```typescript
// we can no
// to the Pe
type Person

let person: Person = {
  name: 'Brandon',
  age: 19
};
```

```typescript
type Person = {
    name: string;
    age: number;
}
```

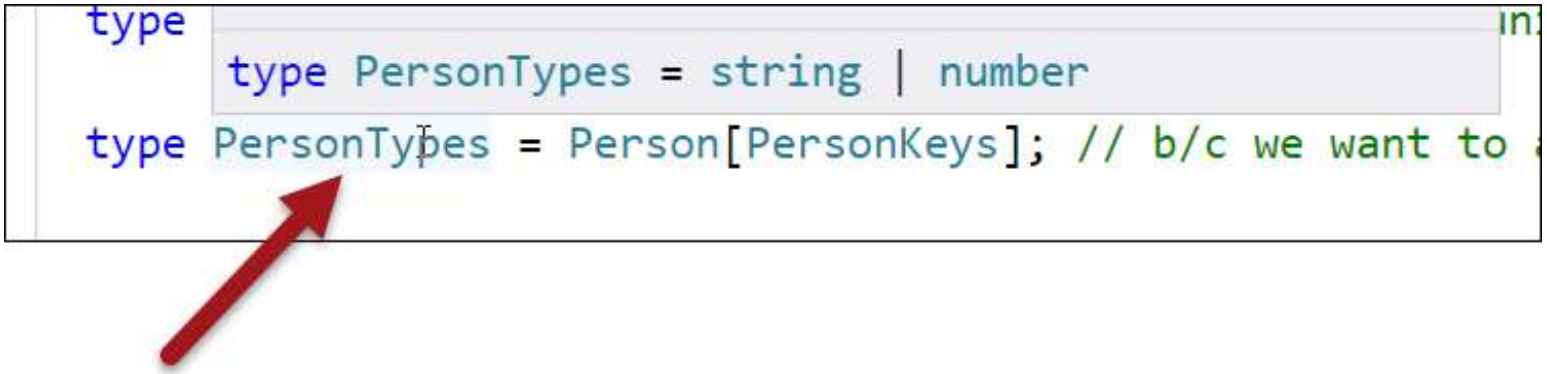
In JavaScript, `typeof` would have given us `'object'`.

In TypeScript, it gives us the properties of the inferred type!

`Keyof` index type queries

```
// PersonKeys is now a union type "name"| "age"
type PersonKeys = keyof Person;

// b/c we want to access the exact types
// of the 'name' and 'age' properties
type PersonTypes = Person[PersonKeys];
```



Creating a custom Lookup function

Let's say we want to look up the value of a given property on an object – BUT DO IT TYPE SAFE

This would be the type-unsafe notation:

```
function getPropertyValue(obj : object, key: string) {
  return obj[key]; // type unsafe way
}
```

Solution: create a generic type, and use `extends keyof`:

```
function getPropertyValue<T, K extends keyof T>(obj: T, key: K) {
   return obj[key]; // type safe way
}

const personName = getProperty(person, 'name');
```

"K is a subtype of T, and has the keys that are looked up"

```
const personName: string
const personName = getProperty(person, 'name');
console.log(personName);
```

First of all – we get the correct typing on the variable the value is assigned to.

```
  return obj[key]; // type safe way
}

const personName = getProperty(person, 'test');
console.log(personName);
```

```
[ts] Argument of type '"test"' is not assignable
 to parameter of type '"name" | "age"'.
```

Second – we get an error if we try to look up a non-existing property

Workshop

- Study the example `../21-type-queries.ts`
- Create an example of your own, using one of your own data types:
  - 1. Use `typeof` as a type query
  - 2. Use `keyof` and see what type is returned
  - 3. Create a lookup function that returns the value of one of the properties of your own custom object
- Check your current project if `<T, K extends keyof T>` is used. Explain now *in your own words* what is happening here.