Programming in Java - Packaging

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Packages

esteco.Television

```java
package esteco;

class Television {
    String model;
    boolean on;
    int channel;
    int volume;

    Television(String model) {
        this.model = model;
    }
}
```

units.Television

```java
package units;

class Television {
    String model;
    boolean on;
    int channel;
    int volume;

    Television(String model) {
        this.model = model;
    }
}
```

Java classes can be organized in different namespaces by defining different packages.

Hierarchical packages

com.esteco.sdm.Television

```java
package com.esteco.sdm;

public class Television {
    String model;
    boolean on;
    int channel;
    int volume;

    public Television(String model) {
        this.model = model;
    }
}
```

it.units.sdm.Television

```java
package it.units.sdm;

public class Television {
    String model;
    boolean on;
    int channel;
    int volume;

    public Television(String model) {
        this.model = model;
    }
}
```

Packages can be organized in hierarchies. Each package is separate from the parent using the dot notation.

The package hierarchy must be reflected in the file system.

The fully-qualified name

HelloTelevision.java

```
class HelloTelevision {

    public static void main(String args[]) {
        com.esteco.sdm.Television tv1 = new com.esteco.sdm.Television("LG121");
        it.units.sdm.Television tv2 = new it.units.sdm.Television("LG121");

        System.out.println("Hello tv1: " + tv1.getClass().getName());
        System.out.println("Hello tv2: " + tv2.getClass().getName());
    }
}
```

fully-qualified name = package name + '.' + simple name

To reference classes in other packages they must be declared as public.
The constructor must be declared as public, too!

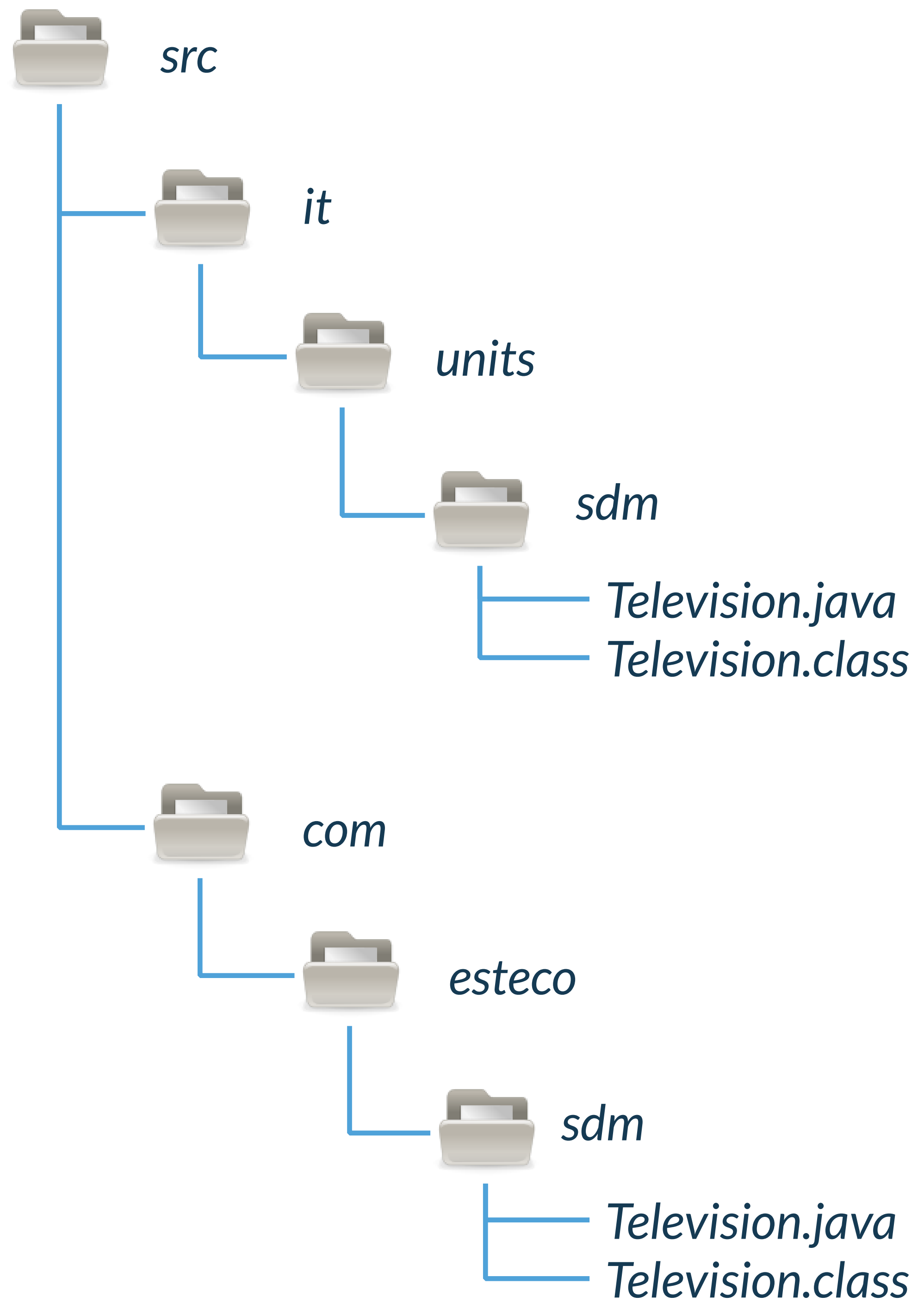
Location of Java files

com.esteco.sdm.Television

```java
package com.esteco.sdm;

class Television {
    String model;
    boolean on;
    int channel;
    int volume;

    Television(String model) {
        this.model = model;
    }
}
```



The package hierarchy must be reflected in the file system. This is not compulsory for Java source files, but it is for class files.

Compilation & execution

```
path-to-src$ javac it/units/sdm/Television.java

path-to-src$ ls it/units/sdm/
Television.class  Television.java

path-to-src$ java it.units.sdm.Television
```

To compile a Java file we have to specify its path. Either relative or absolute. The path can be independent from the declared package, but this practice is discouraged.

To run a Java file we have to specify its name, inclusive of the package. Java will search the class file converting the package into a path relative to the current location.

I let you discover how single file launch works

Compilation of multiple sources

it.units.sdm.Calculator

```java
package it.units.sdm;

class Calculator {

    final Display display;

    Calculator(Display display) {
        this.display = display;
    }

    void zeroPressed() {
        //...
    }

    //...
}
```

it.units.sdm.Display

```java
package it.units.sdm;

class Display {
    void display(String text) {
        System.out.println(text);
    }
}
```

javac is able to find dependencies if they are in the path reflected by the package.

```
javac it/units/calculator/Calculator.java
```

Causes the compilation of the Display class.

The import declaration

HelloTelevision.java

```java
import com.esteco.sdm.Television;

class HelloTelevision {

    public static void main(String args[]) {
        Television tv1 = new Television("LG121");
        it.units.sdm.Television tv2 = new it.units.sdm.Television("LG121");

        System.out.println("Hello tv1: " + tv1.getClass().getName());
        System.out.println("Hello tv2: " + tv2.getClass().getName());
    }
}
```

Each class can be referenced by using its simple name or the fully-qualified name. The simple name can be used

1. *when the referenced class is in the same package of the current class*
2. *when the referenced class has been imported by using the import declaration*

`java.lang` package

Classes in the java.lang package are imported by default.

Notable classes in the java.lang package.

```
Class
Exception
Math
Object
Runnable
Runtime
String
StringBuilder
System
Thread
```

Thank you!

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