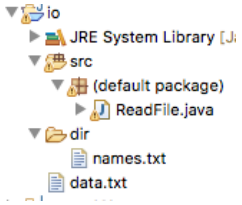
Working with Paths

We now look at methods that can be used to deal with a path to a particular directory or file on your hard drive. Three classes/interfaces come into play; all are in package `java.nio.file`:

> Interface `Path`: has instance methods that give information about or operate on a path.
> Class `Files`: has static methods to operate on the file/directory given by a `Path` object.
> Class `Paths`: has static methods to create a `Path` object corresponding to a `String`.

Note the difference between `Path` and `Files`: `Path` has methods for dealing with paths; `Files` has methods for dealing with the file/directory given by a path.

Creating a Path object



Consider the Eclipse project shown to the right. In classes in directory `src`, to create a `Path pd` for file `data.txt` and a `Path pn` for file `names.txt`, use:

```
Path pd= Paths.get("data.txt");
Path pn= Paths.get("dir", "names.txt");
```

Note that `Path` is an interface, and you do not know the actual class of `pd`! Its class will depend on the operating system on which your computer is running. You can print the value of `pd.getClass()` to find out. Try it, and compare what you get with what friends who own a different kind of computer get. This illustrates how useful interfaces are. We don't *care* what the class of `pd` is. We just need to know what methods it has.

Method `Paths.get` can have any number of names as arguments. They usually form a relative path starting at some node of the tree of your hard drive directory. It is possible to give an absolute path, starting at the root of your hard drive directory, but don't do that. If you do, your program won't work on someone else's computer because the file structure will be different. More on this later.

First time reading this? No need to read further now

You do not have to digest the following material on methods in interface `Path` and class `Files` if this is your first time looking at I/O and you just want to know how to read and write files. You can skip to item (3) in the JavaHyperText entry for I/O. But this information properly belongs here as a reference.

Information about a Path

Interface `Path` has several functions for extracting information about a `Path p`. You may never need them, but it's nice to know about them. Below are some of them. We give examples of what they do assuming `p` contains four names, `"s1"`, `"s2"`, `"s3"`, and `"s4"`.

> `p.toString()`: The path as a string. It will have system-specific name separators (usually / or \). Example: `"s1/s2/s3/s4"`.
>
> `p.getFileName()`: A `Path` object that contains only the last name on `p`. Example: a `Path` for `"s4"`.
>
> `p.getParent()`: The `Path` of the parent (null if no parent). Example: a `Path` containing `"s1"`, `"s2"`, and `"s4"`.
>
> `p.getRoot()`: The `Path` consisting of the root. This is **`null`** for a relative path because the root is missing.
>
> `p.getNameCount()`: The number of names in `p`. Example: 4.
>
> `p.isAbsolute()`: True if `p` is an absolute path, false if not.
>
> `p.toAbsolute()`: The absolute `Path` object corresponding to relative path `p`. This will typically be done by resolving the path against the file system default directory. So, starting from the root of the default directory, a tree search can be made for the node begins path `p`.

Thus given a relative `Path`, one can construct a corresponding absolute path.

There are other methods. If you need to process a `Path` in some fashion, visit the API documentation for interface `Path` and look through its methods.

Information about the file or directory described by a Path

As you now know, class `Path` has methods for finding out about a `Path` object `p`. Class `Files`, on the other hand, contains static methods that give you information about the actual file or directory that is described by `p`. You can find out whether it is a file or a dictionary, whether it exists, and whether it is readable or writable. You can even create the file or directory if it doesn't exist, you can copy the file to another place, you can delete it, and you can move it or rename it.

Finally, you can obtain a `BufferedReader` or `BufferedWriter` for it, allowing you to read or write the file. This is the subject of item (3) in the JavaHyperText entry for I/O.

Here are just a few of the static methods in class `Files`.

`Files.exists(p)`: true if the file/directory described by p exists.

`Files.isDirectory(p)`: true if p describes a directory and not a file.

`Files.isReadable(p)`: true if p is readable.

`Files.isWritable(p)`: true if p is writable.

`Files.createDirectory(p)`: Create the directory described by `Path p`, but fail if it already exists. Read the spec carefully before using this method.

`Files.createFile(p)`: Create the file described by `Path p`, but fail if it already exists. Read the spec carefully before using this method.

`Files.move(p1, p2)`: move files described by `Path p1` to the placed described by `Path p2`. Read the spec carefully before using this method.