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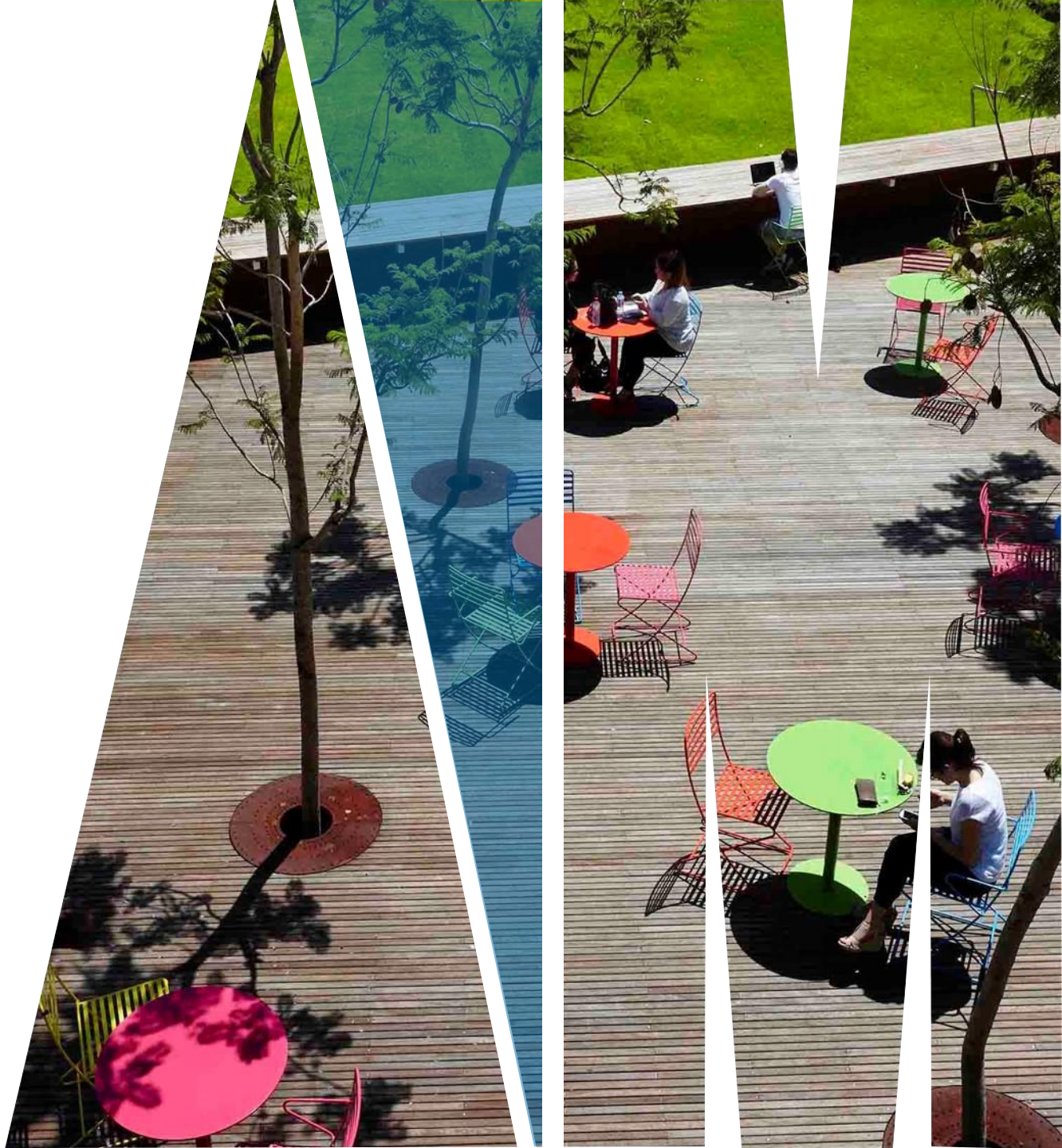
FIT2099 Object-Oriented Design and Implementation

Generics

(abstraction)



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WHY GENERICS?

Sometimes Java's strongly typed nature gets in the way of good use of abstraction

- example: suppose you want to write a program that requires a set of integers and a set of strings
- the set operations and logic behind these sets would be the same, so we would like to be able to define a **Set class** to generalise these
- but we'd need to be able to store **both Integers and Strings** in it…
- would also be nice to be able to re-use this Set code in other projects

THE GENERICS IN JAVA

Java addresses this problem using **generics**

- you have seen these in the Collection framework (e.g. **`ArrayList<>`**)
- essentially, we supply the name of the class as a **parameter** inside **angle brackets**
- let's take a closer look at how they developed and how they work

C# also uses Java-style generics. **C++** uses templates.

Python's duck typing means that it doesn't need such a mechanism, although it also means that it's not possible to constrain the relationships between classes.

WHAT ARE PARAMETERISED TYPES?

Generics means **parameterised types**.

The idea is to allow type (Integer, String, … etc, and user-defined types) to be a parameter to methods, classes, and interfaces.

Using Generics, it is possible **to create classes that work with different data types**.

An entity such as class, interface, or method that operates on a parameterized type is called **generic entity**.

WHAT IS A
GENERIC CLASS

Like C++, we use <> to specify parameter types in generic class creation. To create objects of generic class, we use following syntax.

// To create an instance of generic class
BaseType <Type> obj = new BaseType <Type>()

*Note: In Parameter type **we cannot use primitives like 'int','char' or 'double'.***

ADVANTAGES OF GENERICS

Programs that uses Generics has got many benefits over non-generic code.

Code Reuse: We can write a method/class/interface once and use for any type we want.

Type Safety: Generics make errors to appear **at compile time** rather than at in run time (it's always better to know problems in your code at compile time rather than making your code fail at run time).

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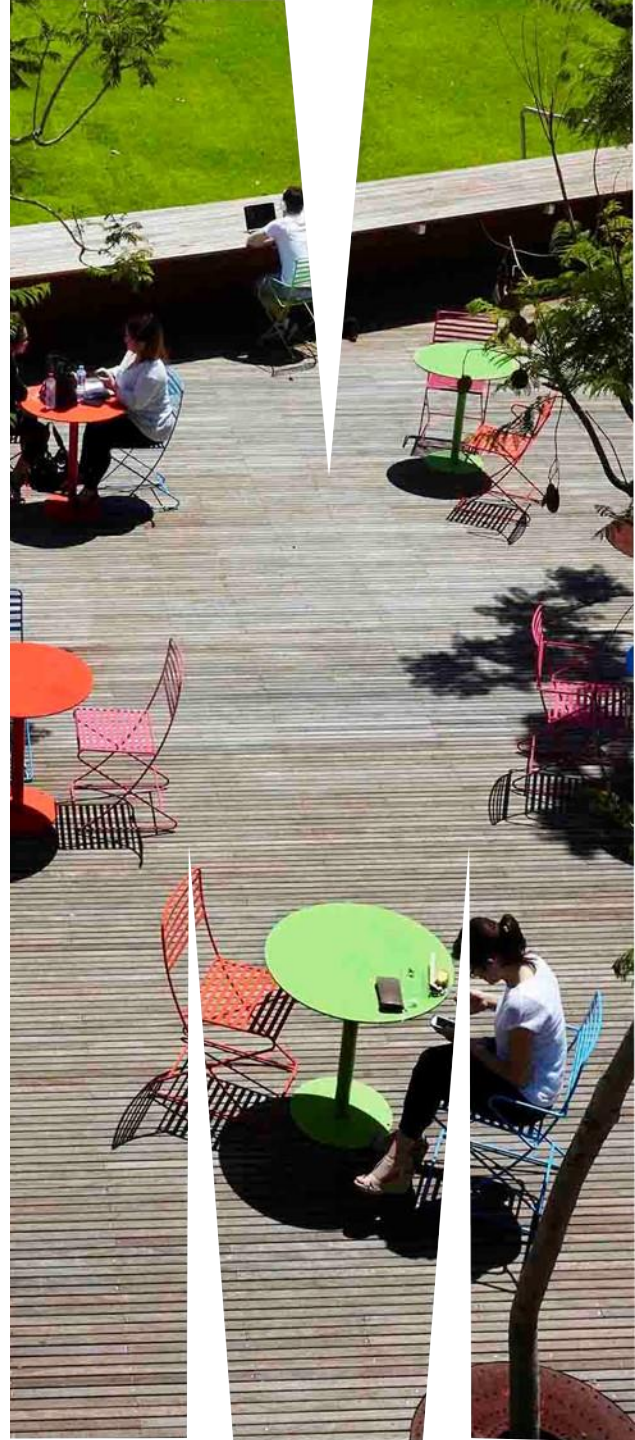
Thanks



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