Lab Tutorial

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Distributed Systems course
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1. Overview

The purpose of this manual is to explain how to prepare the environment to do the practice of Distributed Systems.

The manual is divided into the following sections:

- **Virtual machine**: this section explains how to install the virtualization software, and how to create our virtual machine with GNU / Linux.

  This section is important if you use Windows OS; if you use GNU/Linux or OS X, you can ignore this section.

- **Java**: this section explains how to install and configure Java.

  You can ignore this section if you already have Java7 or upper installed in your computer.

- **Eclipse**: this section explains how to install and configure *Eclipse IDE*. Moreover, you can learn how to create a new project and how to do a test. Also shows how to import the *PRA* as an Eclipse Project and how to execute *Phase1*

2. GNU/Linux virtual machine

The base code we provide you is ready to be validated in GNU/ Linux environment. So you need to have installed Linux in your computer. If you do not have it installed you can create a virtual machine with GNU/Linux.

We use VirtualBox for virtualizing operating systems

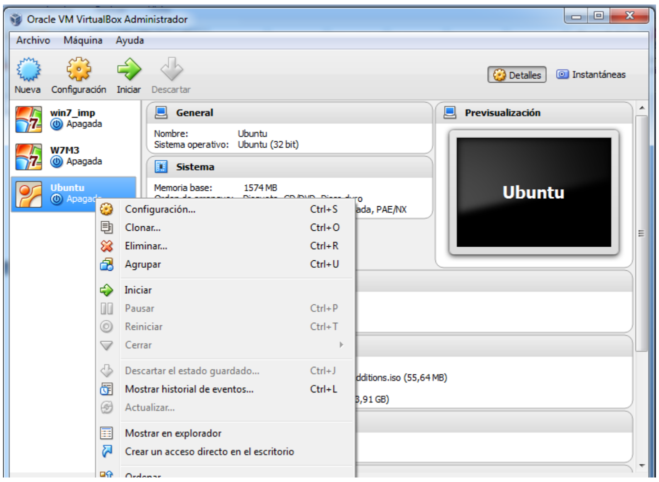
2.1. Install VirtualBox

- Download the appropriate package for your operating system: https://www.virtualbox.org/wiki/Downloads
- Install the software on your computer
- Download the operating system GNU/ Linux as an image (.iso file).
  e.g. Ubuntu 14.04.2 LTS 32bits or newer
  http://releases.ubuntu.com/14.04.2/ubuntu-14.04.2-desktop-i386.iso
- Run VirtualBox:

> Select Machine → New ... → Put a name and select an OS → Select RAM Memory allocated to this virtual machine → Select Create a virtual hard drive now → VDI → Dynamically allocated → Select the maximum disk size → Create

- Prepare the installation of the virtual machine you just created:

> Select Settings ... → Storage → Controller: IDE → Add CD/DVD Device icon → choose disk → select ubuntu .iso file → Open → OK

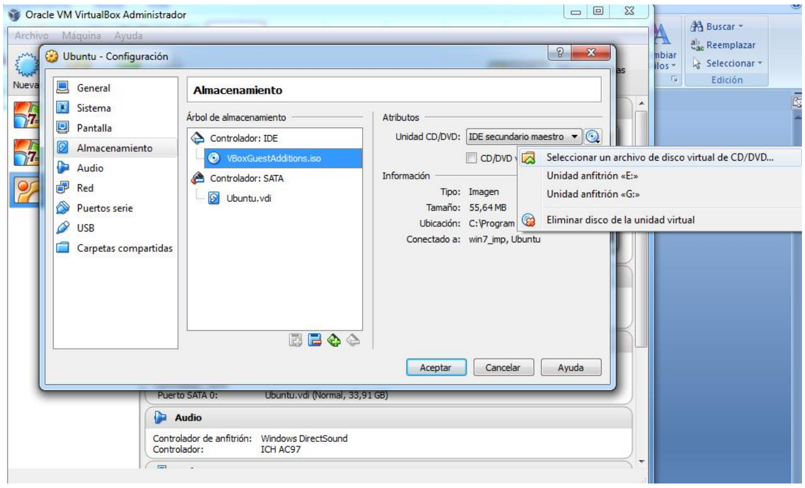


Oracle VM VirtualBox Administrador

Nombre: Ubuntu
Sistema operativo: Ubuntu (32 bit)

Memoria base: 1574 MB

Figure 1



Unidad CD/DVD: IDE secundario maestro

Tipo: Imagen

Tamaño: 55,64 MB

Ubicación: C:\Program

Conectado a: win7_imp, Ubuntu

Puerto SATA 0: Ubuntu.vdi (Normal, 33,91 GB)

Controlador de anfitrión: Windows DirectSound

Controlador: ICH AC97

Figure 2

- Start the virtual machine and Install the operating Ubuntu to the virtual machine.

After this process is completed you will have available GNU/Linux OS.

3. Java

For developing and deploying java applications install Java Standard Edition Development Kit (JDK) on your computer. You will need JDK7 or upper in order to do the practice

There is another product available, Java Standard Edition Runtime Edition (JRE), but only includes utilities for running java programs, not for compiling source code.

3.1. Installation

Download jdk according to your operating system:

- **GNU/Linux:**
  - RedHat, Suse, Oracle Linux, SLES

    32bits: https://www.java.com/en/download/help/linux_install.xml

    64bits: https://www.java.com/en/download/help/linux_x64_install.xml
  - Ubuntu: https://help.ubuntu.com/community/Java#Oracle_Java_7
- **OS X**: https://www.java.com/en/download/help/mac_install.xml

3.2. Setup

If you try to run java code from Command Line Interface (CLI), you will need to set PATH. This environment variable allows you to run java utilities from any folder.

To set environment variable PATH:
http://docs.oracle.com/javase/tutorial/essential/environment/paths.html

4. Eclipse

An integrated development environment (IDE) or interactive development environment is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, build automation tools and a debugger. There are several Java IDE available and eclipse is the one we use.

The practice can be done with any other IDE, but from Distributed Sytems laboratory only will support Eclipse.

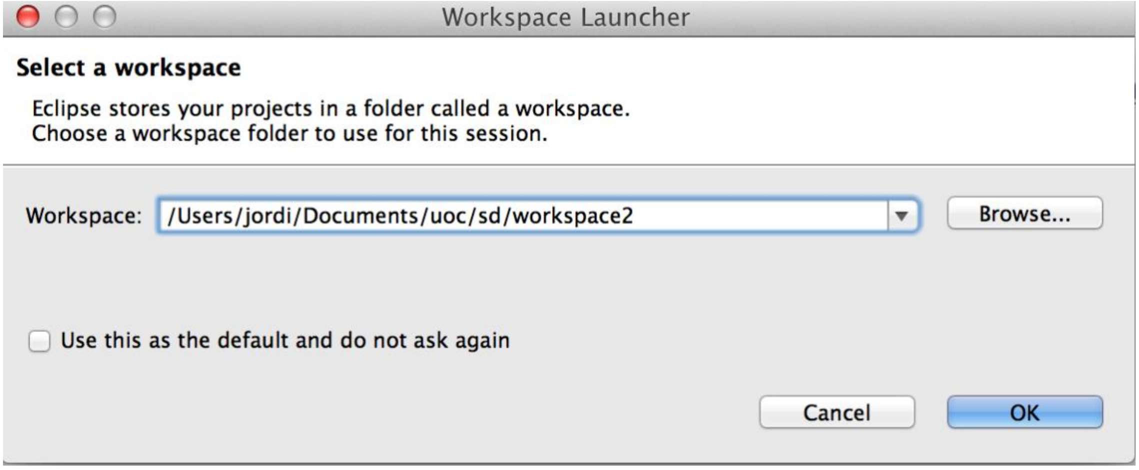
4.1. Installation

Install Eclipse:

- Download Eclipse IDE for Java Developers, from https://www.eclipse.org/downloads/
- Unzip the file into the folder you like
- run eclipse.

4.2. Setup

1. Run eclipse and choose a folder to be the workspace. Eclipse will store your Java Projects into this folder



Select a workspace

Eclipse stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.

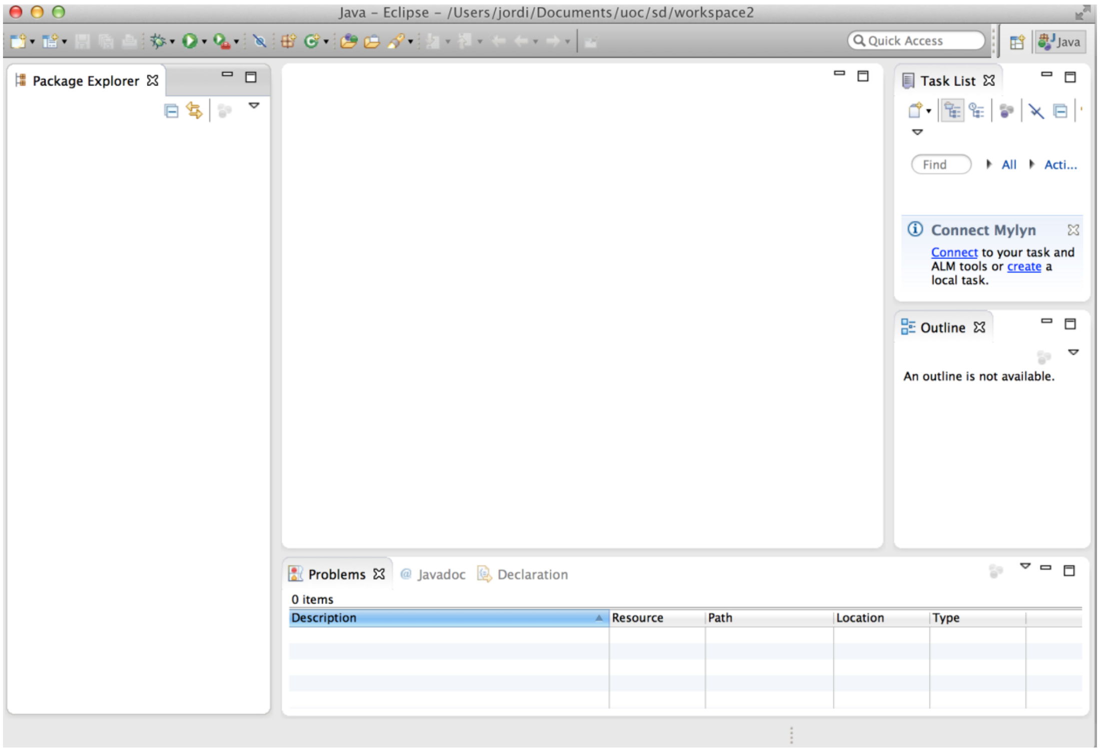
Workspace: /Users/jordi/Documents/uoc/sd/workspace2

□ Use this as the default and do not ask again

Figure 3

2. Then choose *Go to the workbench*.

3. The main screen that shows us Eclipse IDE is:



Connect to your task and ALM tools or create a local task.

An outline is not available.

Figure 4

4.2.1. Testing environment:

1. **Creating a new project**: *File → New → Java project → Project Name: TestEntorn*

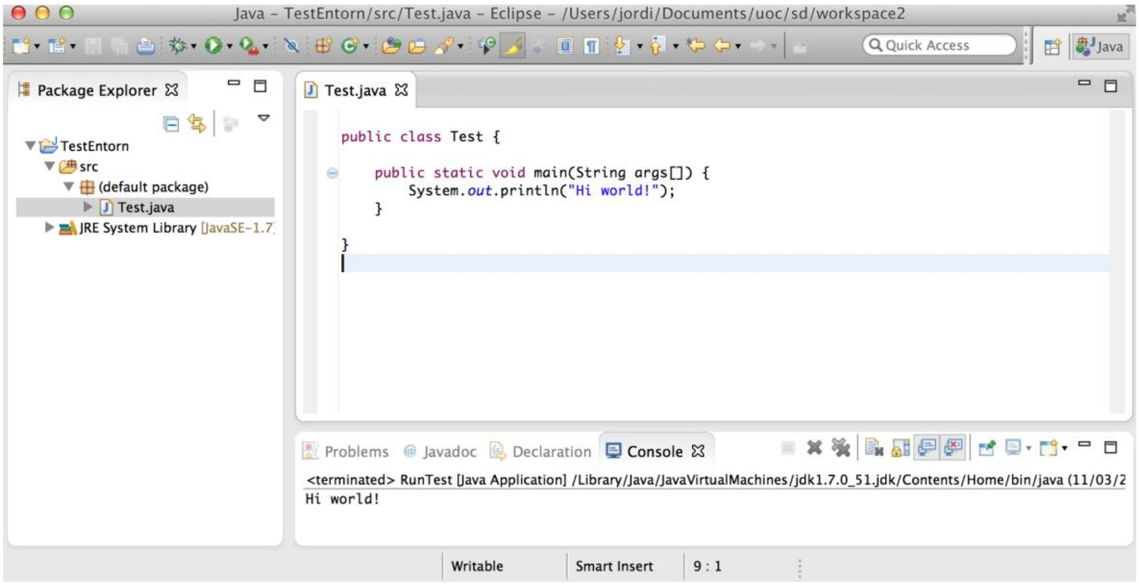
2. **Creating a new class: select the project** → *File → New → Class → Name: Test*

3. **Put the following text in the tab called *Test.java:***

```
public class Test {
   public static void main(String args[]) {
         System.out.println("Hi world!");
   }
}
```

4. **Run:** *Run → Run configuration … → Java Application → New → Name: RunTest*; *Project: TestEntorn*; *Main class: Test → Apply → Run*.

   You may see *Hi world!* in the eclipse console.



Java – TestEntorn/src/Test.java – Eclipse – /Users/jordi/Documents/uoc/sd/workspace2

```
public class Test {

    public static void main(String args[]) {
        System.out.println("Hi world!");
    }

}
```

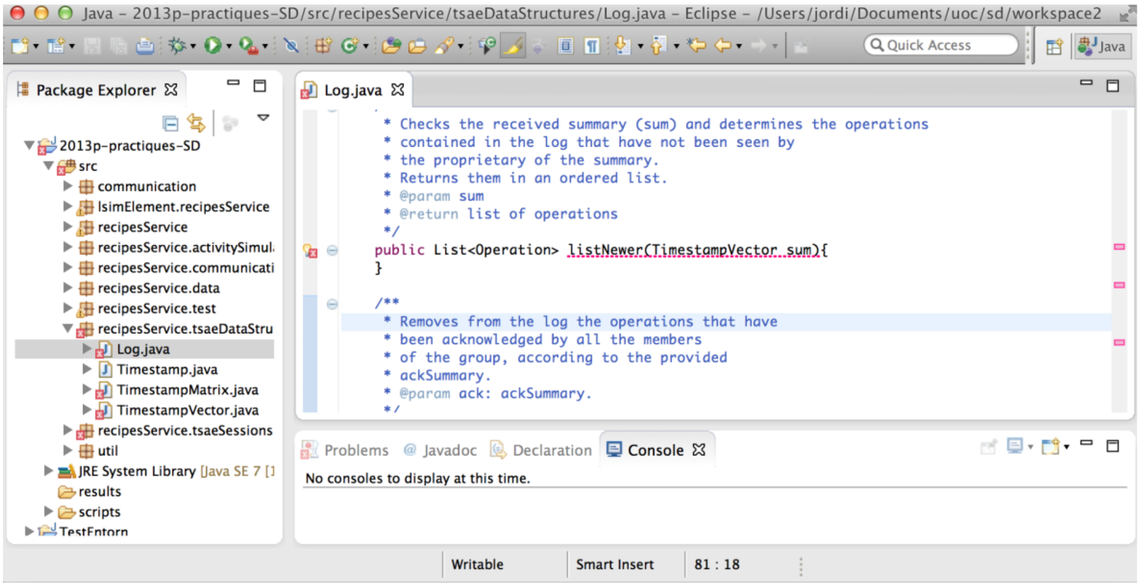
```
<terminated> RunTest [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_51.jdk/Contents/Home/bin/java (11/03/2
Hi world!
```

Figure 5

4.2.2. Import and run SD project

For importing a project easily:

1. Download the project and unzip.
2. Import: *File* → *Import...* → *General* → *Existing projects into Workspace* → select this folder: *(...)/2015t-practica-SD/2015t-practiques-SD—baseCode*;
3. Select *Copy project into workspace* → *Finish*.


Java – 2013p-practiques-SD/src/recipesService/tsaeDataStructures/Log.java – Eclipse – /Users/jordi/Documents/uoc/sd/workspace2
Quick Access
Java
Package Explorer
2013p-practiques-SD
src
communication
lsimElement.recipesService
recipesService
recipesService.activitySimul.
recipesService.communicati
recipesService.data
recipesService.test
recipesService.tsaeDataStru
Log.java
Timestamp.java
TimestampMatrix.java
TimestampVector.java
recipesService.tsaeSessions
util
JRE System Library [Java SE 7 [1
results
scripts
TestEntorn
Log.java
Problems
Javadoc
Declaration
Console
Writable
Smart Insert
81 : 18

```
     * Checks the received summary (sum) and determines the operations
     * contained in the log that have not been seen by
     * the proprietary of the summary.
     * Returns them in an ordered list.
     * @param sum
     * @return list of operations
     */
    public List<Operation> listNewer(TimestampVector sum){
    }

    /**
     * Removes from the log the operations that have
     * been acknowledged by all the members
     * of the group, according to the provided
     * ackSummary.
     * @param ack: ackSummary.
     */
```

```
No consoles to display at this time.
```

Figure 6

- **Local evaluation**

  When you have implemented *Log* and *TimestampVector* classes, you can test in a diferent ways:

  - **From CLI**, run:

    `java -cp ../bin recipesService.Server --phase1`

    (run it from *scripts* folder)

  - **From Eclipse**:

    Run → Run Configuration … → create run configuration → Arguments tab:

    - Program arguments:

      `<port> <uoc-username> -h sd.uoc.edu`

    - Working directory :

      `${workspace_loc:2015t-practica-SD—solucio/scripts}`

    Apply → Run

- **Formal evaluation**
  - **From CLI**, run:

```
java -cp ../bin recipesService.Phase1 <port> <uoc-username> -h sd.uoc.edu
```

(run it from *scripts* folder)

  - **From Eclipse**:

Run → Run Configuration … → create run configuration →

→ Main tab:

- Choose your project from list
- Main class:

```
recipes_service.Phase1
```

→ Arguments tab:

- Program arguments:

```
<port> <uoc-username> -h sd.uoc.edu
```

- Working directory :

```
${workspace_loc:2015t-practica-SD—solucio/scripts}
```

Apply → Run