1.- Introduction

1.1.- Goals

Many developers around the world choose LeJOS, Java for Lego Mindstorm as the platform to develop programs with NXT Lego Mindstorm. I consider that this eBook will help LeJOS community to develop better programs with LeJOS.

1.2.- LeJOS Project

LeJOS is Sourceforge project created to develop a technological infrastructure to develop software into Lego Mindstorm Products using Java technology.

Currently leJOS has opened the following research lines:

1. NXT Technology
    a. NXJ
    b. iCommand
2. RCX Technology
    a. leJOS for RCX

This eBook will focus in NXT technology with NXJ using a Windows Environment.

1.3.- NXT Brick

The NXT is the brain of a MINDSTORMS® robot. It's an intelligent, computer-controlled LEGO® brick that lets a MINDSTORMS robot come alive and perform different operations.

Motor ports
The NXT has three output ports for attaching motors - Ports A, B and C

Sensor ports
The NXT has four input ports for attaching sensors - Ports 1, 2, 3 and 4.

USB port
Connect a USB cable to the USB port and download programs from your computer to the NXT (or upload data from the robot to your computer). You can also use the wireless Bluetooth connection for uploading and downloading.

Loudspeaker
Make a program with real sounds and listen to them when you run the program

NXT Buttons
Orange button: On/Enter /Run
Light grey arrows: Used for moving left and right in the NXT menu
Dark grey button: Clear/Go back

NXT Display
Your NXT comes with many display features - see the MINDSTORMS NXT Users Guide that comes with your NXT kit for specific information on display icons and options

Technical specifications

- 32-bit ARM7 microcontroller
- 256 Kbytes FLASH, 64 Kbytes RAM
- 8-bit AVR microcontroller
- 4 Kbytes FLASH, 512 Byte RAM
- Bluetooth wireless communication (Bluetooth Class II V2.0 compliant)
- USB full speed port
- 4 input ports, 6-wire cable digital platform (One port includes a IEC 61158 Type 4/EN 50 170 compliant expansion port for future use)
- 3 output ports, 6-wire cable digital platform
- 100 x 64 pixel LCD graphical display
- Loudspeaker - 8 kHz sound quality. Sound channel with 8-bit resolution and 2-16 KHz sample rate.
- Power source: 6 AA batteries

1.3.1.- NXT Sensors used in the eBook

NXT Sensors used in the document are the following:

- NXT Motor
- Ultrasonic Sensor
- Compass Sensor
- NXTCam
- Tilt Sensor
- NXTCam
- RFID Sensor

NXT Motor

Ultrasonic Sensor

Compass Sensor

Tilt Sensor

NXTCam

RFID Sensor

1.4.- About the authors

Juan Antonio Breña Moral collaborates in LeJOS Research team since 2006. He works in Europe developing Engineering and IT solutions for middle and large customers in several markets as Defence, Telecommunications, Pharmaceutics, Energy, Automobile, Construction, Ensurance and Internet.

Further information:
www.juanantonio.info
www.esmeta.es

2.- Introduction

2.1.- LeJOS Community

LeJOS is a sourceforge project created and maintained to develop a Java Virtual Machine in the Lego Mindstorm NXT Brick. Everybody can participate in any development process with Code and Ideas.

The goals of this document:

1. Learn how LeJOS's code is organized in Sourceforge servers
2. Learn how to use a Subversion client
3. Learn how to collaborate in LeJOS project with new code

2.2.- Subversion system

Version control is the art of managing changes to information. It has long been a critical tool for programmers, who typically spend their time making small changes to software and then undoing or checking some of those changes the next day. Imagine a team of such developers working concurrently on the very same files and you can see why a good system is needed to manage the potential chaos.

In LeJOS project we use a subversion system to control the code.

You can see the code's repository here:
http://lejos.svn.sourceforge.net/viewvc/lejos/trunk/

2.3.- Tortoise SVN

TortoiseSVN is a free open-source client for the *Subversion* version control system. That is, TortoiseSVN manages files and directories over time. Files are stored in a central *repository*. The repository is much like an ordinary file server, except that it remembers every change ever made to your files and directories. This allows you to recover older versions of your files and examine the history of how and when your data changed, and who changed it. This is why many people think of Subversion and version control systems in general as a sort of "time machine".

The document explains how to use Tortoise SVN for Windows's operating system. Exist in the market others alternatives:

- Subversive
- Polaris

Further information:

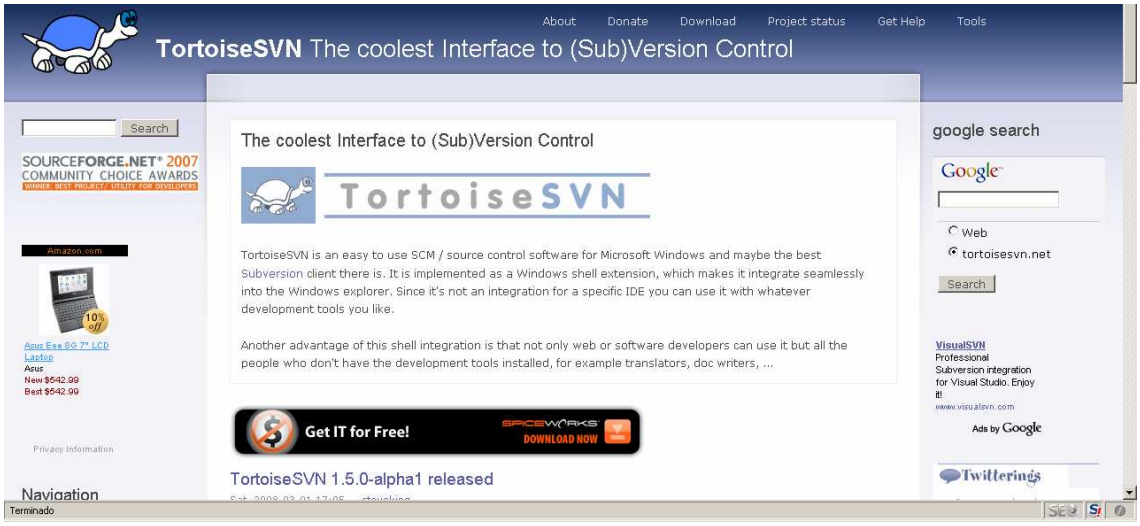
http://subclipse.tigris.org/
http://www.polarion.org/index.php?page=overview&project=subversive

3.- Installing Tortoise SVN

3.1.- Download latest version

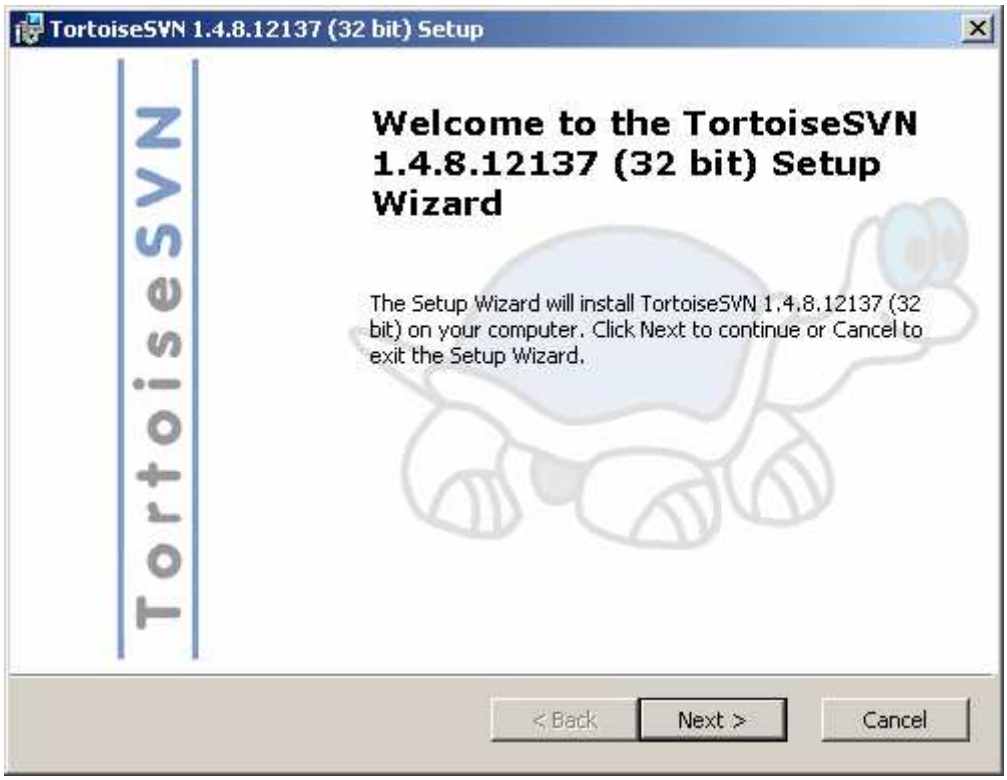
It is necessary to install a Subversion Client in your computer to manage any Subversion system. Download latest version of Tortoise here:

http://www.tortoisesvn.net/

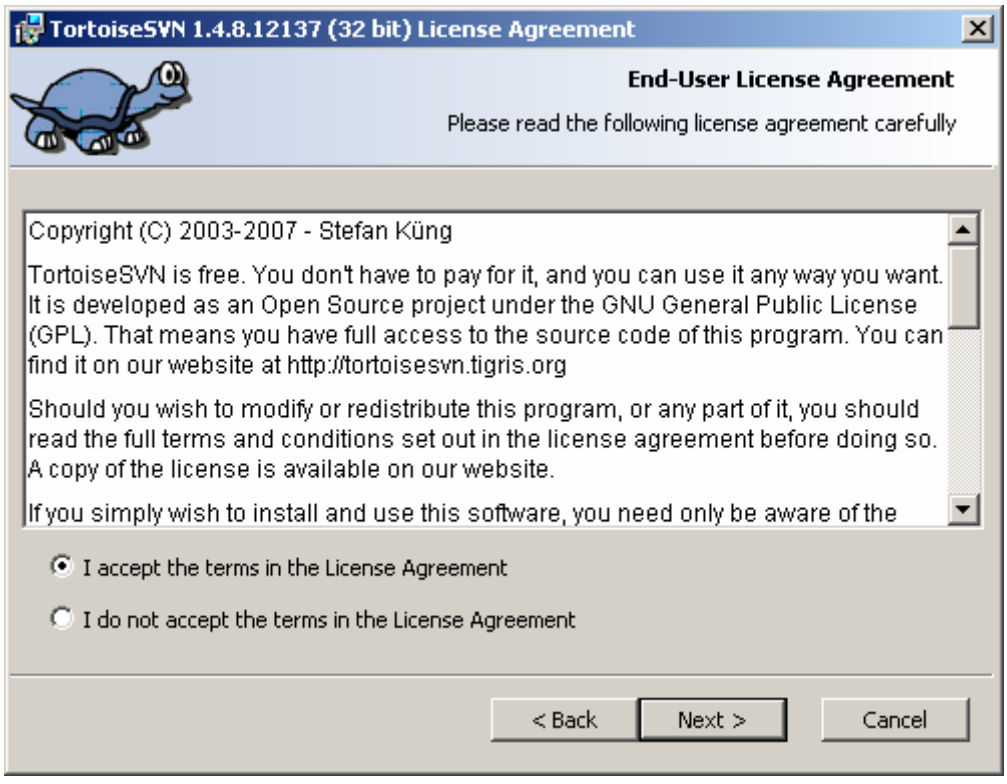


3.2.- Install Tortoise

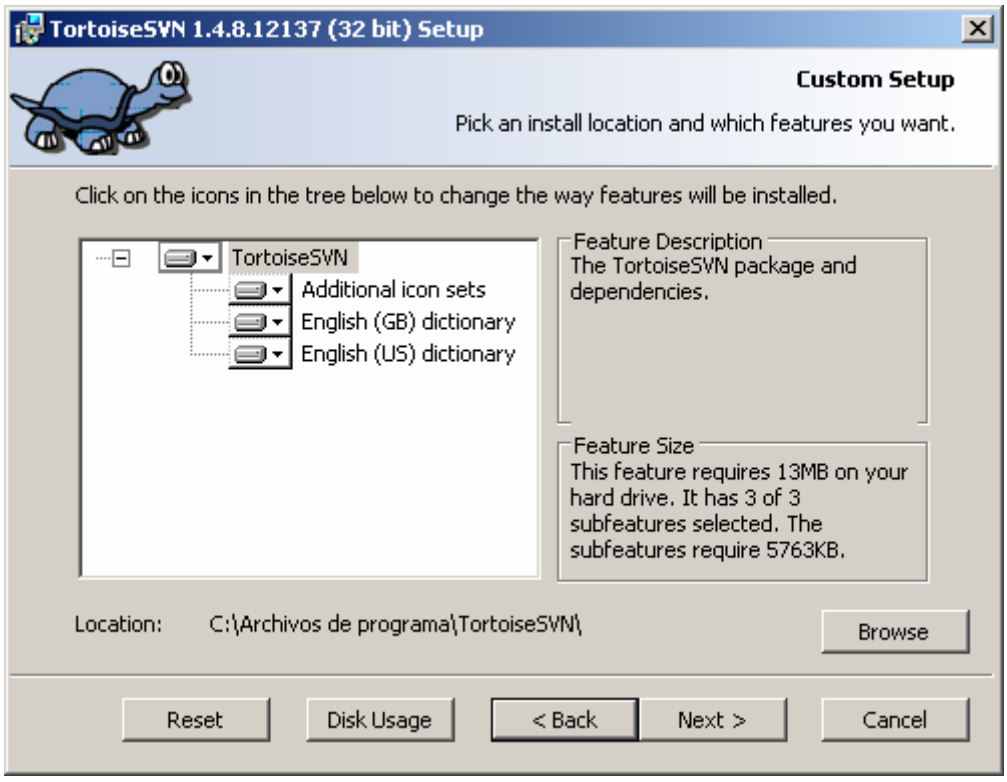
When you have downloaded the client, execute it and follow all steps in the installation.



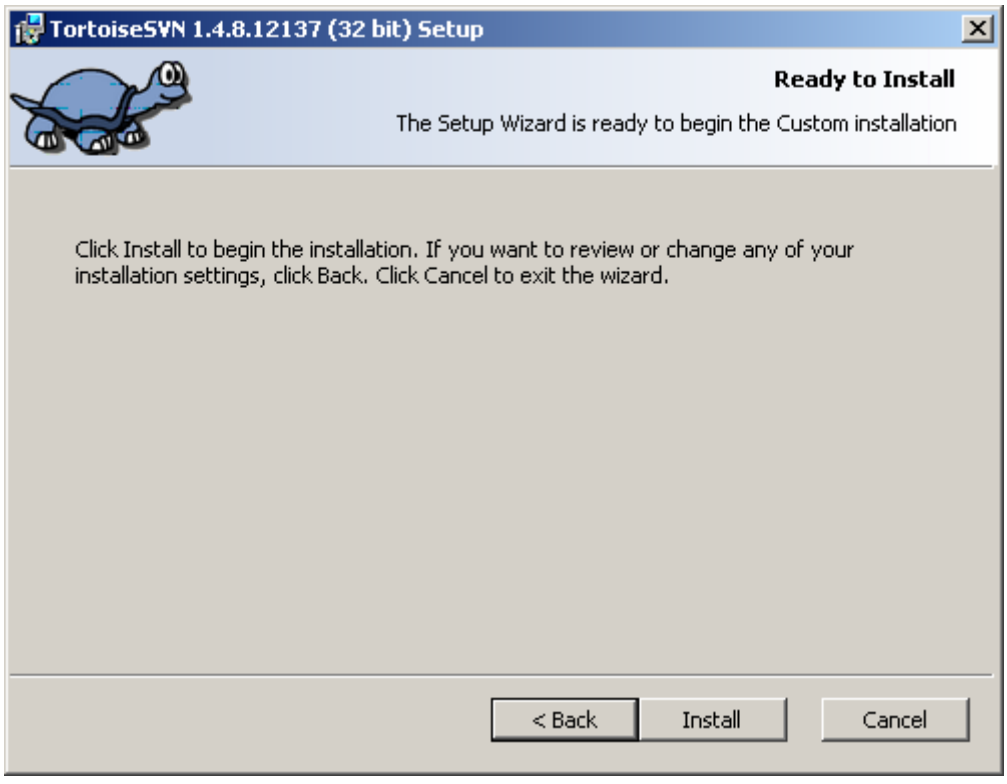
Accept the terms:



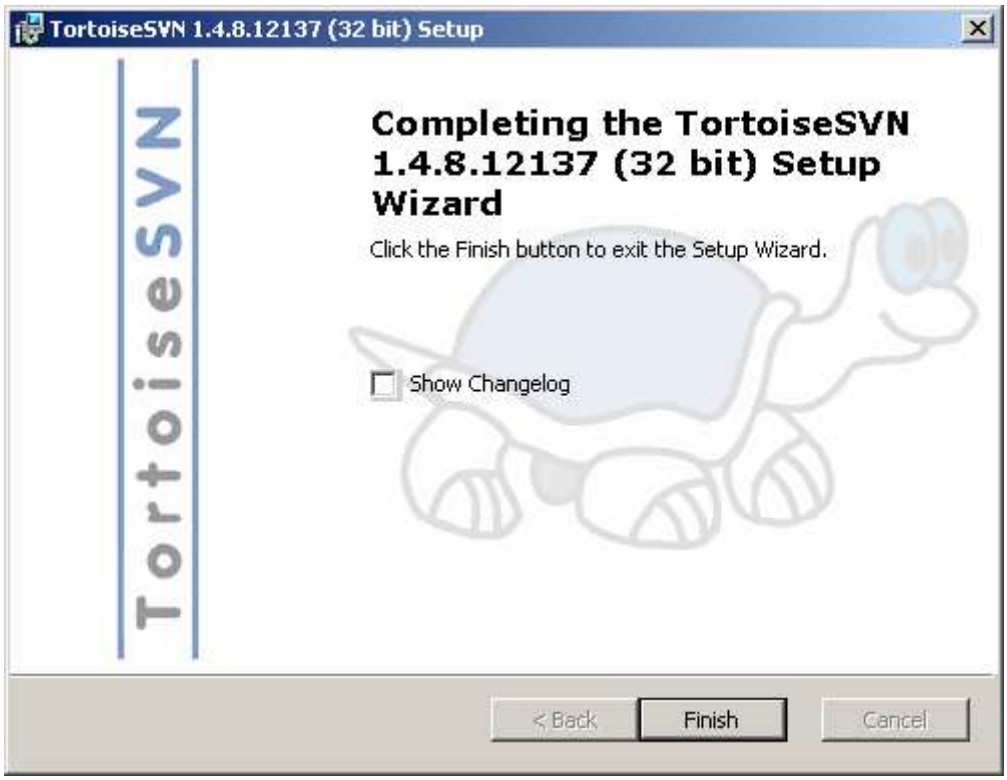
Select all components:



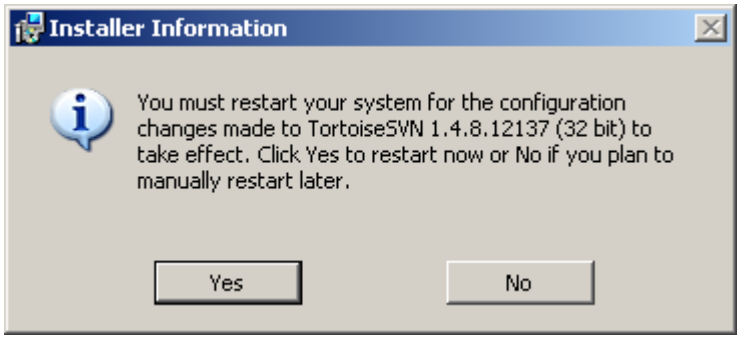
Install the components:



Close the installer. The installation has finished correctly.



Tortoise needs to reboot your computer to run correctly. Reboot your computer and continue with the following section of this eBook.

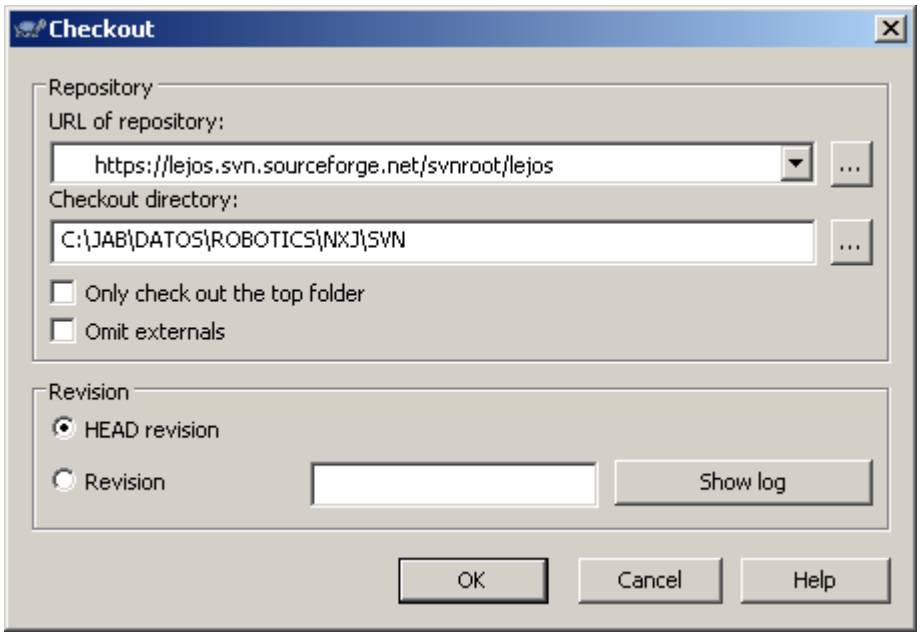


4.- Downloading LeJOS Repository

4.1.- First steps with Tortoise SVN

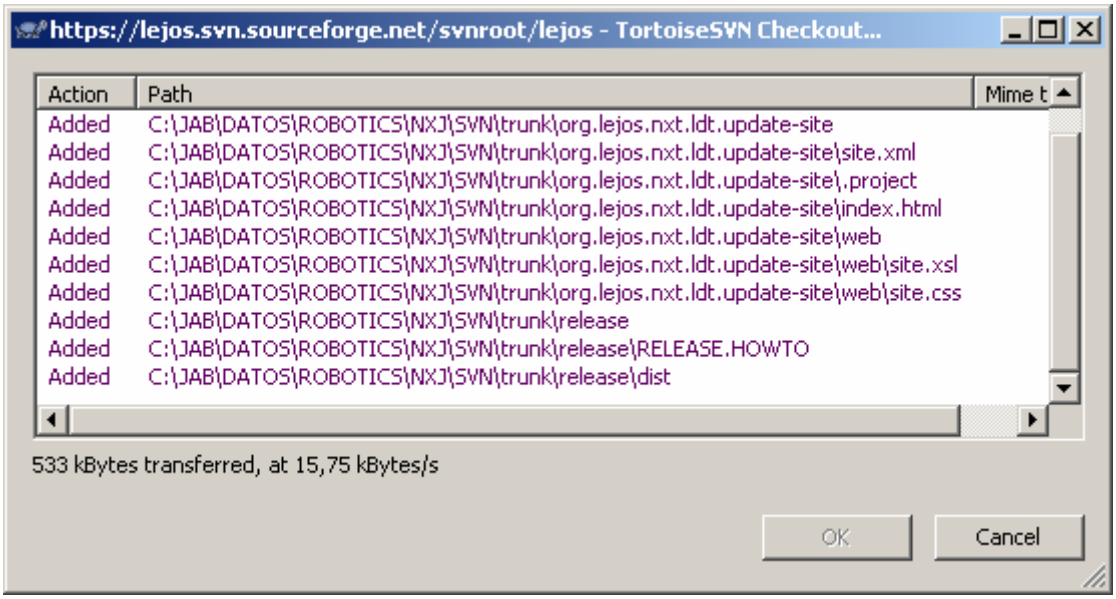
When you have rebooted your machine, if you use contextual menu in windows you can see a new icons in your Windows Explorer:

If you want to download all source code, click in the option SVN Checkout:

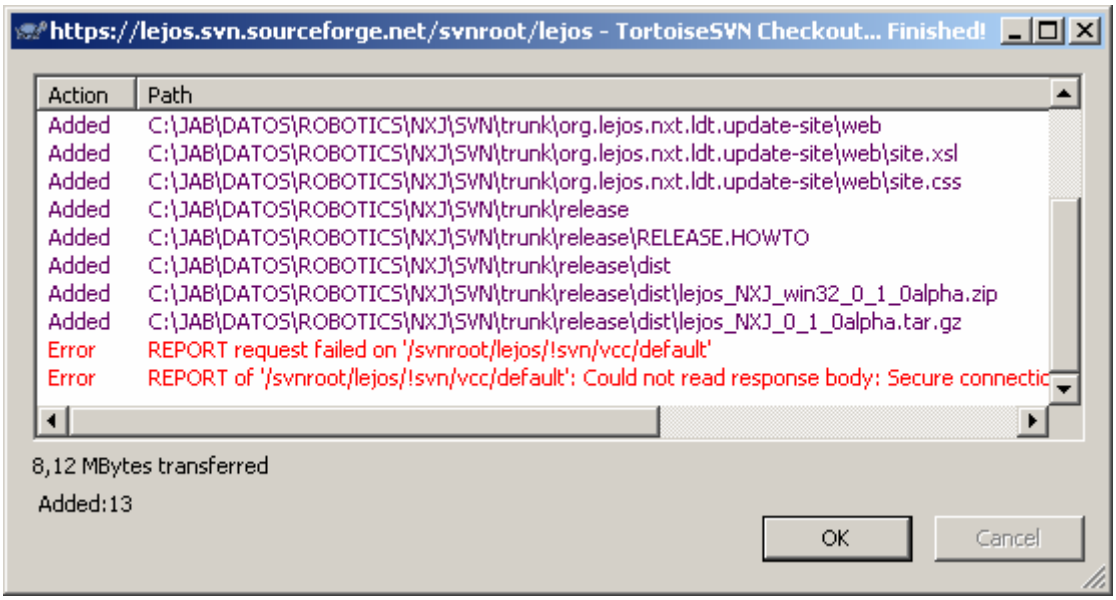


The repository URL is:
https://lejos.svn.sourceforge.net/svnroot/lejos

Select the folder where you want to download LeJOS project. Click in Ok Button to start to download then you will see a new window where you can see the files that you are downloading in your computer.

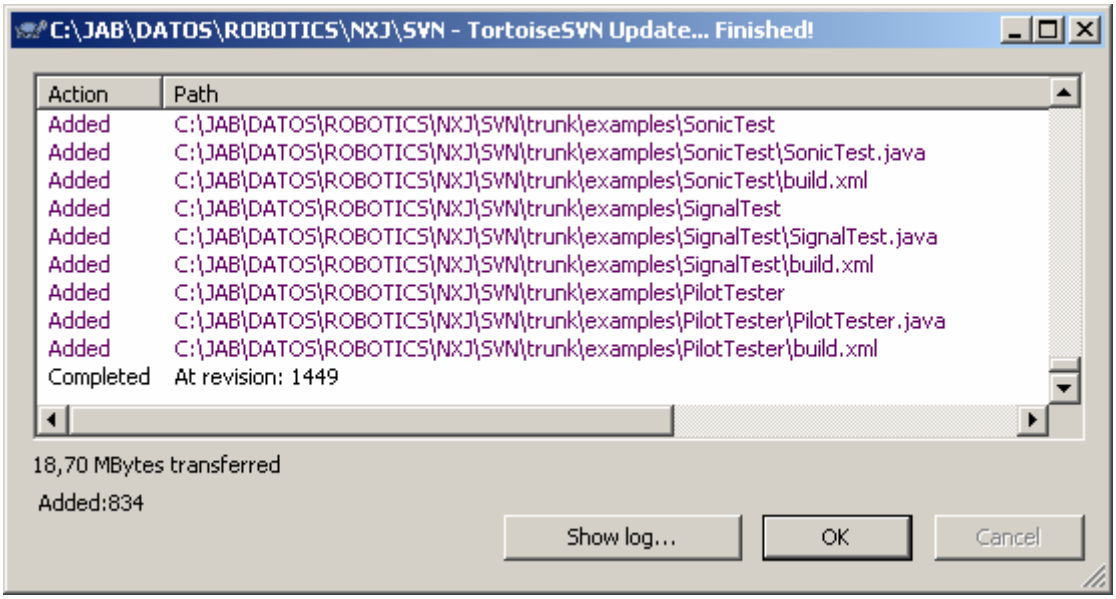


If you lost your internet connection, Tortoise has an option to continue with your download, SVN Update.



Click in SVN Update:

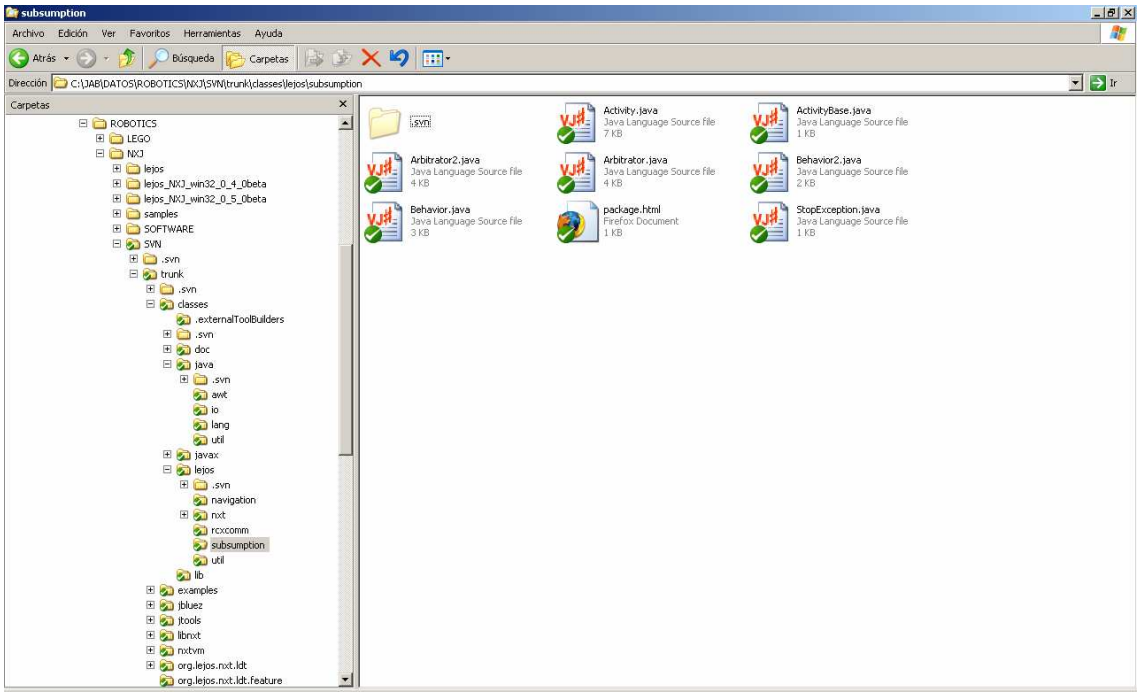
When you finish with your download, you will see this one:



5.- Using Tortoise in LeJOS

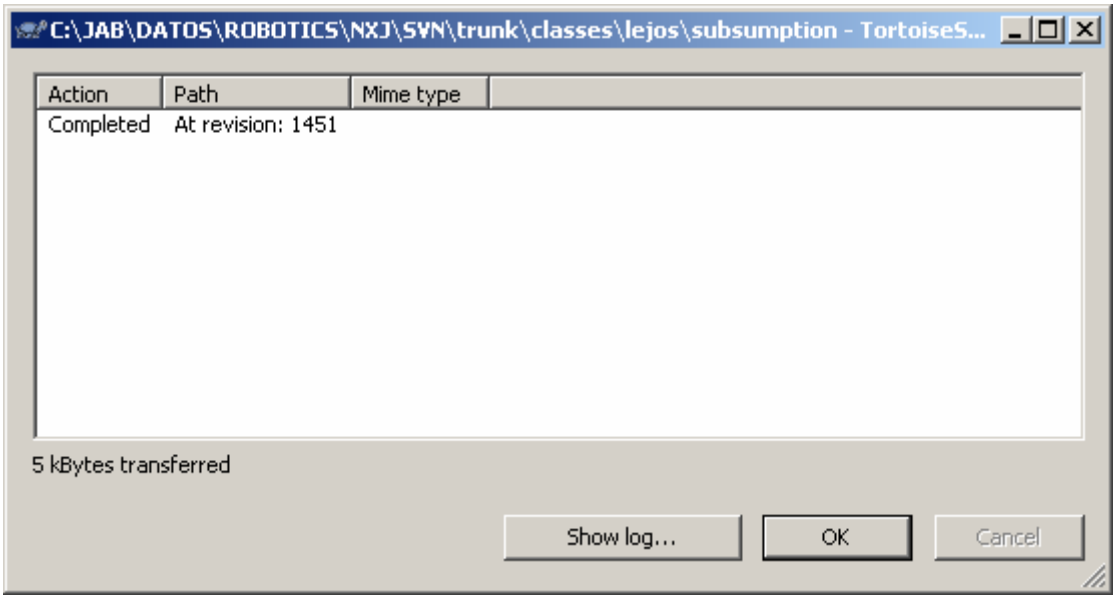
5.1.- Browsing the repository

When you have downloaded LeJOS project computer then you will see your Windows Explorer with a new icons:

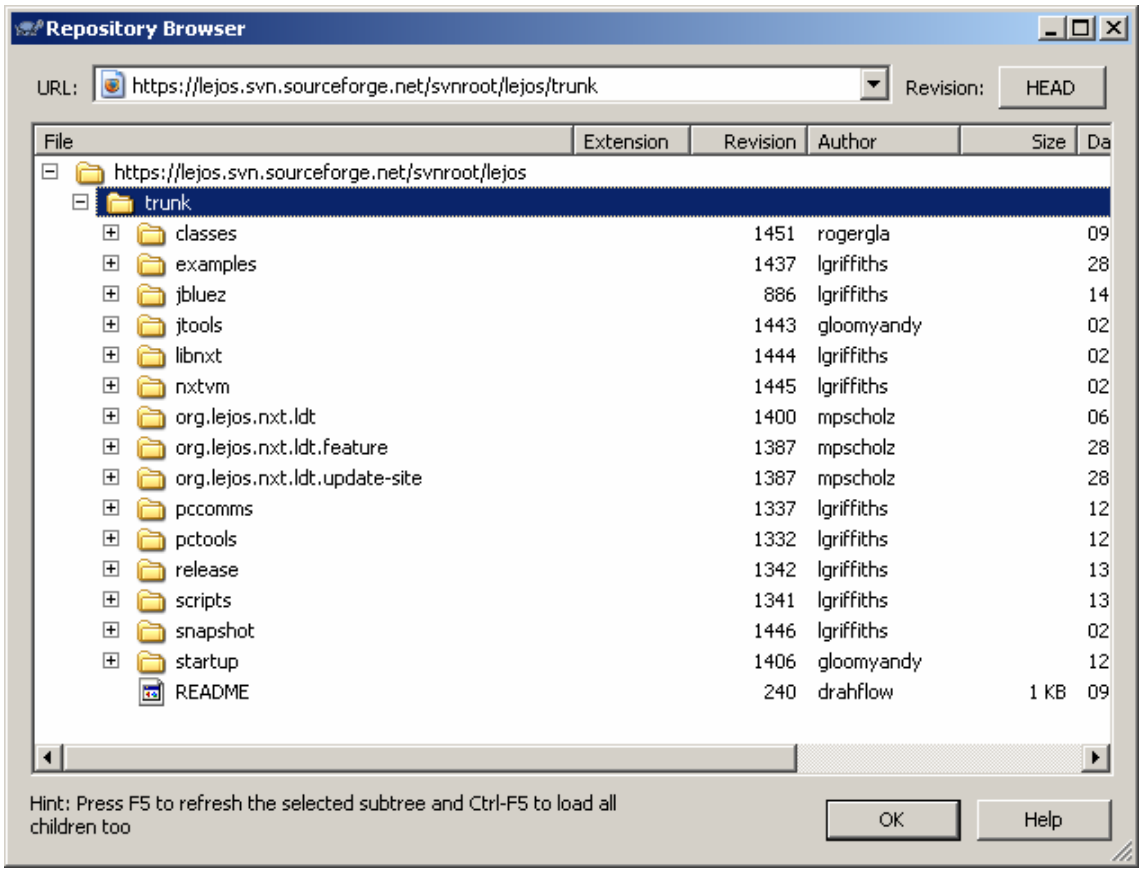


If in any moment you need to update a part of you project, simply select the folder, in this case the folder named "Subsumption" and click in the option "SVN Update"

Then you will update the folder that you have chosen.

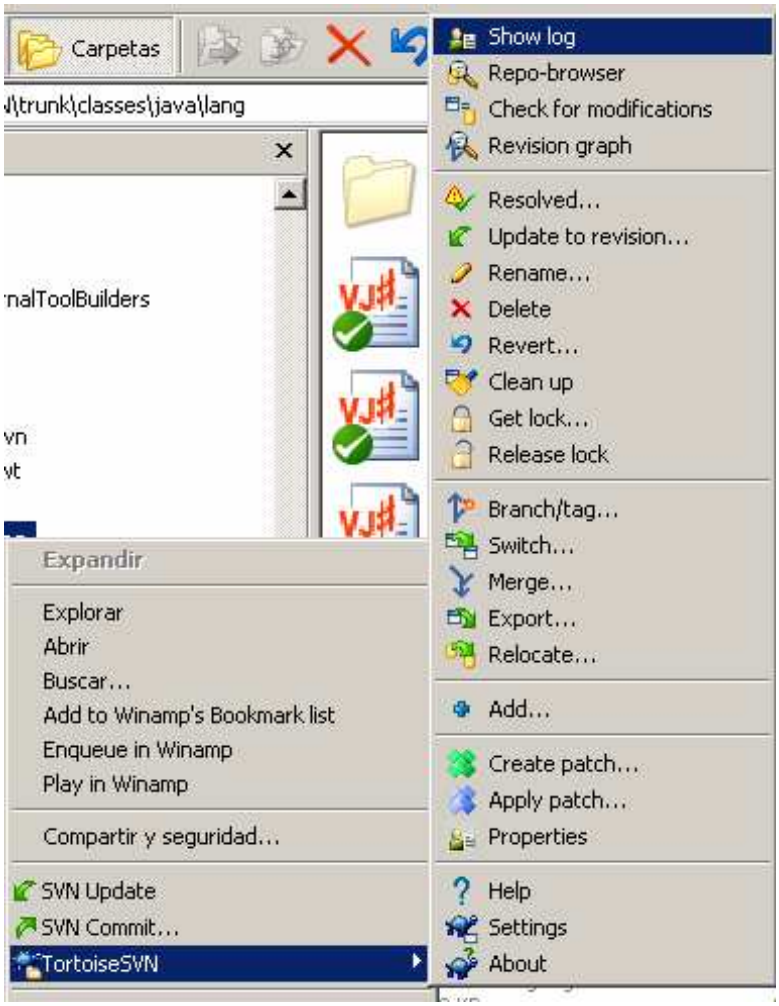


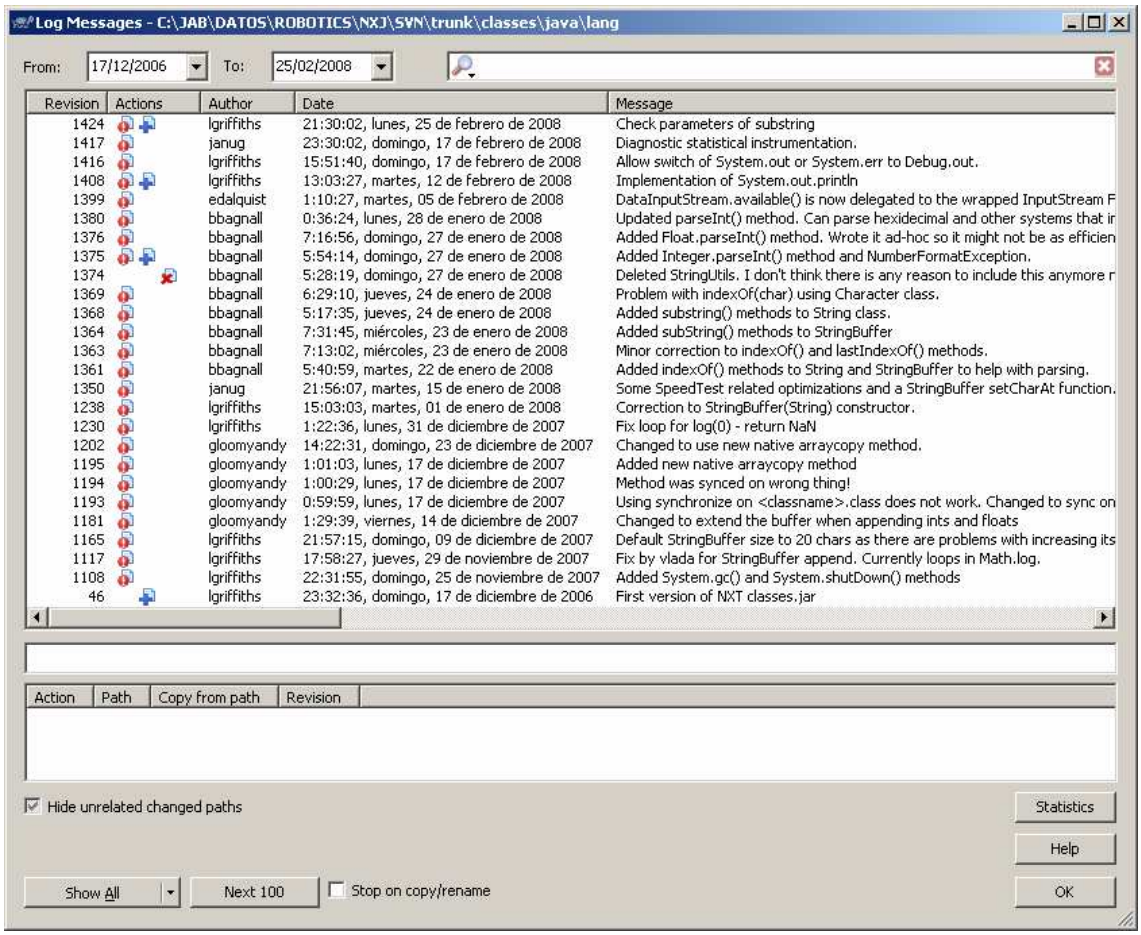
If you need to see the repository in the server, use the option "Repo-browser"



5.2.- Track the log

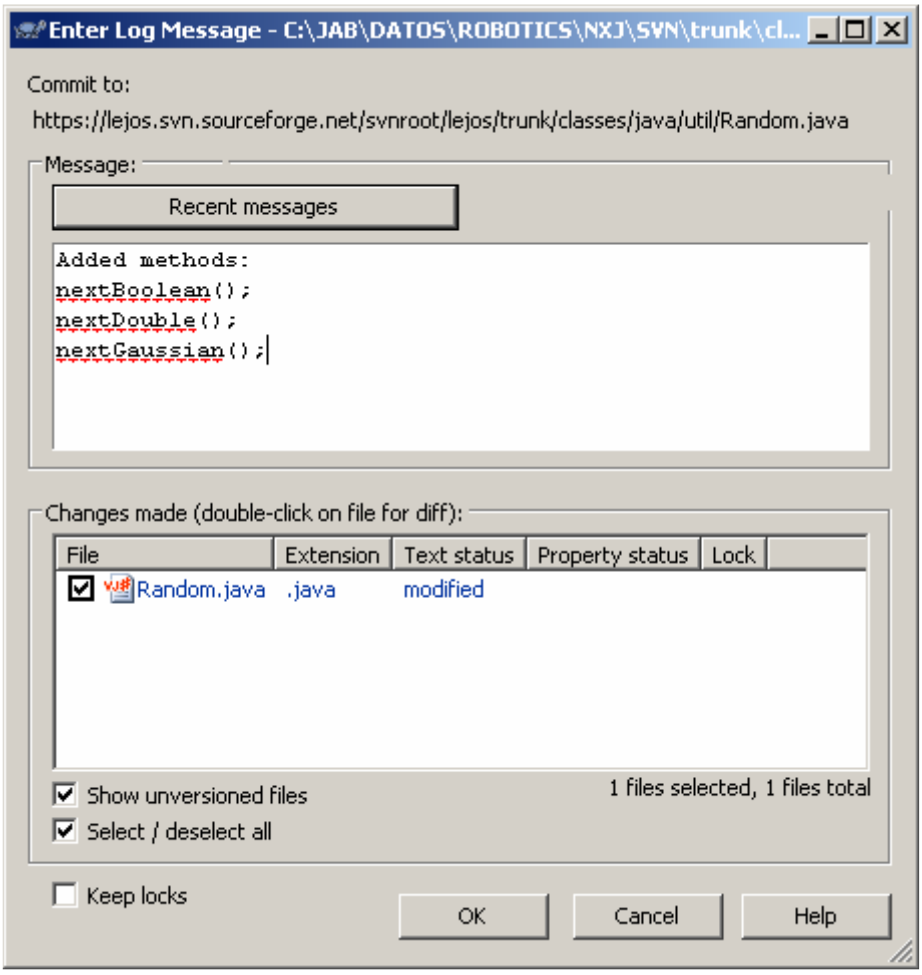
Using subversion technology, it is possible to see the Log. To learn the concept, use a classic package in LeJOS, java.lang. Select the folder lang and click in the option "See log"


Carpetas
\trunk\classes\java\lang
nalToolBuilders
vn
vt
Expandir
Explorar
Abrir
Buscar...
Add to Winamp's Bookmark list
Enqueue in Winamp
Play in Winamp
Compartir y seguridad...
SVN Update
SVN Commit...
TortoiseSVN
Show log
Repo-browser
Check for modifications
Revision graph
Resolved...
Update to revision...
Rename...
Delete
Revert...
Clean up
Get lock...
Release lock
Branch/tag...
Switch...
Merge...
Export...
Relocate...
Add...
Create patch...
Apply patch...
Properties
Help
Settings
About

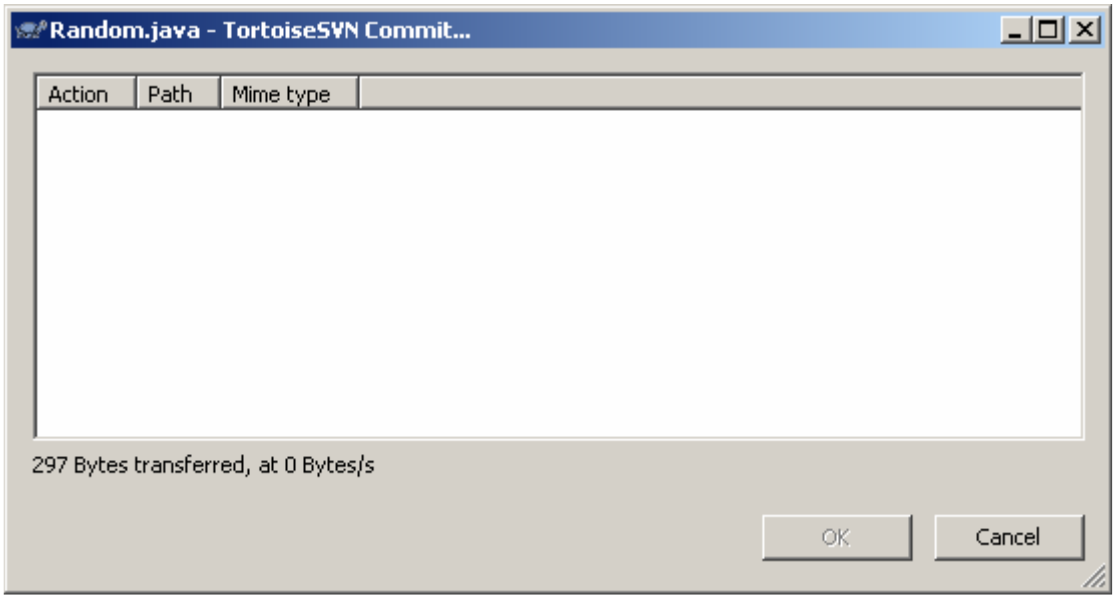


5.3.- Collaborate with new code

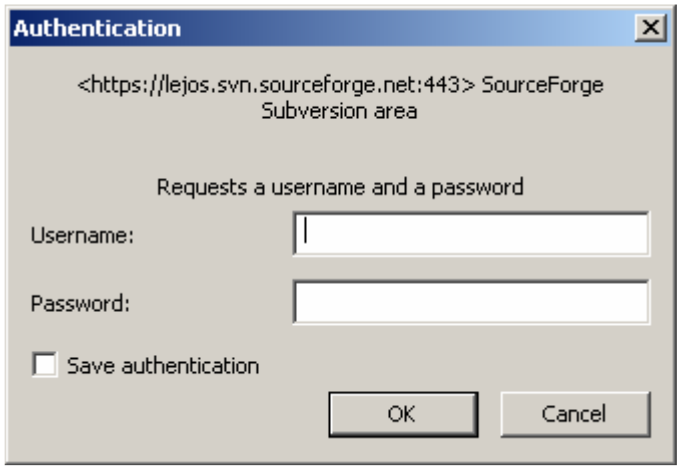
If you want to collaborate with the project then you can update your files in your local computer and click in the option "SVN Commit" then you will see the following window:



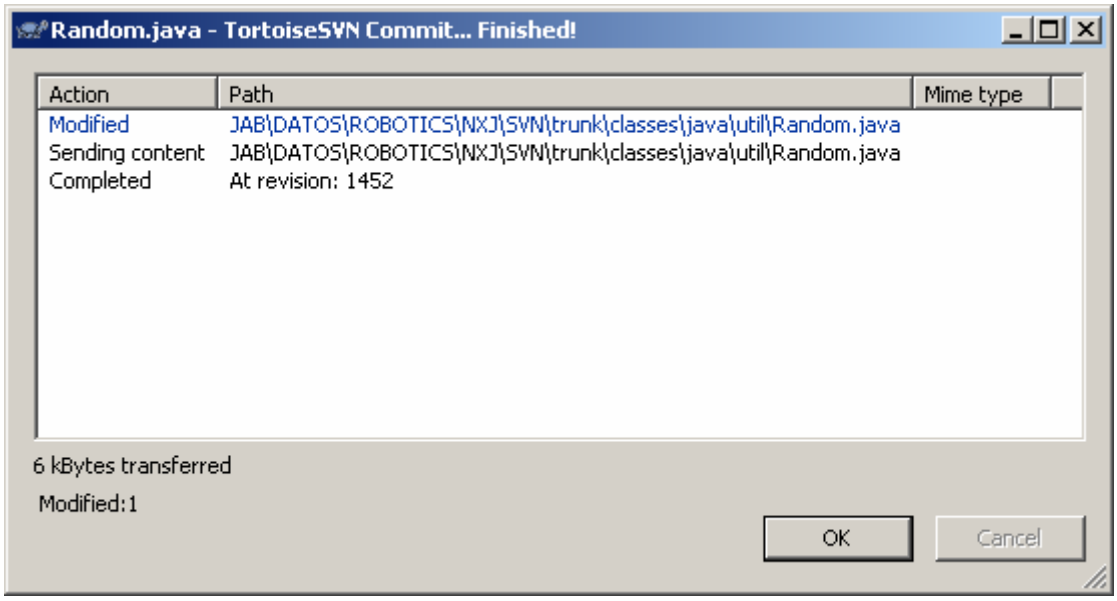
In this window, you must to write a text to explain the reasons why you update the code. Click in the Ok button to submit the code and explanation to commit the code.



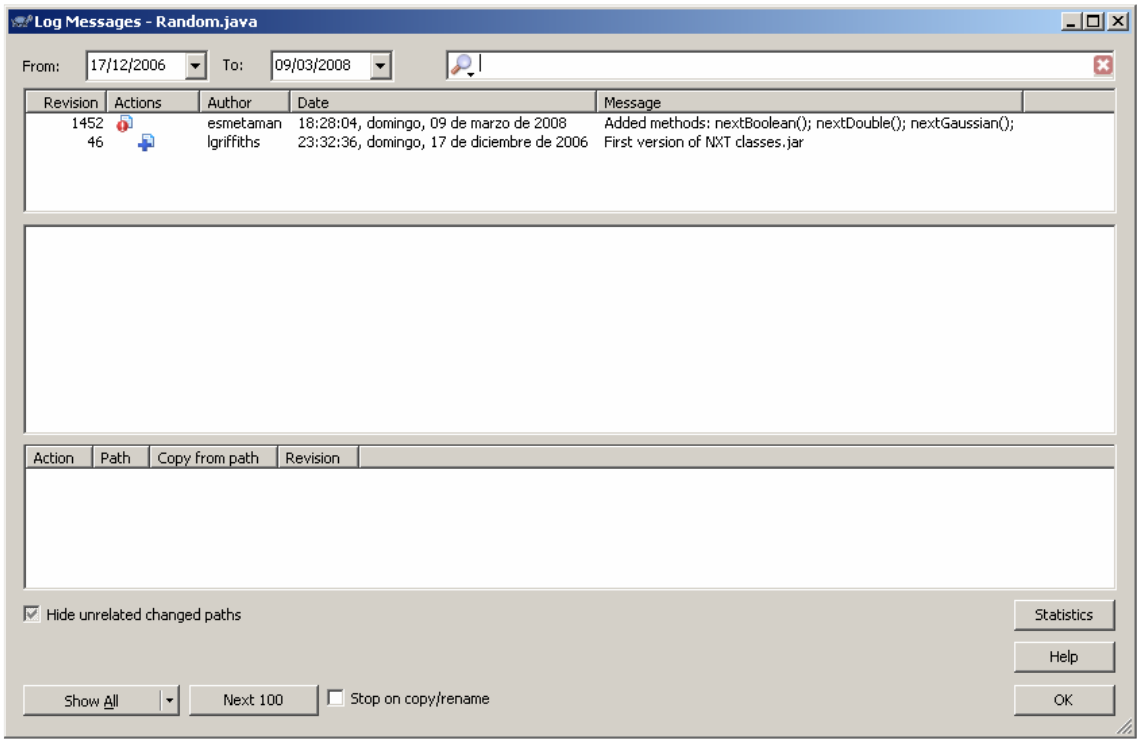
In this moment, it is necessary to login to finish the process



When you login in sourceforge then tortoise will finish the process uploading your code. At the end of the process, you will see the results:



If you check the log using the option "Show log" then you will see your coments:



6.- How to be a new LeJOS Developer

6.1.- Request a user

In previous section, we see that if you create new code, it is necessary to authenticate then you need a LeJOS user. Write us to get your LeJOS user to collaborate with us.