Packages

Hello world

A typical hello world application look likes this:

Our package

Get access to java.util classes

Class declaration

Main method

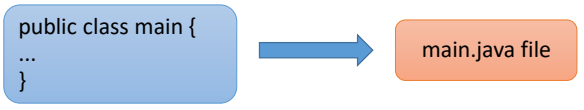
```
package com.foo;

import java.time.LocalDate;
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner in  = new Scanner(System.in);
        System.out.print("Hello World");
    }
}
```

So what is a package? And why do we need it?

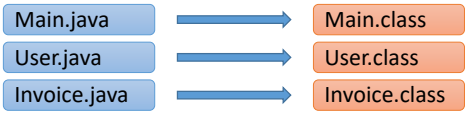
Packages

In Java, we use **classes** to organize our code.

Each **.Java** file should contain one **class** declaration with the **same filename** as the class.

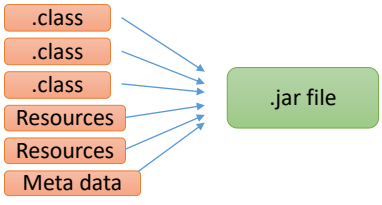


Each .java file is later compiled into a class file:



Packages

When we want to distribute our application we typically package them up into **.jar** files.



A **.jar** file is actually a .ZIP file and can be opened up using the **jar** command or any **ZIP** file tool.

A .jar file also provides additional security features like digital signatures, sealing, obfuscation, versioning…

Name conflicts

Many things with the same name

Let's talk about streets

A street has a name, like "**main street**"

Main street

But there might be many streets named "**main street**"

So how can we identify each street individually?

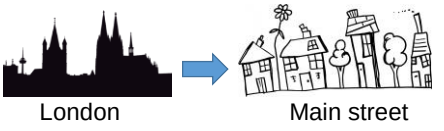
Context

To separate them apart we need **context**

A city **owns** the street.

We can then point out a street by adding the city it belongs to.

- London.Main street
- New York.Main street
- Berlin.Main street



Packages

In Java we use **packages** to keep our classes organized

By using packages the **User** class in the different parts of the application does not collide.

Packages

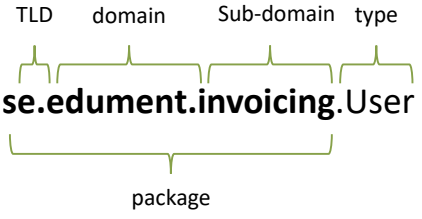
A type always has a unique name composed of its **package** and **class name**.

The package and class name combination is always unique!

Packages

There are standard naming conventions Java developers use to avoid package naming problems.

You should use the reverse of your company's domain name: for example, Edument's domain is **edument.se**, so the Edument package would be:

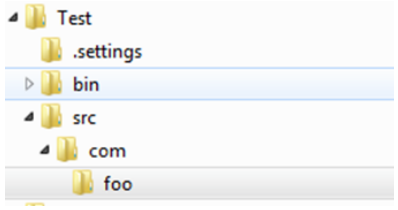


Package names should always be lower case to avoid clashing with classes.

Packages

Packages are reflected in the directory structure on your hard drive.

```
package com.foo;
```



Code in the package goes here

Packages are similar to namespaces in other programming languages.

Packages

In our example from before:

Our **Main** class will be located in the **com.foo** package

```
package com.foo;

import java.time.LocalDate;
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner in  = new Scanner(System.in);
        System.out.print("Enter your name: ");
        String name = in.nextLine();

        System.out.print("What year were you born?: ");
        int year = in.nextInt();
        int age = LocalDate.now().getYear() - year;

        System.out.printf("Hello %s! You are %d years old!",
                          name, age);
        System.out.println();
    }
}
```

The **Scanner** type is located in the **java.util** package.

The **import** directive

”Scanner” resides in the package **java.util**. This line means we don’t have to write the following:

```
java.util.Scanner in = new java.util.Scanner(System.in);
```

Instead, as you have seen, once we have imported the **java.util.Scanner** class the following line is enough:

```
Scanner in = new Scanner(System.in);
```

Packages

Packages summary

- The package statement must be at the top of each .class file
- Only one package statement per .class file
- Every file should preferably have a package statement
- Package names are always written in lowercase
- types that comprise a package are known as the **package members.**
- Class names should always start with a capital letter, like User, Customer, Invoice…

Exercise 11

Let's do exercise 11