

## **HOW TO**

### **Develop and use CLIF ISAC PLUGINS**



**with the ECLIPSE RCP console**

**<http://clif.objectweb.org/>**

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# 1. Introduction to ISAC Plug-ins

## 1.1. What is an ISAC Plug-ins

In order to actually generate traffic on a System Under Test (SUT), we need to define a behavior. A behavior can be understood as a logical definition, a kind of a skeleton. This skeleton must be associated to one or more ISAC plug-ins. Plug-ins are external Java libraries, that are responsible for:

- performing actions (i.e. generating requests) on the SUT, using and managing specific protocols whose response times will be measured (e.g. HTTP, DNS, JDBC, TCP/IP, DHCP, SIP, LDAP);
- providing conditions used by the behaviors' conditional statements (if-then-else, while, preemptive);
- providing timers to implement delays (think time), for example with specific random distributions or computed in some arbitrary way;
- providing ad hoc controls for the plug-in itself (e.g. to change some settings);
- providing support for external data provisioning (e.g. a database of product references or a file containing identifier-password pairs for some user accounts), used as parameters by the behaviors.

## 1.2. Technical requirements

The CLIF framework and provided load injectors are 100% Java™. The current version 1.2.2 is known to be working with:

- Sun J2SDK™ 1.5 (1.5 version or greater is mandatory)
- Apache ant utility version 1.5.4 or greater
- Linux 2.4 and 2.6 kernels
- MacOS X Tiger
- Microsoft Windows XP™

System probes for Linux are also 100% Java, while system probes for Windows and MacOS X are native (C code embedded in Java code via Java Native Interface).

Since CLIF is written in Java, the only constraint about the SUT is that it must be reachable from a Java Virtual Machine (JVM), either directly or indirectly through some wrapping, gateway or native library.

There are two ways of getting a CLIF runtime environment: either by getting the whole source from the CVS repository, or by getting a ready-to-use binary distribution.

## 1.3. Ready to use distributions

CLIF's site at OW2 Forge offers several binary distributions, available as zip files:

- console-Linux  
Eclipse-RCP based standalone console for Linux/Intel.
- console-Windows  
Eclipse-RCP based standalone console for Windows/Intel.

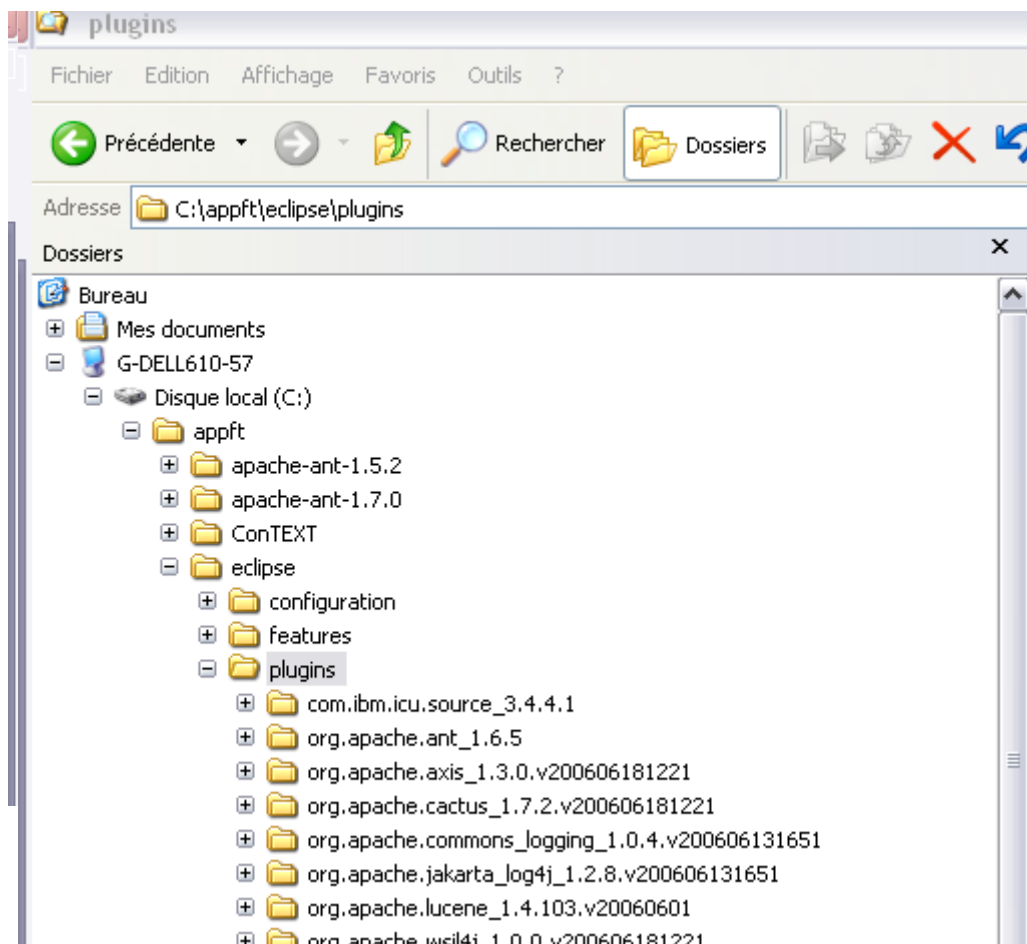
## – How To develop and use CLIF ISAC plug-ins

- console-Macosx  
Eclipse-RCP based standalone console for Windows/Intel.
- clif-plugin  
CLIF console as an Eclipse plug-in.
- isac-plugin  
ISAC editor as an Eclipse plug-in (requires CLIF console plug-in).

### 1.4. Installation

There are two ways to install the isac plug-ins development environment. The first one is to use your Eclipse environment and the second one is to use the Eclipse-RCP based standalone console.

To use your Eclipse environment you have to unzip the clif-plugin and isac-plugin archives into your Eclipse plug-ins directory.

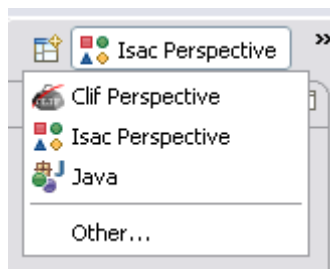


You also have to check that you Eclipse version have some required plugins. If not you can copy and paste it from the archive. Here are the required plugins :

- Directories:
  - org.apache.xerces\_2.7.0
  - org.eclipse.jem.util\_1.1.0

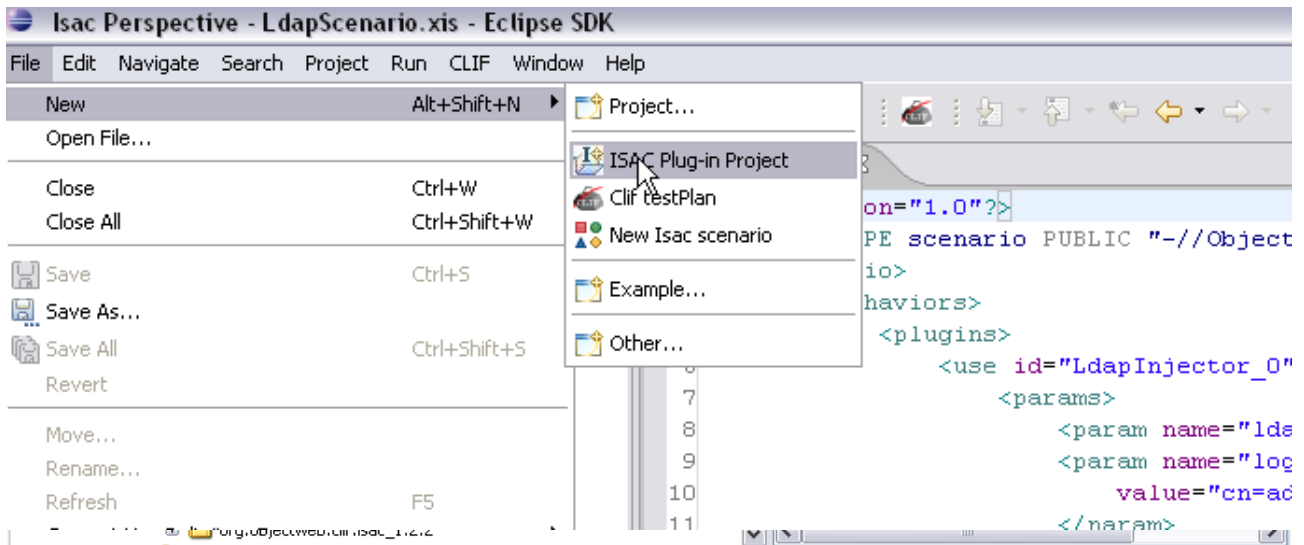
- Jar files:
  - org.eclipse.emf.common\_2.1.0
  - org.eclipse.emf.ecore.edit\_2.1.0
  - org.eclipse.emf.ecore.xml\_2.1.0
  - org.eclipse.emf.ecore\_2.1.0
  - org.eclipse.emf.edit\_2.1.0
  - org.eclipse.wst.common.emf\_1.0.0
  - org.eclipse.wst.common.emfworkbench.integration\_1.0.0
  - org.eclipse.wst.common.environment\_1.0.0
  - org.eclipse.wst.common.project.facet.core\_1.0.0
  - org.eclipse.wst.common.ui\_1.0.0
  - org.eclipse.wst.common.uriresolver\_1.0.0
  - org.eclipse.wst.common.frameworks\_1.0.0
  - org.eclipse.wst.dtd.core\_1.0.0
  - org.eclipse.wst.sse.core\_1.0.0
  - org.eclipse.wst.sse.ui\_1.0.0
  - org.eclipse.wst.validation\_1.0.0
  - org.eclipse.wst.xml.core\_1.0.0
  - org.eclipse.wst.xml.ui\_1.0.0
  - org.eclipse.xsd\_2.1.0

When you will launch Eclipse you will see CLIF options. You will also be able to pass into an ISAC perspective and to access ISAC options for creating ISAC plug-ins.



To use the Eclipse-RCP based standalone console you have to unzip the console-linux or console-Windows or console-Macosx archives (depends on your operating system).

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To launch your Eclipse-RCP based standalone console launch the `clif-console.exe` / `clif-console` (depends on your OS) file in the `clif-<version>-console` directory.

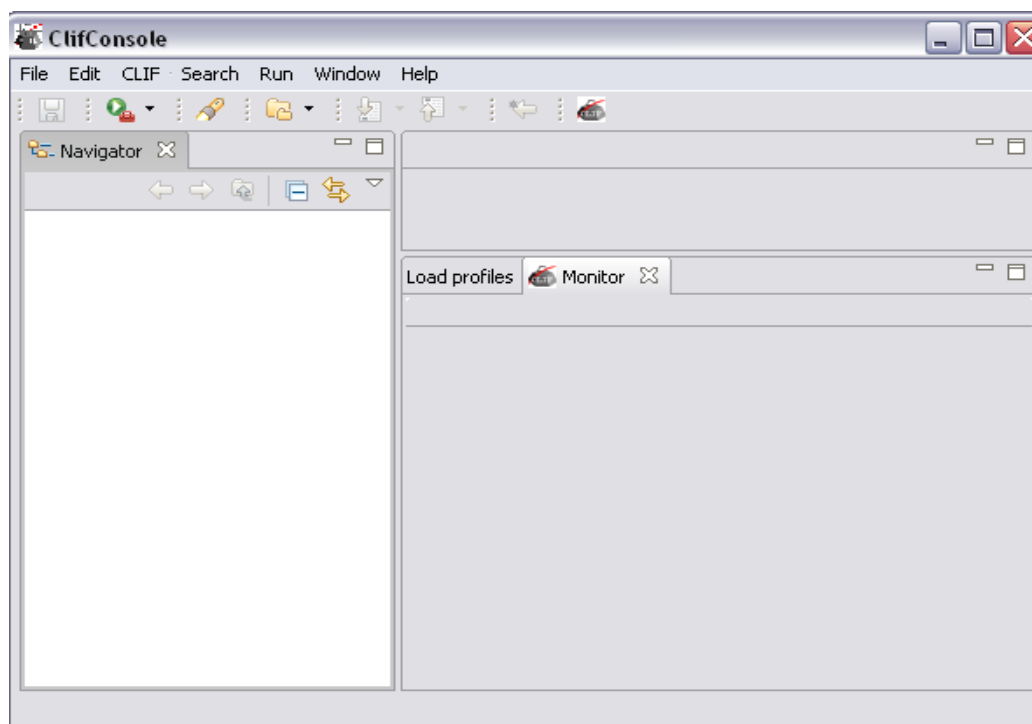
You can also launch it using command line, a number of useful options may be set on the command line :

- `-consoleLog` to see messages printed to your terminal
- `-vm /path/to/the/jvm` to set the right Java Virtual Machine to be used
- `-data my_workspace` to use a different workspace from the default one

So to launch it with console log you have to tape :

`/path/to/the/clif-<version>-console/clif-console(.exe) -consoleLog`

Now you are able to write your ISAC plug-ins using the Eclipse-RCP standalone console :



## 2. How to Define an LDAP injector writing an ISAC plug-ins

### 2.1. LDAP directory overview

LDAP is a lightweight directory access protocol described in RFC 2251-2256,2829-2830, It defines a lightweight access mechanism in which clients send requests to and receive responses from LDAP servers.

LDAP enabled directories use a data model that **assumes** or **represents** the data as a hierarchy of objects. This does not imply that LDAP is an object-oriented database. As pointed out above, LDAP itself is a protocol that allows access to an LDAP enabled service and does not define how the data is stored - but the operational primitives (read, delete, modify) operate on a model (description) of the data that has object-like characteristics (mostly).

#### Object Tree Structure :

Data are represented in an LDAP enabled directory as a hierarchy of objects, each of which is called an entry. The resulting tree structure is called a Data Information Tree (DIT). The top of the tree is commonly called the root (a.k.a **base** or **suffix**).

Each **entry** in the tree has one parent entry (object) and one or more child entries (objects). Each child entry (object) is a sibling of its parent's other child entries.

Each entry is composed of (is an instance of) one or more objectClass. **ObjectClasses** contain zero or more attributes. Attributes have names (and sometimes abbreviations or aliases) and typically contain data (at last!).

#### Summary:

1. Each **Entry** is composed of one or more **objectClasses**
2. Each **objectClass** has a name and contains **Attributes**.
3. Each **Attribute** has a name, usually contains data and is a member of an **object class**.

#### Attributes :

Each **attribute** has a name and normally contains data. **Attributes** are always associated with (are members of) one or more **ObjectClasses**. **Attributes** have a number of interesting characteristics:

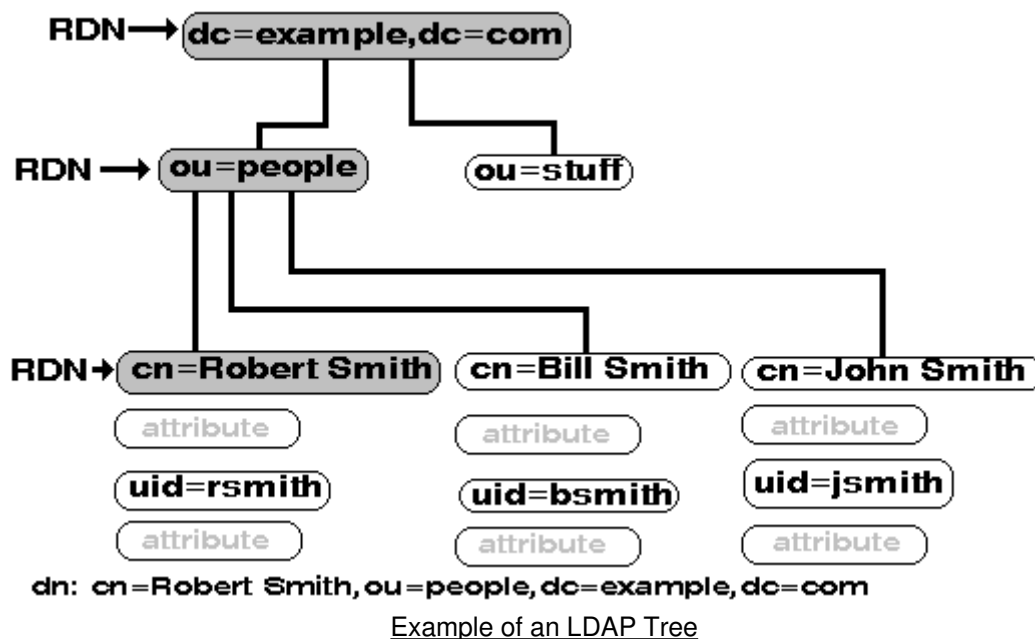
1. All **attributes** are members of one or more **objectclass(es)**
2. Each **attribute** defines the data type that it may contain.
3. **Attributes** can be optional or mandatory.
4. **Attributes** can have single or multi values,
5. **Attributes** have names and sometimes aliases or abbreviations.
6. At each level in the hierarchy the data contained in one **attribute** should uniquely identify the **entry**. It can be any **attribute** in the entry. It can even be a combination of two or more attributes.

#### ObjectClass :

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ObjectClasses are essentially packages of **attributes**. There are a confusing number of pre-defined **objectClasses**, each of which contains bucket-loads of **attributes** for almost all common or garden applications. But of course the one you NEED is never defined! **objectclasses** have two more characteristics:

1. The **objectclass** defines whether an attribute member **MUST** (mandatory) be present or **MAY** (optional) be present.
2. The **objectclass** may be part of a hierarchy in which case it **inherits** all the characteristics of its parent **objectclasses**.



## 2.2. How to Write a LDAP Injector ISAC Plug-in

Writing your own ISAC plug-in is a simple way to customize the injection capabilities of ISAC, still relying on the generic language for defining behaviors and load profiles. Writing an ISAC plug-in basically consists in defining a Java class that encapsulates (a part of) the state of each behavior instance, and provides specific methods for:

- instantiating new *session objects* for new behavior instances;
- implementing load injection primitives;
- implementing timer primitives (e.g. to implement think times);
- implementing external data provisioning;
- implementing condition primitives;
- session object control primitives.

The primitives offered by an ISAC plug-in, as well as a GUI-oriented description for its parameters, are declared through 3 descriptor files:

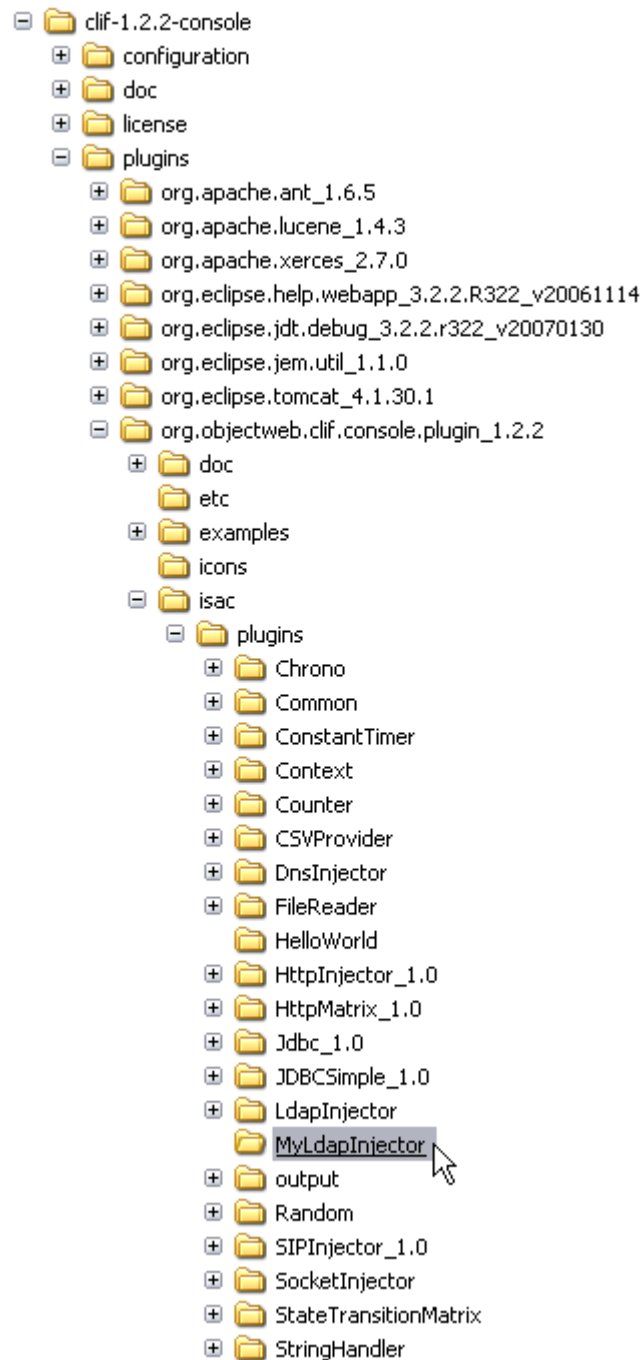


- `plugin.properties` specifies Java properties `plugin.name`, `plugin.xmlFile` and `plugin.guiFile` to respectively set the ISAC plug-in name, the name of the XML file describing the list of primitives and parameters, and the name of the XML file describing the GUI concerns. Usual values for these file names respectively are `plugin.xml` and `gui.xml`.
- `plugin.xml` (or any other name as specified in `plugin.properties` file)
- `gui.xml` (or any other name as specified in `plugin.properties` file)

### **2.2.1. How to Create an Isac Plug-in project**

To add a new ISAC plug-in, you must create a directory in subdirectory `isac/plugins` of the CLIF execution environment. For our example we will create a `MyLdapInjector` directory.

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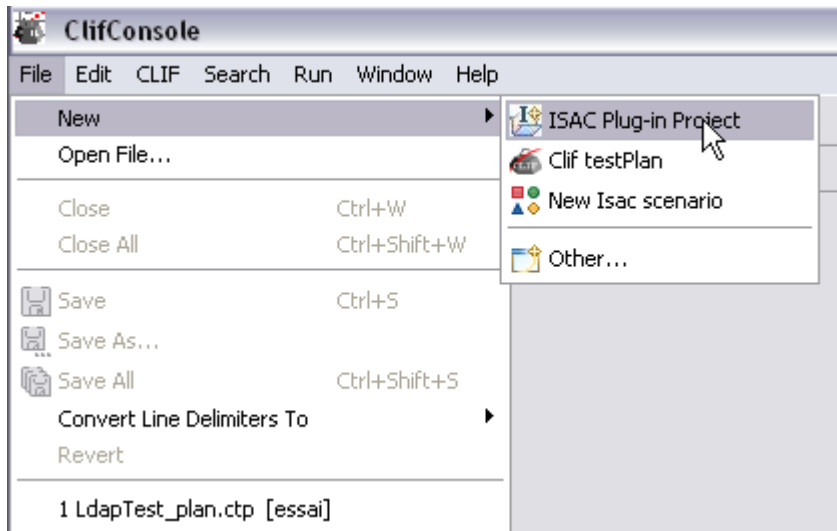


To be able to act on an LDAP directory we need some specific librairies. You have to get ldap.jar and utilities.jar. You can get these librairies into the LdapInjector/lib diectory, Once you have them, create repertory lib in MyLdapInjector and paste them into it.

Dossiers		Nom	Taille	Type	Date de modification
LdapInjector	lib	ldap.jar	432 Ko	Executable Jar File	15/06/2007 11:32
		utilities.jar	42 Ko	Executable Jar File	15/06/2007 11:32

From the Eclipse-RCP standalone console you can use the ISAC plug-in creation Wizard :

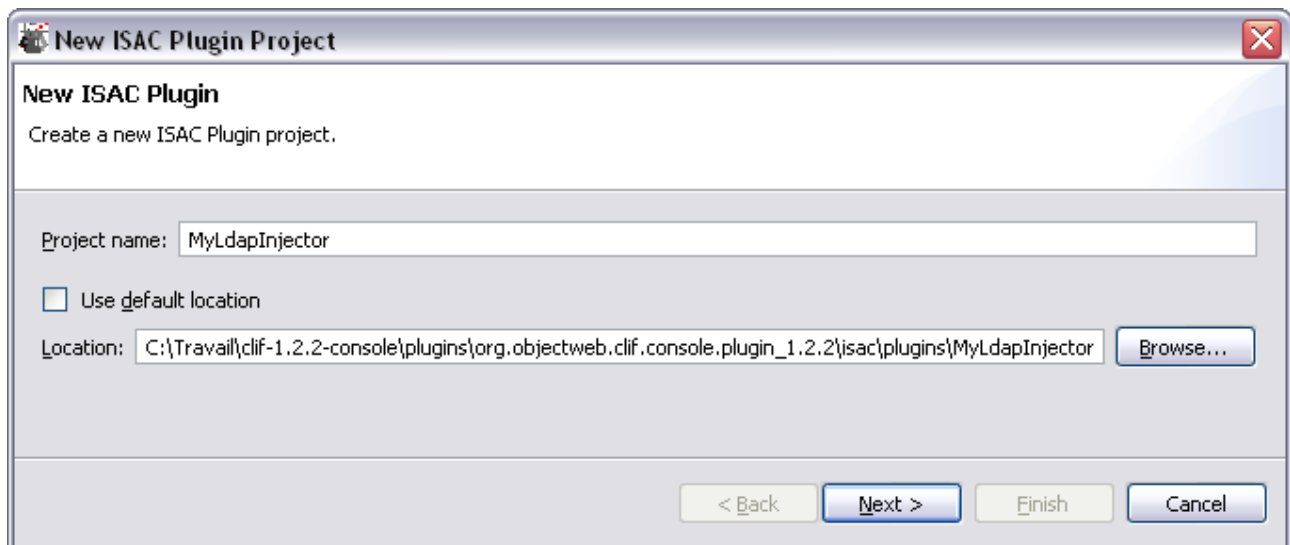
Click on : File > New > ISAC Plug-in Project



Enter your project name : in our case MyLdapInjector

Enter your project location (refer to the repertory that you created before). In our case the location is :

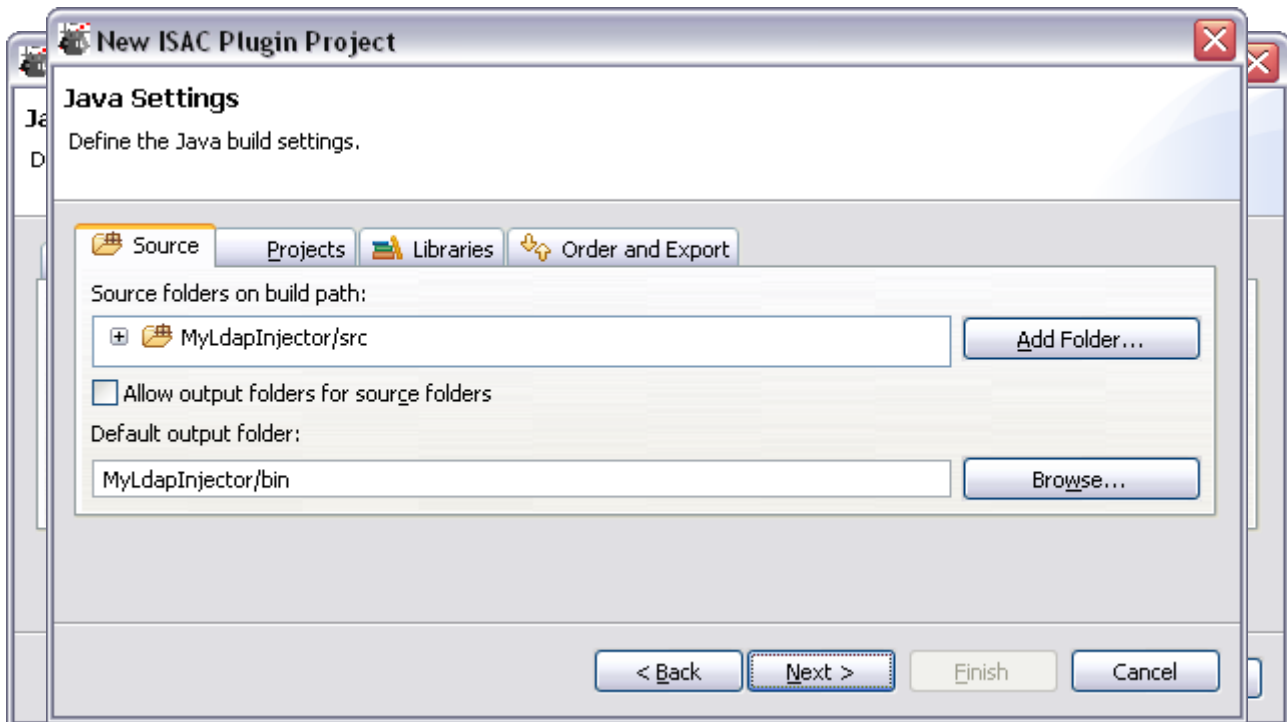
/path/to/the/eclipseStandAloneConsole/clif-<versions>-  
console/plugins/org.objectweb.clif.console.plugin\_1.2.2/isac/plugins/MyLdapInjector



Click on the Next button.

In the java settings, you have to add LDAP librairies (ldap.jar and utilities.jar) to your classpath.

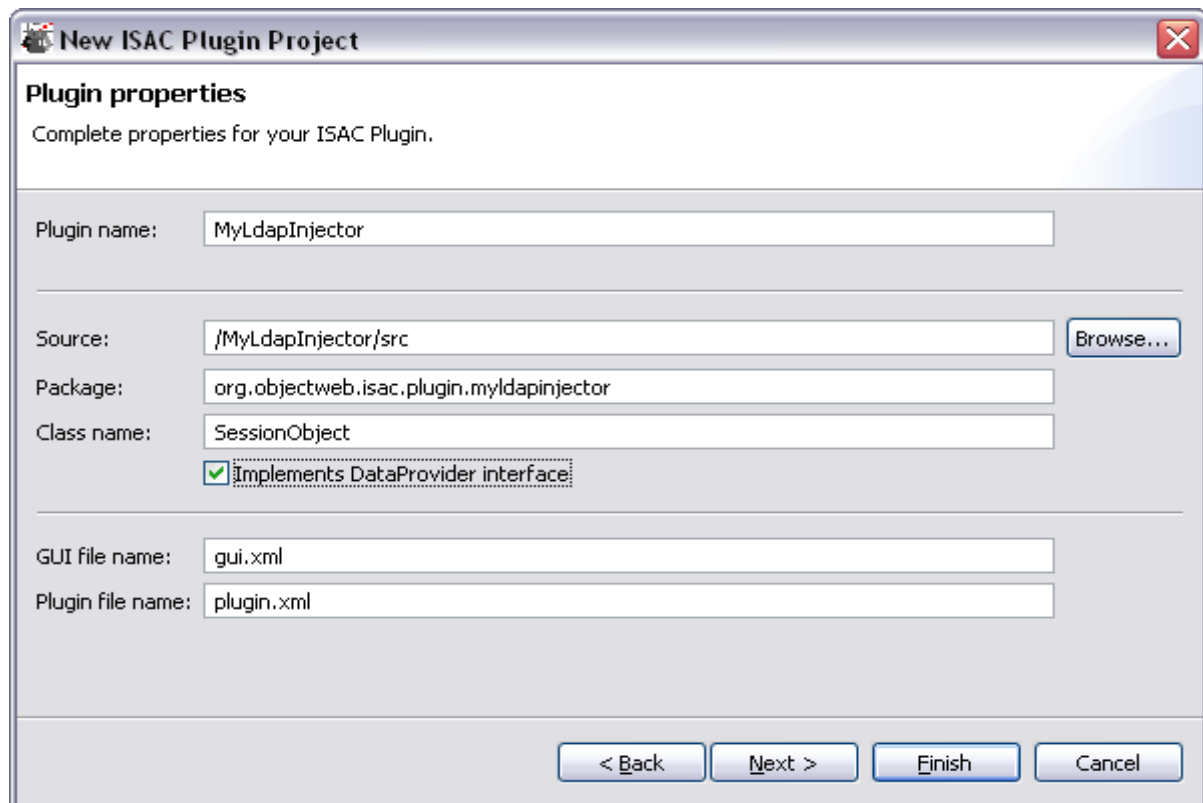
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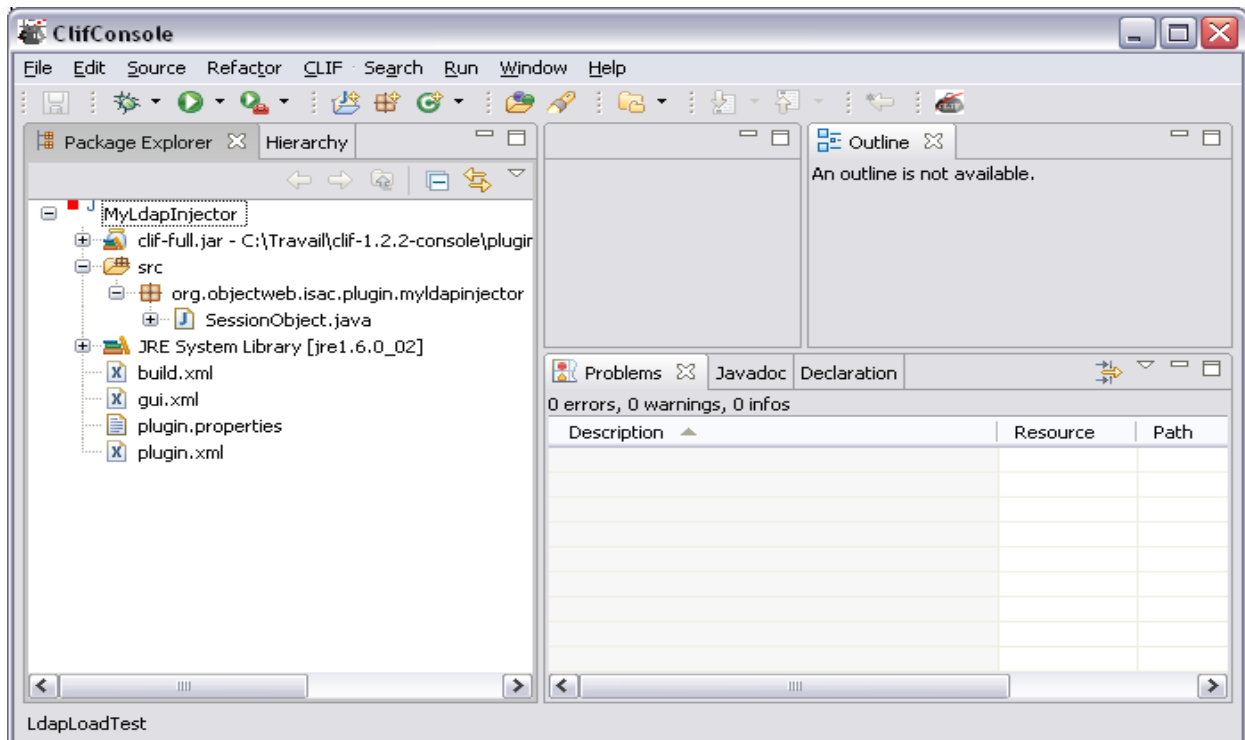
Click on the Next button.

Set the plugin properties. Most of them have default values.

You will need to tick the Implements DataProvider interface box if your plugin have to provide data.



You can now click on the Finish button. The Eclipse Isac perspective will be loaded. It is recommended to click on Finish now to be sure that all settings will be saved in case of an Eclipse crash.



## 2.2.2. Writing your ISAC plug-ins

### Descriptor files overview

The plugin.properties files :

```
plugin.name=MyLdapInjector
plugin.guiFile=gui.xml
plugin.xmlFile=plugin.xml
```

The plug-in descriptor file specifies (plugin.xml by default):

- the plug-in name, which must match the plug-in's directory name,
- the associated session object class and the initial settings parameters, with some help
- the samples, controls, conditions and timers with their parameters and help.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plugin PUBLIC "-//objectweb.org//DTD CLIF Isac 1.0//EN"
"classpath:org/objectweb/clif/scenario/isac/dtd/plugin.dtd">

<plugin name="MyLdapInjector">
  <object class="org.objectweb.isac.plugin.myldapinjector.SessionObject">
    <params></params>
    <help>Give object help.</help>
  </object>
```

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```
</plugin>
```

The user interface descriptor file (gui.xml by default) adds explicit labels to primitives and parameters, and associates each parameter to GUI-related information. Possible graphical widgets are available through the following tags : radiobutton, field, checkbox, nfield (variable number of fields), combo. Parameters may also be visually grouped together with the group tag. The parameter value resulting from a nfield widget is the concatenation of the variable number of fields separated by one ';' character.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE gui PUBLIC "-//objectweb.org//DTD CLIF IsacGUI 1.0//EN"
"classpath:org/objectweb/clif/scenario/isac/dtd/gui.dtd">

<gui>
  <object name="SessionObject">
    <params></params>
  </object>
</gui>
```

The Eclipse wizard also creates a build.xml file which will be used when you will use the ant isac-clean and ant isac-plugins tasks of the build.xml file present in the following directory :

clif-<version>-consoleplugins\org.objectweb.clif.console.plugin\_<plugin\_version>

This XML file contains several ant tasks :

```
<?xml version="1.0" encoding="UTF-8"?>
<project name="ISAC-plugin_MyLdapInjector" default="compile">
  <!-- This build.xml file must be called from CLIF main build.xml file. 4
  properties are provided by CLIF main build.xml file:
    - libext.dir, all Jars used by the plugin must be copied to this
  directory
    - clif.classpath, classpath for full CLIF runtime library
    - build.dir, build directory (where classes must be generated and
  necessary resource files,
    if any, must be copied)
  - isac.dir, ISAC root directory -->
  -
  <!-- General Configuration -->
  <property
    name="plugin.dir" value="${isac.dir}/plugins/MyLdapInjector">
  </property>
  <!-- classpath definition -->
  <path id="plugin.compile.classpath">
    <pathelement path="${clif.classpath}"></pathelement>
    <pathelement path="${build.dir}"></pathelement>
  </path>
  <target name="compile">
    <javac
      srcdir="${plugin.dir}/src" destdir="${build.dir}"
      classpathref="plugin.compile.classpath">
    </javac>
    <copy todir="${build.dir}/MyLdapInjector">
      <fileset
        dir="${plugin.dir}"
        includes="plugin.properties,plugin.xml,gui.xml">
      </fileset>
```

```

    </copy>
  </target>
  <target name="clean"></target>
</project>

```

## The SessionObject Class overview

The last file generated by the Eclipse wizard is the SessionObject.java file. This Java class implements the SessionObjectAction interface to handle replication of specimens for creation of session objects that will be actually associated to behavior instances (method createNewSessionObject()). This interface is also used for freeing resources used by session objects before they are discarded (method close()), and recycling old session objects into fresh ones (method reset()).

```

package org.objectweb.isac.plugin.myldapinjector;

import org.objectweb.clif.scenario.isac.plugin.SessionObjectAction;
import java.util.Hashtable;
import org.objectweb.clif.scenario.isac.plugin.DataProvider;
import org.objectweb.clif.scenario.isac.exception.IsacRuntimeException;

/**
 * Implementation of a session object for plugin ~MyLdapInjector~
 */
public class SessionObject implements SessionObjectAction, DataProvider {

    /**
     * Constructor for specimen object.
     *
     * @param params key-value pairs for plugin parameters
     */
    public SessionObject(Hashtable params) {}

    /**
     * Copy constructor (clone specimen object to get session object).
     *
     * @param so specimen object to clone
     */
    private SessionObject(SessionObject so) {}

    //////////////////////////////////////
    // SessionObjectAction implementation //
    //////////////////////////////////////

    /**
     * @see
     org.objectweb.clif.scenario.isac.plugin.SessionObjectAction#createNewSessionObject()
     */
    public Object createNewSessionObject() {
        return new SessionObject(this);
    }

    /**
     * @see org.objectweb.clif.scenario.isac.plugin.SessionObjectAction#close()
     */

```

```
public void close() {}

/**
 * @see org.objectweb.clif.scenario.isac.plugin.SessionObjectAction#reset()
 */
public void reset() {}

////////////////////////////////////
// DataProvider implementation //
////////////////////////////////////

/**
 * @see org.objectweb.clif.scenario.isac.plugin.DataProvider#doGet()
 */
public String doGet(String var) {
    throw new IsacRuntimeException("Unknown parameter value in
~MyLdapInjector~ ISAC plugin: " + var);
}
}
```

## LDAP injector primitives

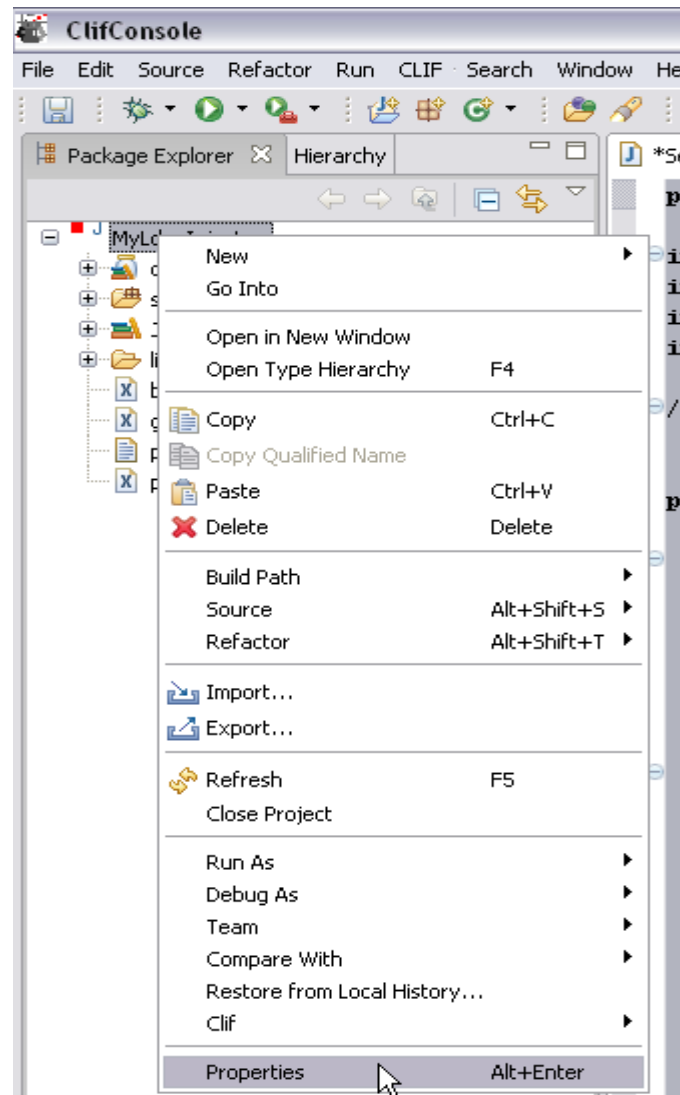
Now we can define all the primitives of our LDAP injector. In this tutorial only two primitives will be define :

- Connection : connection to the LDAP directory (bind)
- CloseConnection : close the connection to the LDAP directory (unbind)

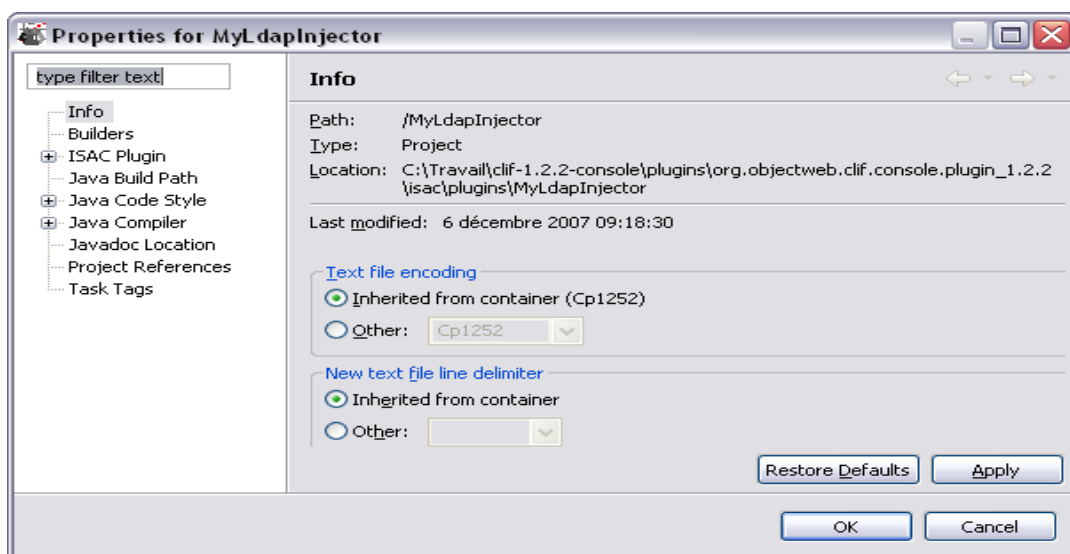
To define these primitives we will use the Eclipse wizard.

Right click on the MyLdapInjector project, then click on properties :



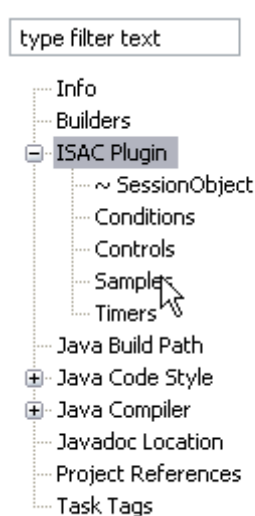


The following window appears :



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Now with the ISAC Plugin menu you will be able to define :

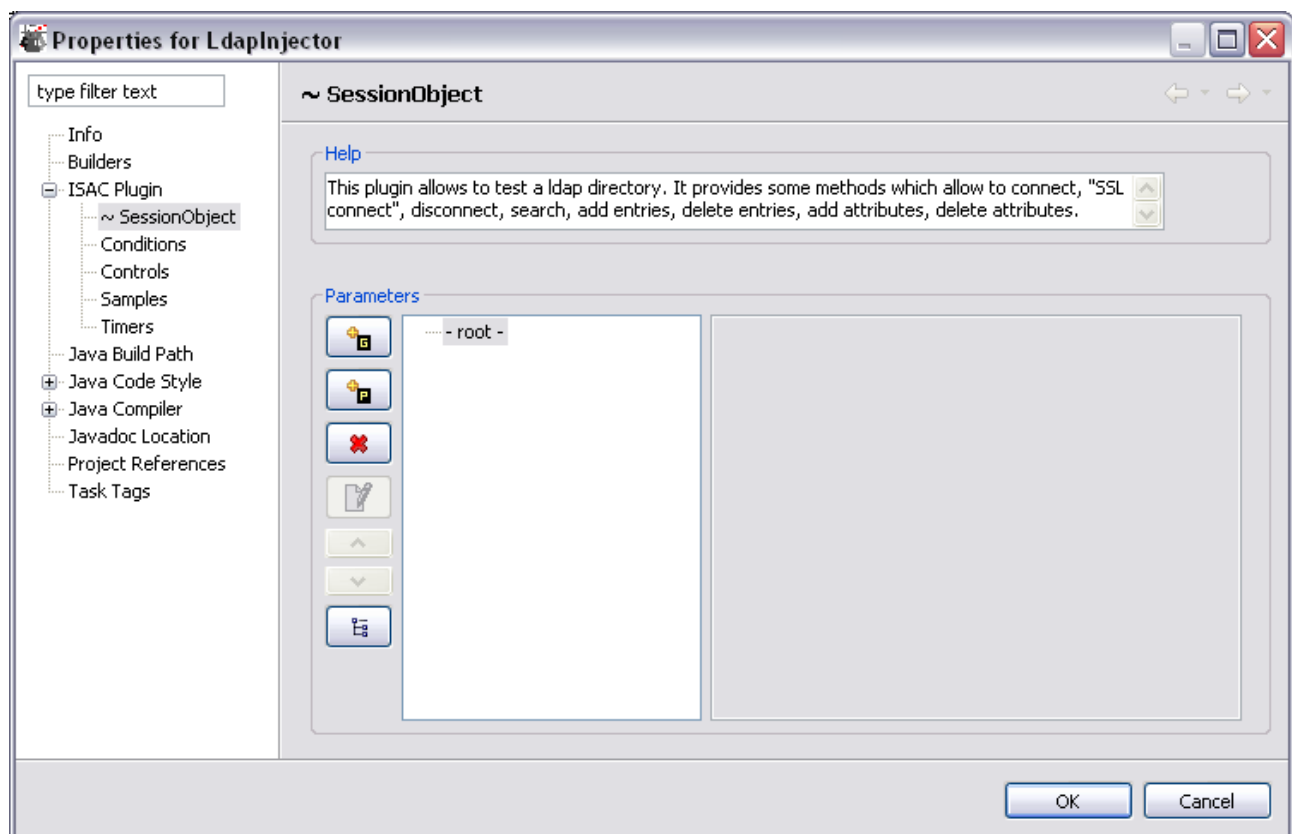


- SessionObject
- Conditions
- Controls
- Sample
- Timers


### Session object

In the session object, global attributes of the LdapInjector will be defined.

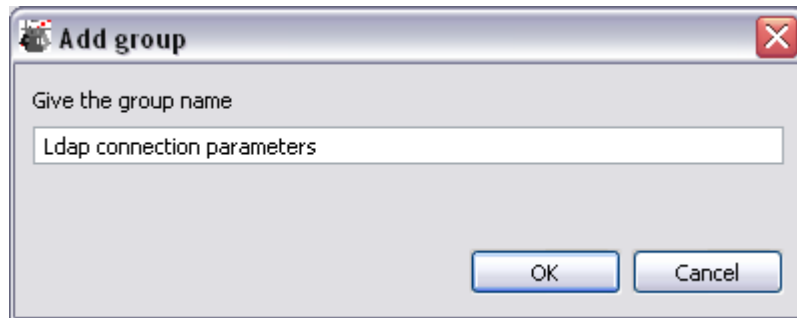
First of all, you have to write the definition of your LDAP injector. This definition will be displayed in the help contextual menu when you will define your ISAC scenario.




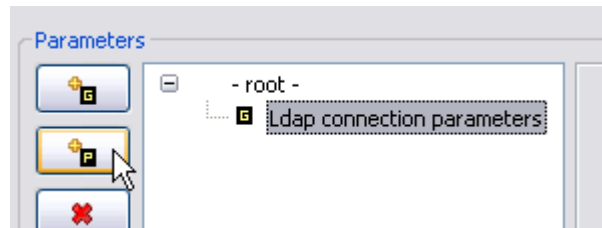
After adding contextual help you can define groups of global parameters. For example, you can define a group that contain severals parameters.

Click on  to add a group in the session object.

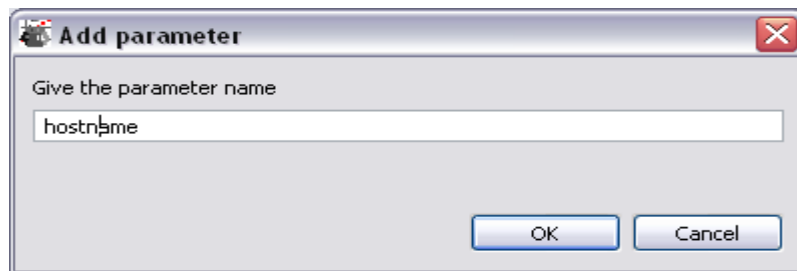
Give the  group name :




Then you can add several parameters into the group that you have created. First of all, select it, and then click on 



Give the parameter name :



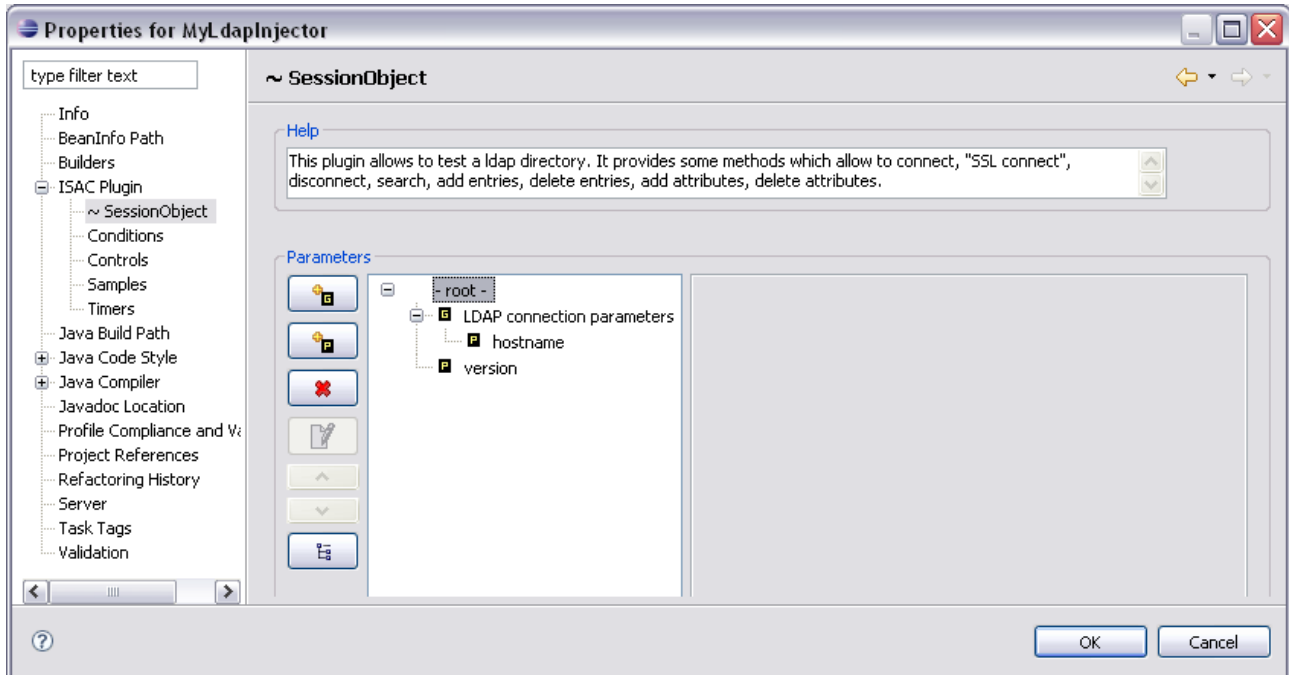
Do it with all your parameters.

If you want to add parameters which are not connection parameters you have to click first on “root” and then on 

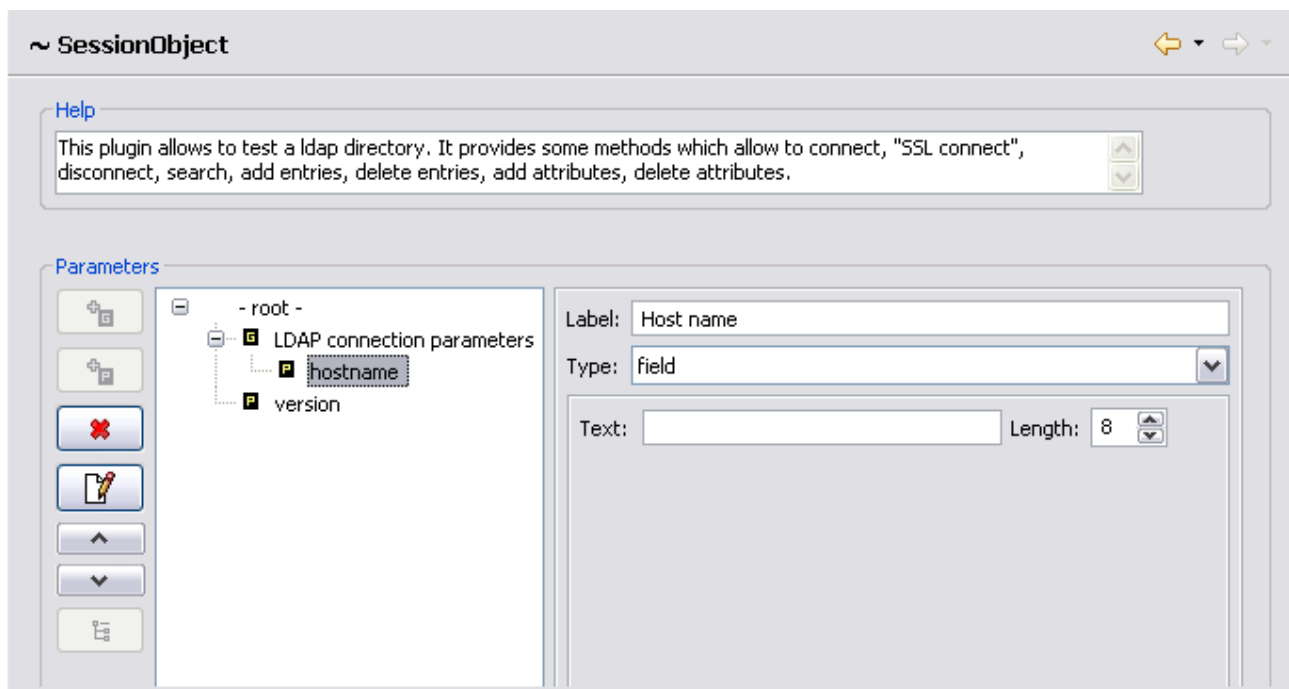
Finally you will have something like that :

Now you have to give each parameter a name, a type, a default text value if necessary, a list of values, depending of the parameters you are defining.

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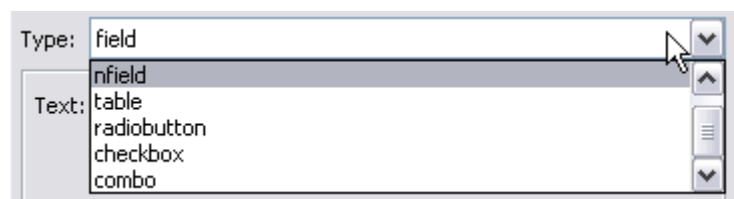


Click on the parameter you want to define :



To choose the parameter's type there is a list of choice :

- field
- nfield
- table
- radio button
- checkbox
- combo



In your case (LDAP injector) you will choose field type for all parameters.

So you just have to define a Label (this will be the label displayed when you will write your ISAC scenario), the type, a text if our parameter has a default value and a length (this length represents the size of the input text field of the isac scenario wizard).

These actions with the wizard modify :

- SessionObject.java class adding attributes :

```
static final String PLUGIN_VERSION = "version";
static final String PLUGIN_HOSTNAME = "hostname";
```

- plugin.xml file adding parameters :

```
<params>
  <param name="hostname" type="String"></param>
  <param name="version" type="String"></param>
</params>
```

- gui.xml files adding parameters :

```
<params>
  <group name="Ldap connection parameters">
    <param label="Host name" name="hostname">
      <field text="" size="8"></field>
    </param>
  </group>
  <param label="LDAP version" name="version">
    <field text="" size="8"></field>
  </param>
</params>
```

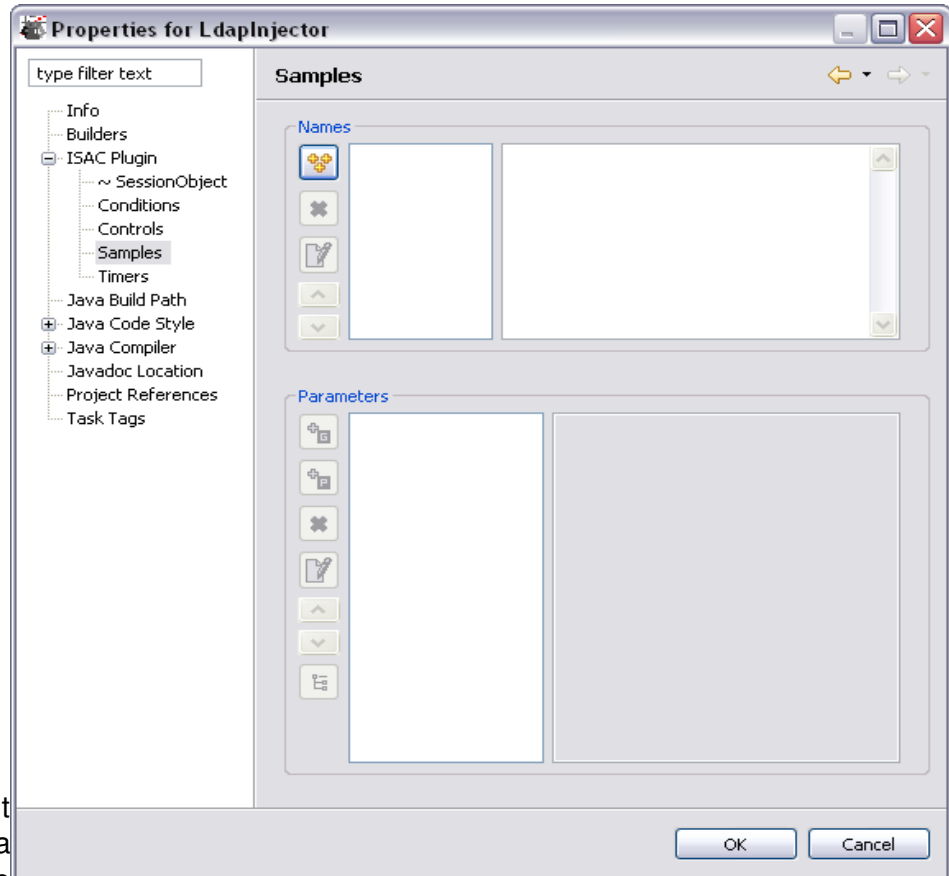
## Adding Samples



To add samples is to define primitives of LDAP injector. These primitives are :

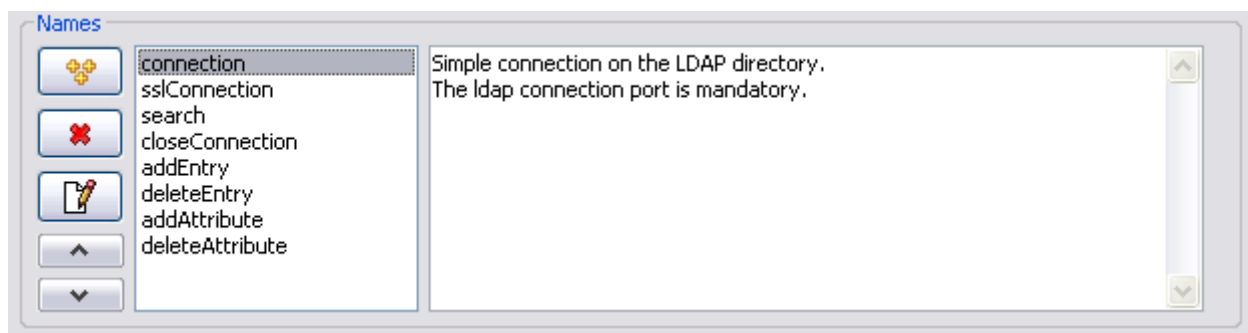
- connection

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- SSL connection
- closeConnection
- search
- add entry
- delete entry
- add attribute
- delete attributes



Click on the  button and  add all the primitives you want to define giving them a name and don't forget to write a description of all of them.




After adding the primitive's name and description you will have to add their specific attributes. Each primitive has specific attributes :

- connection
  - login : the login DN to connect to the LDAP directory
  - password : the password to connect to the LDAP directory
  - port : the port to connect using non-secure connection.
- sslConnection
  - login : the login DN to connect to the LDAP directory
  - password : the password to connect to the LDAP directory
  - port : The port to connect using secure connection.

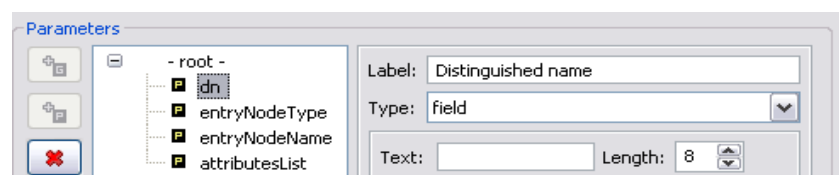
- keystorePath : The path to access the keystore file.
- closeConnection (no attributes)
- search
  - searchBase : the place in the directory tree where to start to searching. (eg : ou=people,dc=orange,dc=fr)
  - searchFilter : the search filter (e.g. : sn=fran\*)
  - searchScope : the search depth. (e.g. : 2)
- addEntry
  - dn : the LDAP distinguished name
  - entryNodeType : type of the node to insert (cn or sn or ou ou or uid)
  - entryNodeName : name of the node to insert
  - attributesList : node's list of attributes
- deleteEntry
  - dn : distinguished name representing the node to delete.
- addAttribute
  - dn : distinguished name of the node where we want to add attributes
  - attributesList : list of the couple attributes name / attributes values
- deleteAttribute
  - dn : distinguished name of the node where we want to delete attributes
  - attributestodelete : name of the attributes to delete.

Now we focus on the definition of the attributes of the addEntry primitive.

To an add attribute just click on  the add parameter button (notice that you can define group of attributes as with session object).

The dn attribute has :


- label : Distinguished name
- type : field
- text : no default value
- length : 8

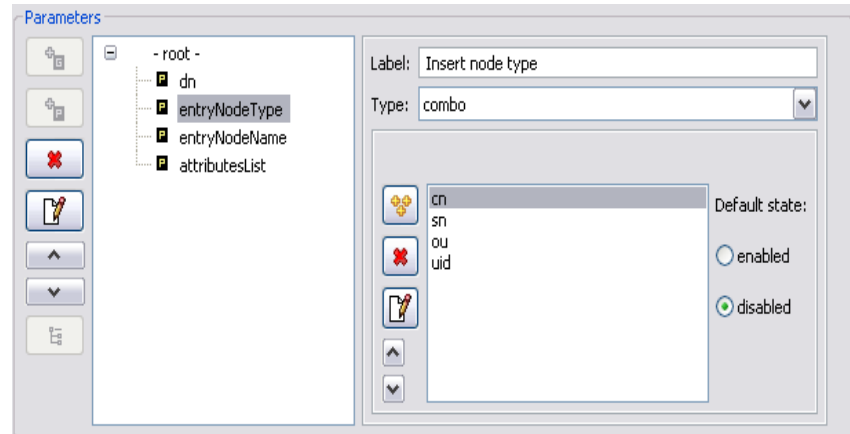


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The entryNodeType has :

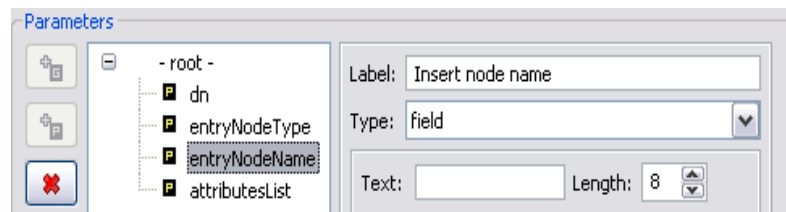
- label : Insert node type
- type : combo

To add values to combobox click on  and enter the different values with a default state (enabled or disabled),



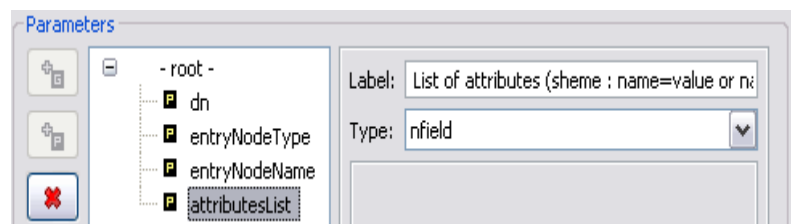
The entryNodeName has :

- label : Insert node name
- type : field
- text : no default text
- length : 8



The attributesList has :

- label : List of attributes (scheme : name=value or name=value1,value2,value3)
- type : nfield



These actions with the wizard modify these files :

- SessionObject.java class :

This variable SAMPLE\_ADDENTRY identifies the addEntry primitive in the LdapInjector plugin. Each primitive has unique identifier.

```
static final int SAMPLE_ADDENTRY = 4;
```

The variables below are added when you define addEntry attributes. Each attributes of each primitive is identified with a variable which value is the variable name defined in the wizard.

```
static final String SAMPLE_ADDENTRY_ATTRIBUTESLIST = "attributesList";
static final String SAMPLE_ADDENTRY_ENTRYNODENAME = "entryNodeName";
static final String SAMPLE_ADDENTRY_ENTRYNODETYPE = "entryNodeType";
static final String SAMPLE_ADDENTRY_DN = "dn";
```

Adding samples with the wizard modify this java class by adding a method doSample which return an ActionEvent. This method has three parameters :

- The first argument gives the primitive identifier.
- The second parameter gives the list of parameter values indexed by their names, as set in the plugin descriptor file using tag params;



- The third argument gives a report object whose fields will have to be filled before being returned.

Basically, the doSample() method is supposed to perform a load injection request, wait for some kind of response, state if this request is a success or a failure, measure its response time and return a sample report. Returning null is also possible, to make CLIF ignore this sample.

```
/**
 * @see org.objectweb.clif.scenario.isac.plugin.SampleAction#doSample()
 */
public ActionEvent doSample(int number, Map params, ActionEvent report) {
    switch (number) {
        case SAMPLE_DELETEATTRIBUTE:
            break;
        case SAMPLE_ADDATTRIBUTE:
            break;
        case SAMPLE_DELETEENTRY:
            break;
        case SAMPLE_ADDENTRY:
            break;
        case SAMPLE_SEARCH:
            break;
        case SAMPLE_SSLCONNECTION:
            break;
        case SAMPLE_CONNECTION:
            break;
        default:
            throw new Error("Unable to find this sample in ~LdapInjector~ ISAC
plugin: " + number);
    }
    throw new IsacRuntimeException("No action defined for this sample in
~LdapInjector~ ISAC plugin: " + number);
}
```

- plugin.xml :

In the plugin.xml file the addEntry sample is added with all its parameters and its help.

```
<sample name="addEntry" number="4">
    <params>
        <param name="dn" type="String"></param>
        <param name="entryNodeType" type="String"></param>
        <param name="entryNodeName" type="String"></param>
        <param name="attributesList" type="String"></param>
    </params>
    <help>Add entry into an ldap directory.&#xD;
To be able to add an entry into ldap directory the following parameters are
madatory :&#xD;
    - Distinguished name&#xD;
```

## – How To develop and use CLIF ISAC plug-ins

```
- Node type (type of the node to insert) &#xD;
- Node name (name of the node to insert)&#xD;
- List of the attributes : couple name=value(s) of the attributes which
composed the node.</help>
</sample>
```

- gui.xml :

The user interface descriptor file adds explicit labels to primitives and parameters, and associates each parameter to GUI related information. Graphical widgets appears here (combo, field, nfield).

```
<sample name="addEntry">
  <params>
    <param label="Distinguished name" name="dn">
      <field text="" size="8"></field>
    </param>
    <param label="Insert node type" name="entryNodeType">
      <combo>
        <choice value="cn" default="false"></choice>
        <choice value="sn" default="false"></choice>
        <choice value="ou" default="false"></choice>
        <choice value="uid" default="false"></choice>
      </combo>
    </param>
    <param label="Insert node name" name="entryNodeName">
      <field text="" size="8"></field>
    </param>
    <param label="List of attributes (scheme : name=value or
name=value1,value2,value3)" name="attributesList">
      <nfield></nfield>
    </param>
  </params>
</sample>
```

## Complete SessionObject class with Java code

At this point we have finished using the ISAC plug-in wizard. We are now going to write Java code to implement the LDAP connection (secure or non-secure), disconnection and add entry methods.

When you write an ISAC scenario you can import several times the LdapInjector plugin with different settings. For each import the ISAC execution engine instantiates and initializes with specific settings a specimen session object. For that purpose, your plugin class must implement a public constructor taking a Map as a single argument. This Map will hold the specimen settings with the parameters names as keys, as specified in the plugin XML descriptor file. The specimen objects will be used just for replication, according to the load profiles, but will never be associated to behavior instances.

Here are global parameters which have to be set for every imported LdapInjector plugin.

```
private String hostname;
private int ldapVersion;
```

In the SessionObject constructor we checked the value of the parameters. These must not be null or empty, they must be set.

```
/**
 * Constructor for specimen object.
 *
 * @param params key-value pairs for plugin parameters
 * @throws ClifException
 */
public SessionObject(Hashtable params) throws ClifException {
    // local address setting
    String value = (String)params.get(PLUGIN_HOSTNAME);
    if (value != null && value.length() > 0) {
        try {
            hostname = value;
        } catch (Exception ex) {
            throw new ClifException("ISAC can't get hostname because the specified
hostname is not valid: " + value, ex);
        }
    } else {
        throw new ClifException("ISAC can't get hostname because the specified
hostname is not valid: " + value);
    }

    // ldap version setting
    value = (String)params.get(PLUGIN_VERSION);
    if (value != null && value.length() > 0) {
        try {
            ldapVersion = Integer.parseInt(value);
        } catch (Exception ex) {
            throw new ClifException("ISAC can't get LDAP version because the
specified LDAP version is not valid: " + value, ex);
        }
    } else {
        throw new ClifException("ISAC can't get LDAP version because the
specified LDAP version is not valid: " + value);
    }
}

/**
 * Copy constructor (clone specimen object to get session object).
 *
 * @param so specimen object to clone
 */
private SessionObject(SessionObject so) {
    this.hostname = so.hostname;
    this.ldapVersion = so.ldapVersion;
}
```

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Declare your LDAPConnection object to be able to access it from every implemented method which will manipulate your LDAP directory. This object will be instantiate in the doConnection() method.

```
private LDAPConnection ldapConnection;
```

All the methods implement for this LDAP injector have three parameters, like the doSample method :

- The first argument gives the primitive identifier;
- The second parameter gives the list of parameter values indexed by their names, as set in the plugin descriptor file using tag params;
- The third argument gives a report object whose fields will have to be filled before being returned.

And return an ActionEvent.

These following methods are called by the doSample() method depending of the primitive identifier and need to be implemented :

- doConnection(int number, Map params, ActionEvent report);
- doSslConnection(int number, Map params, ActionEvent report);
- doAddEntry(int number, Map params, ActionEvent report);
- doDeleteEntry(int number, Map params, ActionEvent report);
- doAddAttribute(int number, Map params, ActionEvent report);
- doDeleteAttribute(int number, Map params, ActionEvent report);
- doSearch(int number, Map params, ActionEvent report);
- doCloseConnection(int number, Map params, ActionEvent report);

```
/**
 * @see org.objectweb.clif.scenario.isac.plugin.SampleAction#doSample()
 */
public ActionEvent doSample(int number, Map params, ActionEvent report) {
    switch (number) {
        case SAMPLE_DELETEATTRIBUTE:
            return doDeleteAttribute(number, params, report);
        case SAMPLE_ADDATTRIBUTE:
            return doAddAttribute(number, params, report);
        case SAMPLE_DELETEENTRY:
            return doDeleteEntry(number, params, report);
        case SAMPLE_ADDENTRY:
            return doAddEntry(number, params, report);
        case SAMPLE_CLOSECONNECTION:
            return doCloseConnection(number, params, report);
        case SAMPLE_SEARCH:
            return doSearch(number, params, report);
        case SAMPLE_SSLCONNECTION:
            return doSslConnection(number, params, report);
        case SAMPLE_CONNECTION:
            return doConnection(number, params, report);
        default:
```

```

        throw new Error("Unable to find this sample in ~LdapInjector~ ISAC
plugin: " + number);
    }
}

```

Now we will focus more specifically on the addEntry method.

```

/**
 * Add an entry into a LDAP directory. The connection to the LDAP directory
 * must be established before doing the doAddEntry.
 *
 * @param number : The number which handles the connection to the ldap
 * directory.
 * @param report : The ActionReport to update.
 * @param params : A Map containing all the useful variable.
 * @return the report.
 */
private ActionEvent doAddEntry(int number, Map params, ActionEvent report){

```

First of all we have to declare and set attributes of the addEntry primitive. This parameters are in the params Map passed in parameter of the doAddEntry method. The get method applied on a Map returns an Object so we have to cast it into String to be able to use it.

```

String dn = (String) params.get(SAMPLE_ADDENTRY_DN);
String insertNodeName = (String) params.get(SAMPLE_ADDENTRY_ENTRYNODETYPE);
String insertNodeValue = (String) params.get(SAMPLE_ADDENTRY_ENTRYNODENAME);
String attributesList = (String) params.get(SAMPLE_ADDENTRY_ATTRIBUTESLIST);

```

Then we create a LDAPAttributeSet which is a collection of LDAPAttribute objects. LDAPAttributeSet may be used to build an entry to be added to a directory.

```

LDAPAttributeSet attributeSet = new LDAPAttributeSet();

```

The attributesList is a string represented by a sequence of couple name=value or name=value1,value2,value3... Each couple is separated by “;”.

We check if the entry node belongs to the attributesList. If it doesn't, we add it, at the end of the attributesList string :

```

if (attributesList.indexOf(insertNodeName) == -1) {
    attributesList = attributesList+insertNodeName+"="+insertNodeValue+";";
}

```

We check if the entry node belongs to the dn. If it doesn't, we add it, at the beginning of the dn string;

```

if (dn.indexOf(insertNodeName) == -1) {

```

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```
    dn = insertNodeName+"="+insertNodeValue+", "+dn;
}
```

Then we have to transform the String attributesList into a String[] using the split method.

```
String[] tabParam_NameValue = attributesList.split(";");
```

Now we can go into the String[] tabParam\_NameValue and add LDAPAttribute to the LDAPAttributeSet :

```
String name = null;
String[] values = null;

for (int i = 0; i<tabParam_NameValue.length; i++) {
    name=tabParam_NameValue[i].substring(0, tabParam_NameValue[i].indexOf("="));
    values=(tabParam_NameValue[i].substring(tabParam_NameValue[i].indexOf("=")+1,
                                             tabParam_NameValue[i].length())).split(",");
    attributeSet.add( new LDAPAttribute( name, values ));
}
```

Then we can create an LDAPEntry object with the dn and attributeSet as parameters.

```
LDAPEntry newEntry = new LDAPEntry( dn, attributeSet );
```

To be able to identified the add entry lines in the report file you can set the type paramter in the report object :

```
report.type = "ADDEENTRY_TYPE";
```

And you also need to set the Date parameter of the report object to be able to set the add entry duration.

```
report.setDate(System.currentTimeMillis());
```

Now you just have to add the entry in your LDAP directory. To do it, you have to apply the add method to the ldapConnection object which is a global attribute of the SessionObject class and which is initialized in the connection() method.

Wee also have to catch exceptions and to set the result of the add, a comment, state of the add method (successful or not) :

```
try {
    ldapConnection.add( newEntry );

    report.duration = (int) (System.currentTimeMillis());
    report.successful = true;
    report.comment = "Added object: " + dn + " successfully.";
} catch (LDAPException ex) {
    report.successful = false;
    if (ex.getResultCode() == LDAPException.ATTRIBUTE_OR_VALUE_EXISTS) {
```

```

        report.result = ex.toString();
        report.comment = "Failed to add existing attribute.";
    } else {
        report.result = ex.toString();
        report.comment = "Failed to add attribute.";
    }
} catch (Exception e) {
    report.result = e.toString();
    report.comment = "Failed to add existing attribute.";
}

```

And finally you have to return the report.

```

    return report;
}

```

To be able to test make a search in an LDAP directory you will need to implement doConnection(), doCloseConnection and search() methods.

Here is the Java code of these methods :

```

/**
 * Does a connection to a LDAP directory (bind).
 *
 * @param number : The number which handles the connection to the ldap
directory.
 * @param report : The ActionReport to update.
 * @param params : A Map containing all the useful variable.
 * @return the report.
 */
public ActionEvent doConnection(int number, Map params, ActionEvent report) {
    ldapConnection = new LDAPConnection();
    String login = (String) params.get(SAMPLE_CONNECTION_LOGIN);
    String password = (String) params.get(SAMPLE_CONNECTION_PASSWORD);

    report.type = "CONNECT_TYPE";
    report.setDate(System.currentTimeMillis());

    try {
        // connect to the server
        ldapConnection.connect( hostname, Integer.parseInt((String)
params.get(SAMPLE_CONNECTION_PORT)));
        // bind to the server
        ldapConnection.bind(ldapVersion, login, password.getBytes("UTF8"));

        report.duration = (int)(System.currentTimeMillis() - report.getDate());
        report.successful = true;
        report.comment = "Successful bind with server.";

    } catch( LDAPException e ) {
        report.successful = false;
        report.result = e.toString();
        report.comment = "ISAC LdapInjector error occured";
    } catch( UnsupportedEncodingException e ) {
        report.successful = false;
        report.result = e.toString();
    }
}

```

```
        report.comment = "ISAC LdapInjector can't UTF8 encode password
"+password;
    }
    return report;
}

/**
 * Close an opened connection to a LDAP directory (bind).
 *
 * @param number : The number which handles the connection to the ldap
directory.
 * @param report : The ActionReport to update.
 * @param params : A Map containing all the useful variable.
 * @return the report.
 */
public ActionEvent doCloseConnection(int number, Map params, ActionEvent
report)
{
    if (ldapConnection != null) {
        report.type = "DISCONNECT_TYPE";
        report.setDate(System.currentTimeMillis());

        try {
            // disconnect with the server
            ldapConnection.disconnect();
            report.duration = (int)(System.currentTimeMillis() -
report.getDate());
            ldapConnection = null;
            report.successful = true;
            report.comment = "ISAC LdapConnection disconnection Successful";

            return report;
        } catch (LDAPException e) {
            report.successful = false;
            report.comment = "ISAC LdapInjector can't disconnect from " +
hostname;
            report.result = e.toString();
            return report;
        }
    } else {
        report.successful = false;
        report.comment = "ISAC LdapInjector can't disconnect unopen ldap
connection";
        report.result = "ignored";
        return null;
    }
}

/**
 * Does search into a LDAP directory.
 *
 * @param number : The number which handles the connection to the ldap
directory.
 * @param report : The ActionReport to update.
 * @param params : A Map containing all the useful variable.
 * @return the report.
 */
```



```

public ActionEvent doSearch(int number, Map params, ActionEvent report) {
    try {
        report.type = "SEARCH_TYPE";
        report.setDate(System.currentTimeMillis());

        LDAPSearchResults searchResults = ldapConnection.search((String)
params.get(SAMPLE_SEARCH_SEARCHBASE), Integer.parseInt((String)params.get(SAMPLE
_SEARCH_SEARCHSCOPE)), (String)
params.get(SAMPLE_SEARCH_SEARCHFILTER), null, false);

        report.duration=(int)(System.currentTimeMillis()-report.getDate());
        report.successful = true;
        report.comment = "LDAP Search succeeded";

    } catch( LDAPException e ) {
        report.successful = false;
        report.result = e.toString();
        report.comment = "ISAC LdapInjector error occured";
    }
    return report; }

```

To be able to compile your ISAC plug-in you have to complete the build.xml file.

```

<?xml version="1.0" encoding="UTF-8"?>
<project name="ISAC-plugin_MyLdapInjector" default="compile">
  <!-- This build.xml file must be called from CLIF main build.xml file.
4 properties are provided by CLIF main build.xml file:
  - libext.dir, all Jars used by the plugin must be copied to this directory
  - clif.classpath, classpath for full CLIF runtime library
  - build.dir, build directory (where classes must be generated and necessary resource files,
if any, must be copied)
  - isac.dir, ISAC root directory
-->
  <!-- General Configuration -->
  <property name="plugin.dir" value="${isac.dir}/plugins/MyLdapInjector"></property>
  <!-- classpath definition -->
  <path id="plugin.compile.classpath">
    <pathelement path="${clif.classpath}"></pathelement>
    <pathelement path="${build.dir}"></pathelement>
    <fileset dir="${plugin.dir}/lib" includes="*.jar"></fileset>
  </path>
  <target name="compile">
    <javac srcdir="${plugin.dir}/src" destdir="${build.dir}" classpathref="plugin.compile.classpath"></
javac>
    <copy todir="${libext.dir}" overwrite="yes" preservelastmodified="yes">
      <fileset dir="${plugin.dir}/lib" includes="*.jar"></fileset>
    </copy>

```

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```
<copy todir="${build.dir}/MyLdapInjector">
  <fileset dir="${plugin.dir}" includes="plugin.properties,plugin.xml,gui.xml"></fileset>
</copy>
</target>
<target name="clean"></target>
</project>
```

Now you just have to compile and make a jar file with all your ISAC plug-ins.

Go to the following repertory :

/path\_to\_your\_clif\_console/plugins/org.objectweb.clif.console.plugin\_<version>

and launch the ant command : ant isac-plugins

Once it is successful you can use your ISAC plug-ins.

### 3. ISAC is a Scenario Architecture for CLIF

With ISAC, testers are given a way to define load scenarios by combining:

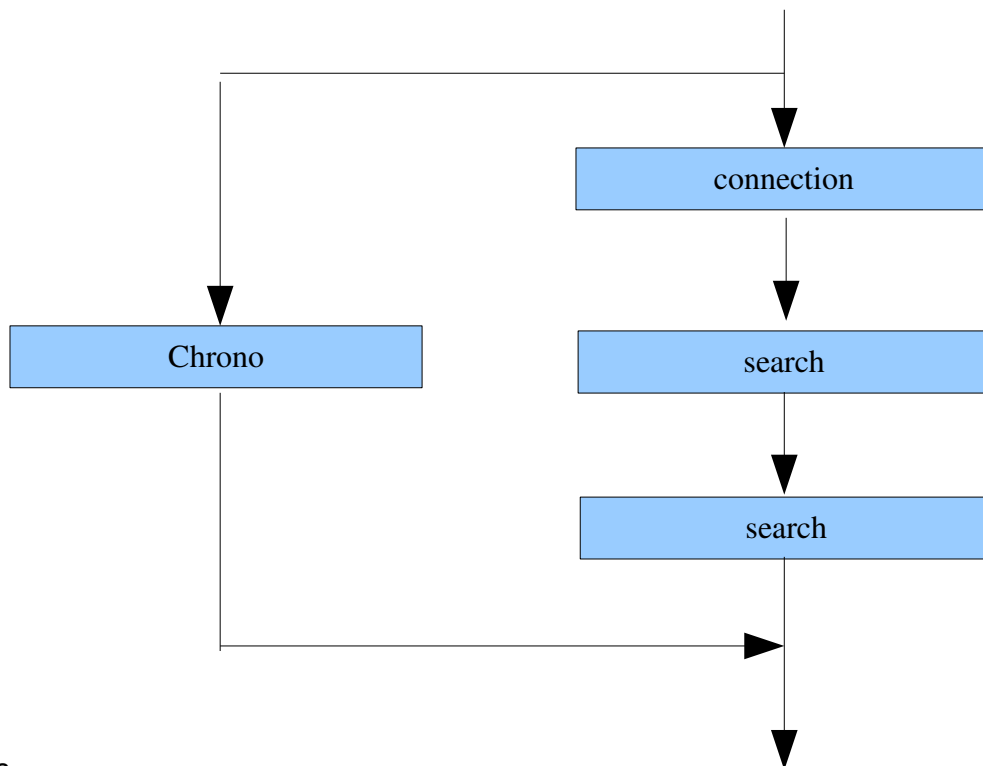
- definitions of elementary behaviors, typically representing users;
- optional definitions of load profiles setting the population (i.e. the number of active instances) of each behavior as a function of time.

#### 3.1. Defining an ISAC scenario for LDAP

In order to make realistic scenarios corresponding to real users behaviors, actions on LDAP can be recorded as an ISAC scenario.

In our tutorial we will define an ISAC scenario which will do some actions on the LDAP directory.

We can see here the actions that our scenario will do :



In this scenario we will connect to the LDAP directory, make a search and disconnect it. We will import the LdapInjector plugin to be able to do this action.

To externalize the data used in the scenario (mandatory parameters of the LdapInjector plugin) we will create CSV file that will contain all the needed data. Each line of the CSV file represents the parameters needed to execute the scenario. Then we will loop on each line to make different calls to the LDAP directory. To do this we will use the CSVProvider plugin.

In this ISAC scenario the scenario duration will be set to 1 second. We need to import the ConstantTimer plugin.

In our load test we will use two or more injectors and we don't want to launch the test at the same moment on each injector. So we will import the Random plugin.

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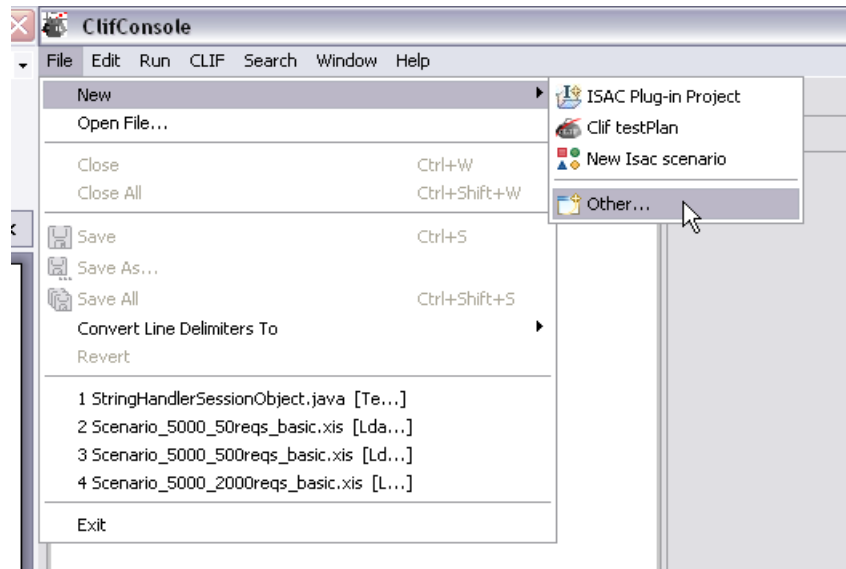
Finally we want to know the response time of group of operation, that's why we will import the Chrono plugin to insert chrono action's duration in the report.

### 3.2. Record your ISAC scenario

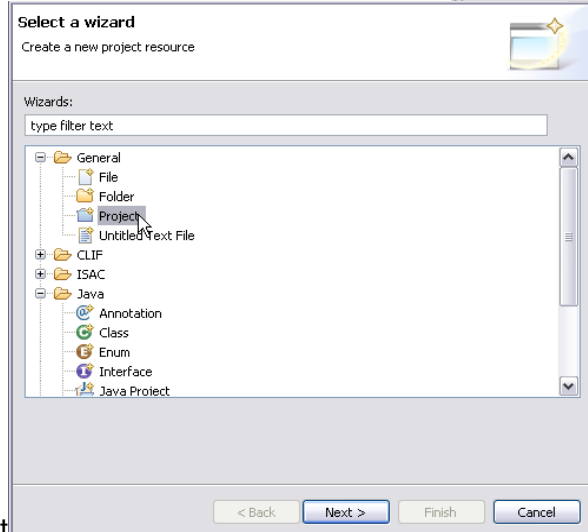
#### Create your project and your ISAC scenario

First of all you have to create a new general project :

Click on File -> New -> Other...



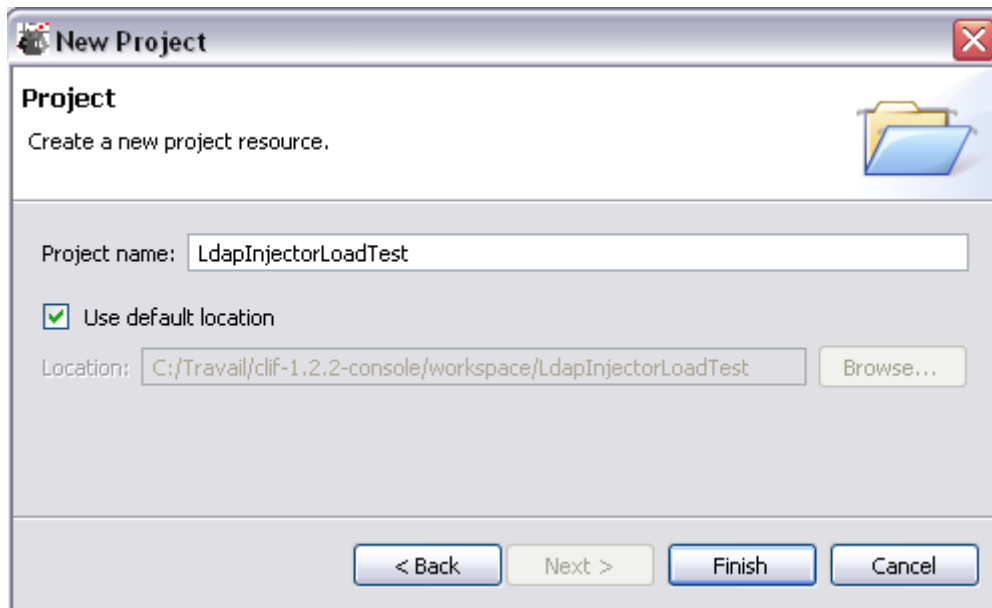
After it, choose General and select Project.



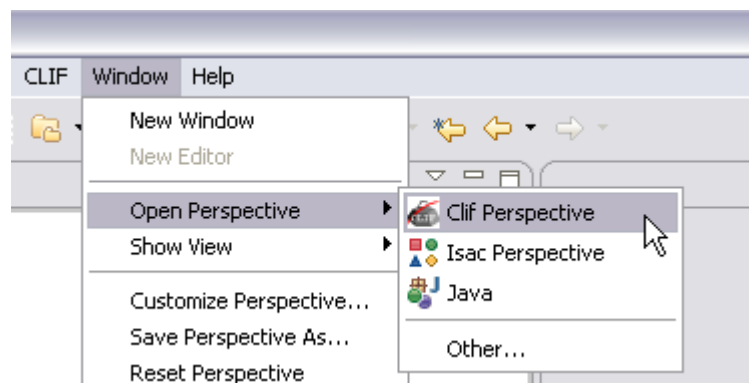
Then click on Next.

Enter your project name (you can use default location or choose an other location)

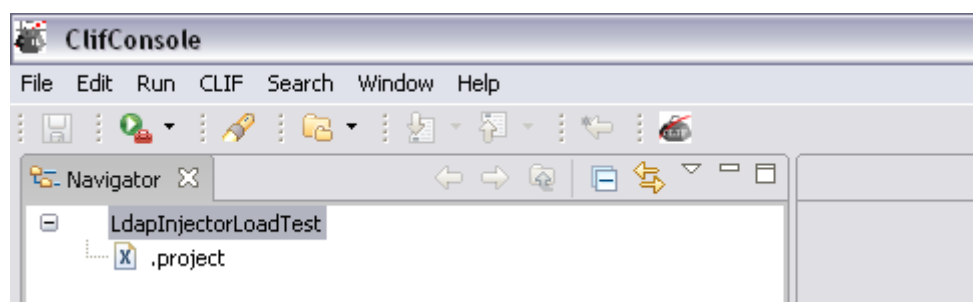
Click on Finish.



If you use your own Eclipse IDE instead of the Clif console you have to open the Clif perspective :



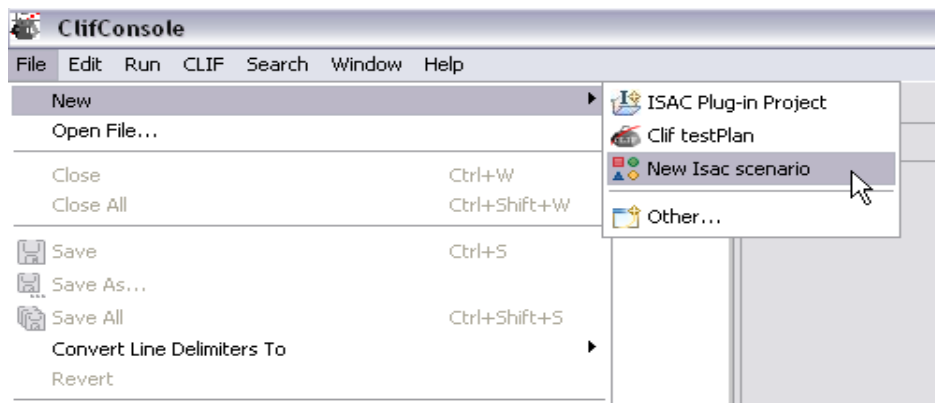
You can now see this perspective :



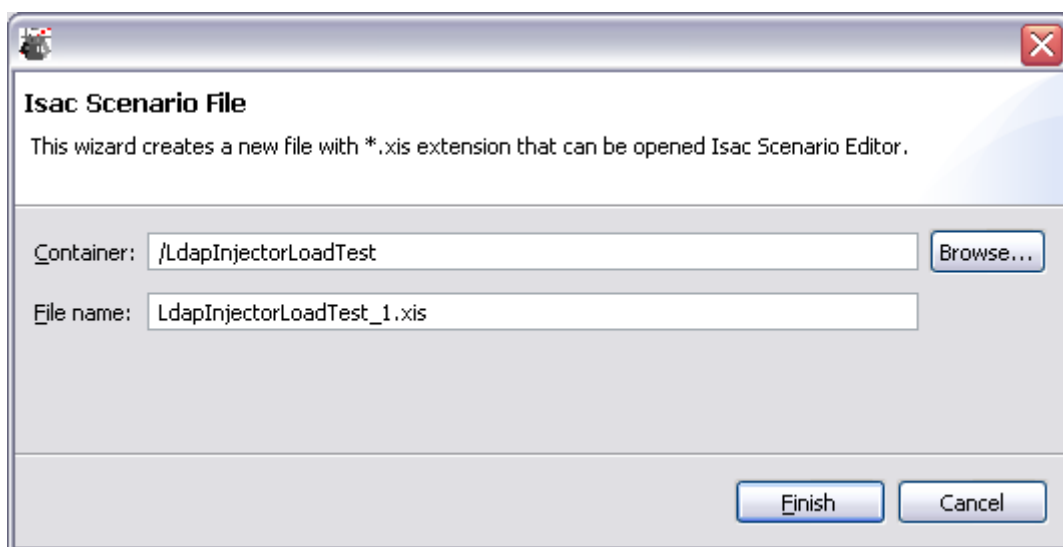
Create your new isac scenario.

Click on File -> New -> New Isac Scenario

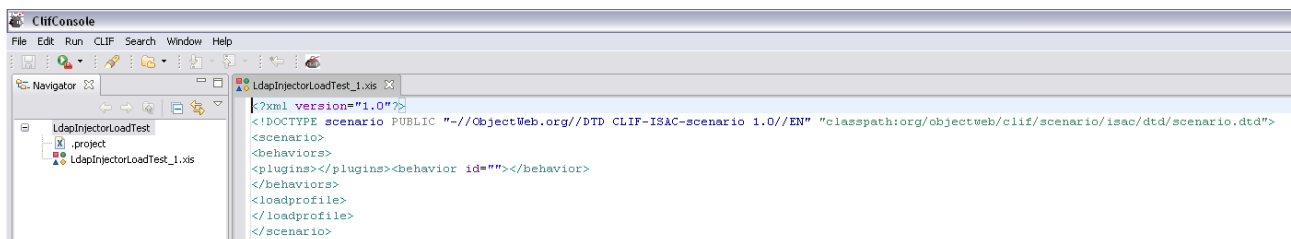
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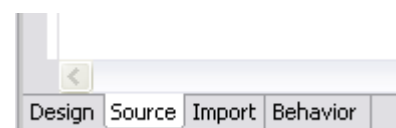
Choose the container (if you have several project into your workspace) and give a name to your ISAC scenario,



Click on Finish.



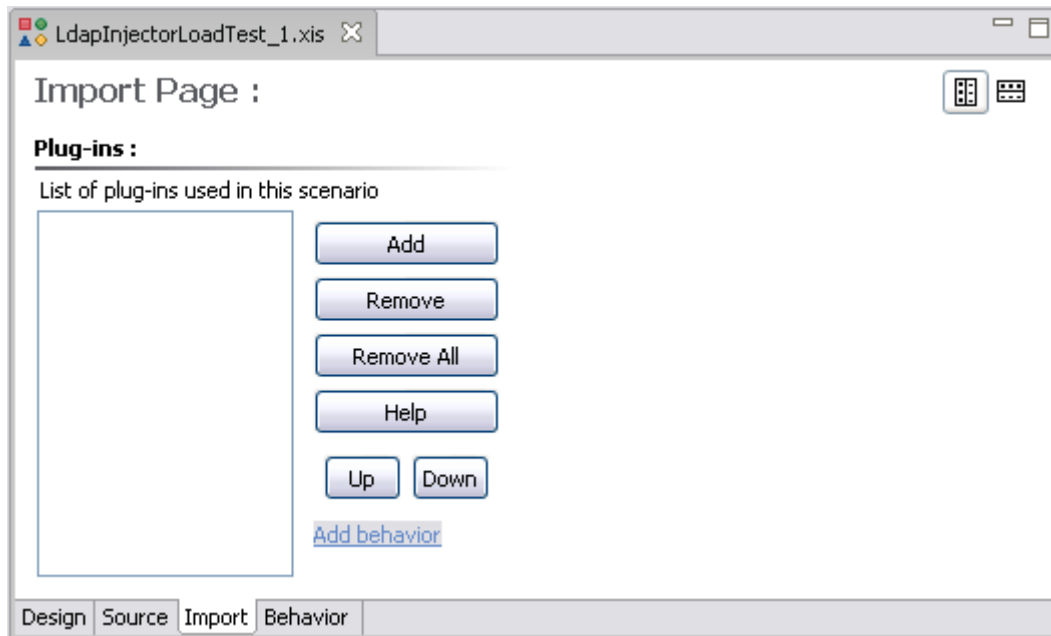
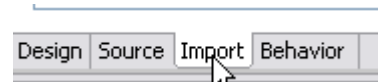
Now you can see the content of your ISAC scenario file.  
At the bottom of the file content there are four tabulations



The first one designs the xis file (which is an xml file),  
The second one shows the source code of the xis file.  
The third one allows you to import the plugins that you will need in your ISAC scenario,  
The last one allows you to define your scenario and your load profile.

## Import ISAC plugins

Click on the Import tabulation to load the Import perspective.



Import the plugins :

- LdapInjector
- CSVProvider
- ConstantTimer
- Random
- Chrono

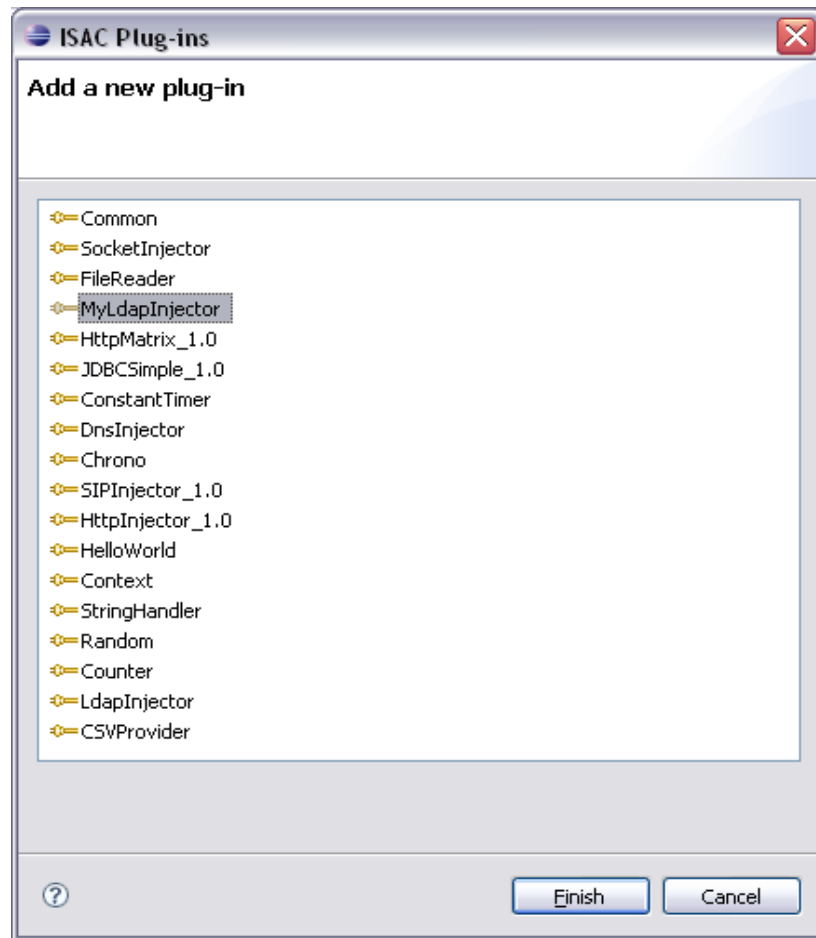
Click on the Add button :



Choose the plugins you need one by one :

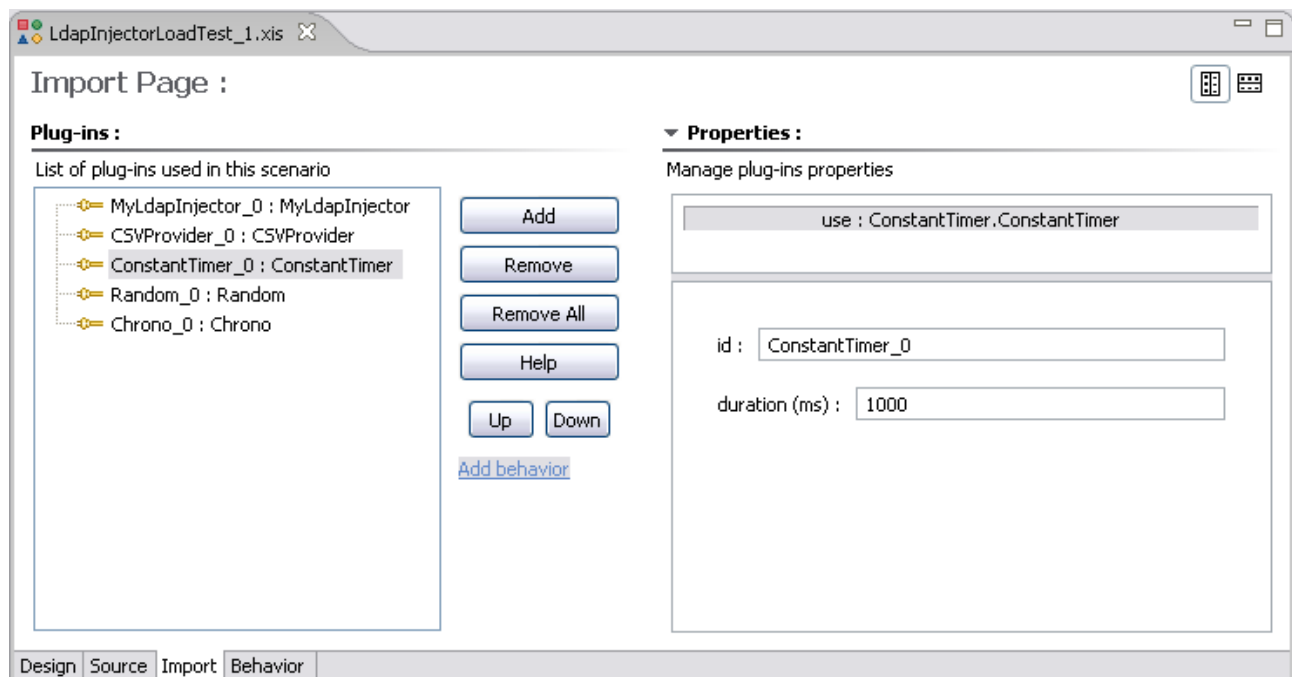
Now all the imported plugins are present in the Import perspective.

– How To develop and use CLIF ISAC plug-ins



We just have to set plug-in default/initialization parameters.

Select the MyLdapInjector\_0:MyLdapInjector and sets the parameters :





Do the same thing with the ConstantTimer plugin.

The Random and Chrono plugin have no general parameter.

Select the CSVProvider plugin and sets its parameters :

▼ **Properties :**

Manage plug-ins properties

use : CSVProvider.CSVProvider

id : CSVProvider\_0

File name : LdapLoadTest\_1.csv

Field separator : #

fields names (separated by the given separator) : login#password#searchBase#searchFilter#searchScope

MacOS9 line separator  
☐ enable

shared  
☐ enable

loop  
☒ enable

The file name is the name of the CSV file that will contain the externals data of the LdapInjector behavior.

A line in the CSV File will have this format :

```
login#password#searchBase#searchFilter#searchScope
uid=0,ou=appli,dc=annuaire,dc=com#secret_0#ou=appli,dc=annuaire,dc=com#(&(uid=0)(autorisation=all))#2
uid=1,ou=appli,dc=annuaire,dc=com#secret_1#ou=appli,dc=annuaire,dc=com#(&(uid=1)(autorisation=all))#2
uid=2,ou=appli,dc=annuaire,dc=com#secret_2#ou=appli,dc=annuaire,dc=com#(&(uid=2)(autorisation=all))#2
```

In the Field separator you have to set the field separator used in the CSV file. (# in our case),

In the Fields names input you have to set the list of the parameters name present in the CSV file separated with the given separator (# here),

Description of the checkbox

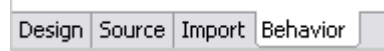
- MacOS9 line separator: use CR instead of LF as line separator.
- shared: when set, progression in the lines is shared by all session objects. In other words, each session object will get a different line instead of all getting the same sequence of lines.
- loop: when set, the line sequence wraps up to the first line when the end of file has been

## –How To develop and use CLIF ISAC plug-ins

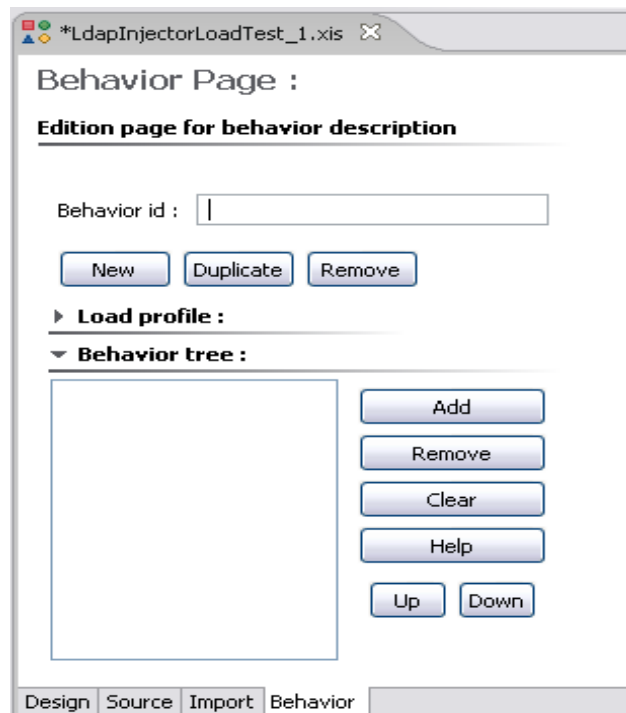
reached. Otherwise, an alarm is thrown when trying to get a field value while the end of file has been reached, and the empty string is used as value.

### Define your behavior

To define your behavior you have to select the behavior perspective of your ISAC scenario xis file.



Once this tabulation selected you can see the following perspective :



You can now give a name to your behavior setting the Behavior id text field :

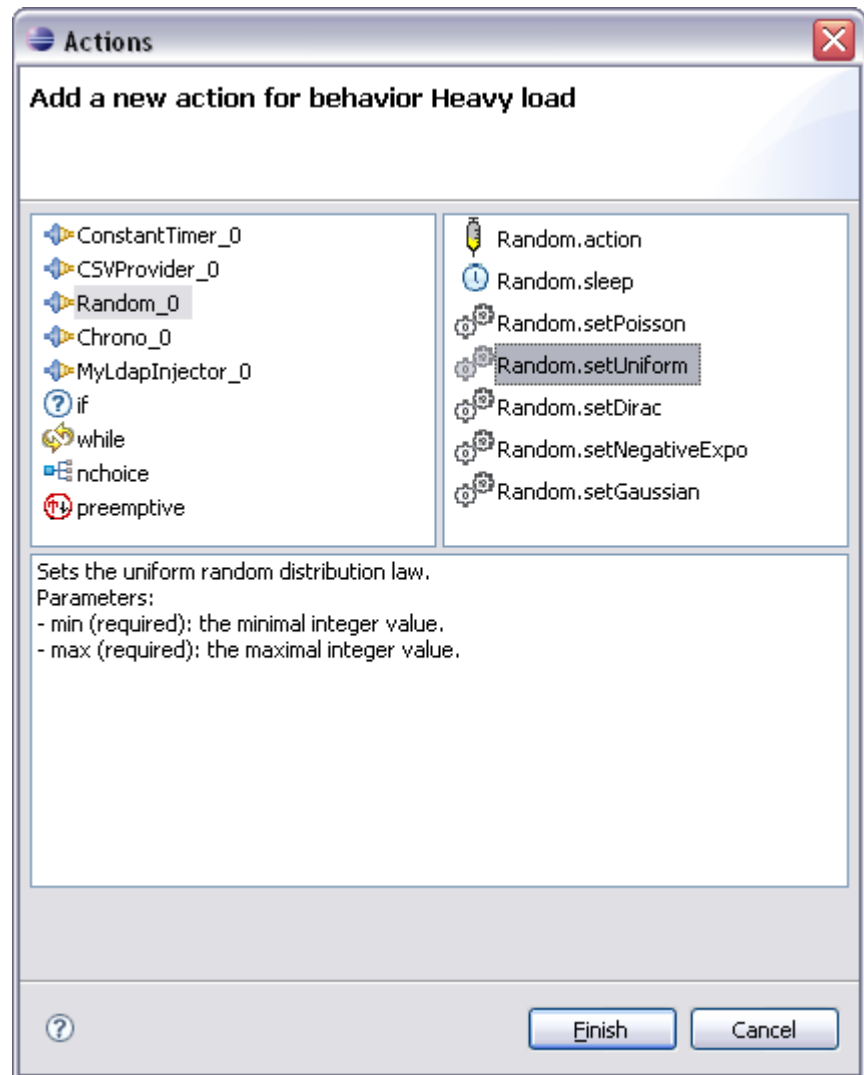


In our case we want to test an LDAP directory so we will describe a scenario that executes sequential actions,

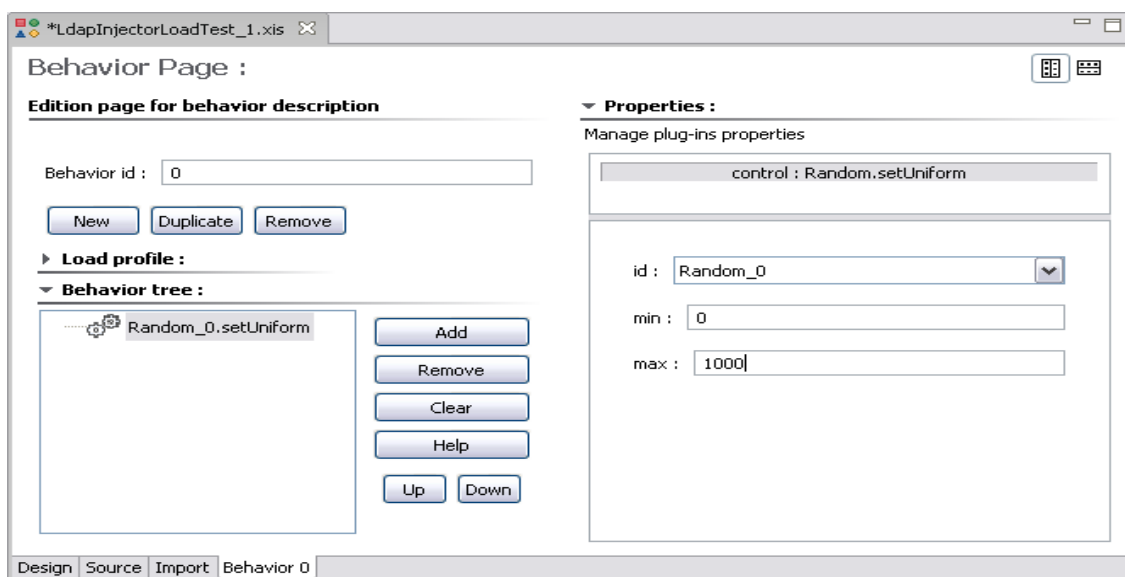
At the beginning of the behavior we add a sleep action. The sleep time will be variable and its variation will depends on a specific random distribution.

Click on the add button  in the behavior perspective.

First we choose the random distribution that we need to use.

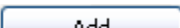


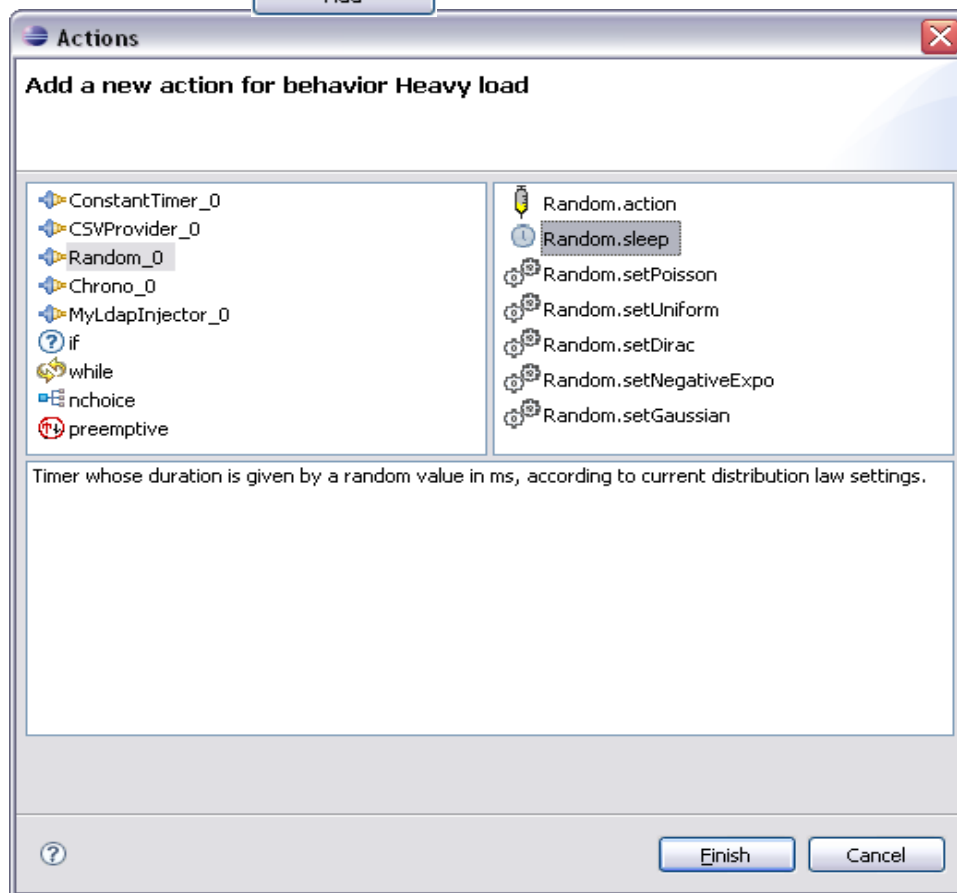
We sets the required parameter's value :



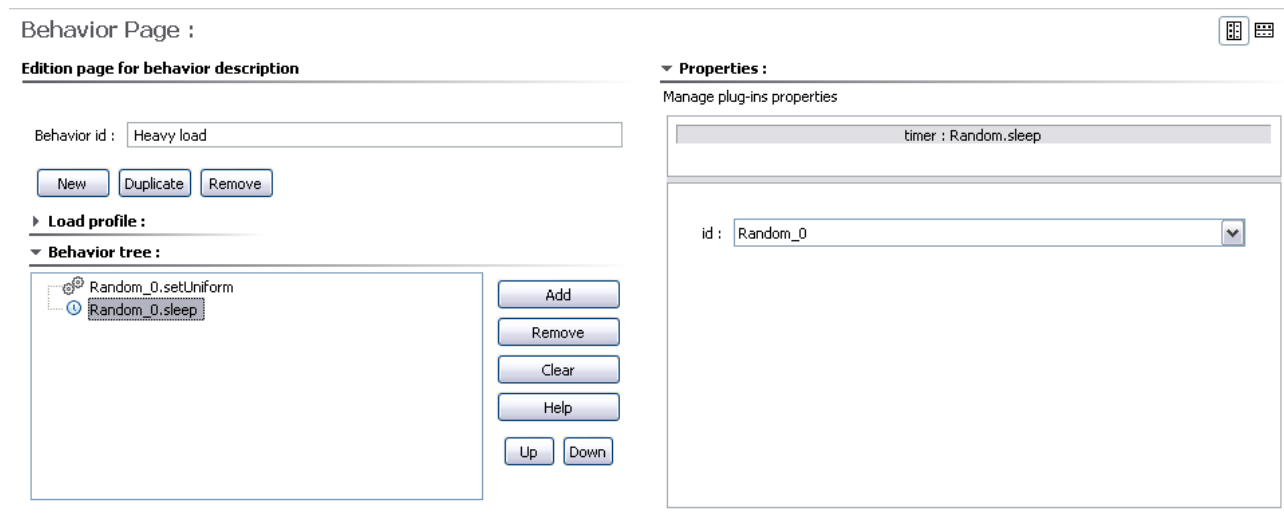
And now we add a sleep action that will sleep the behavior for a duration included between the min and the max value define in the random distribution.

## – How To develop and use CLIF ISAC plug-ins

Click again on the add button  in the behavior perspective.

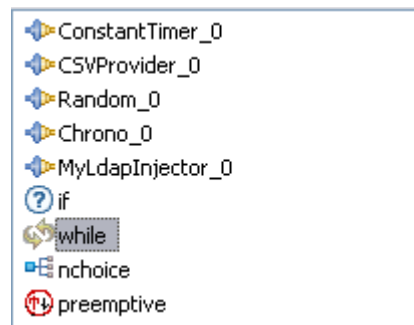


And set the parameter's value of this action :

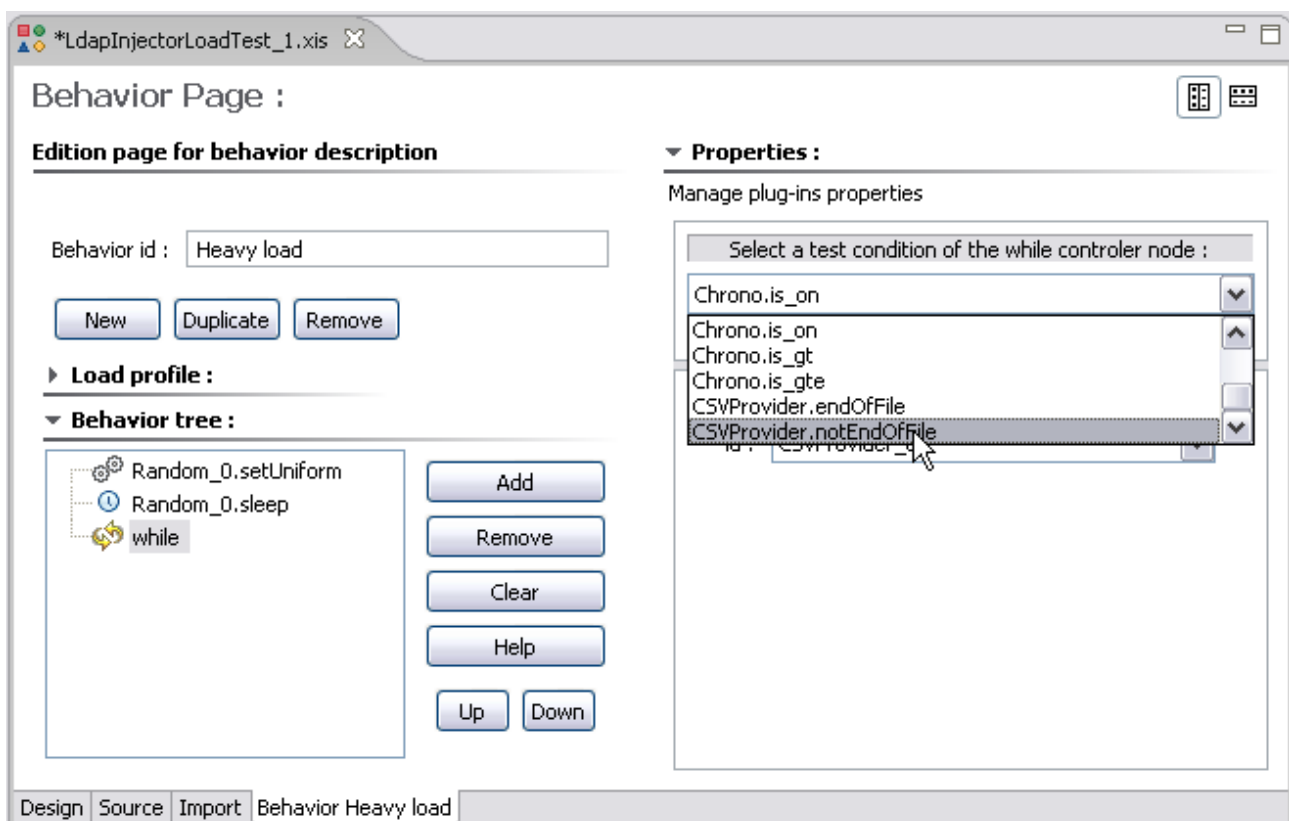


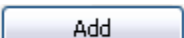
Now we add a while loop.

The while loop condition is : while we are not at the end of the CSV file we iterate.



So we will iterate on each line of the CSV file and will exit from the loop when the end of the file will be reached.

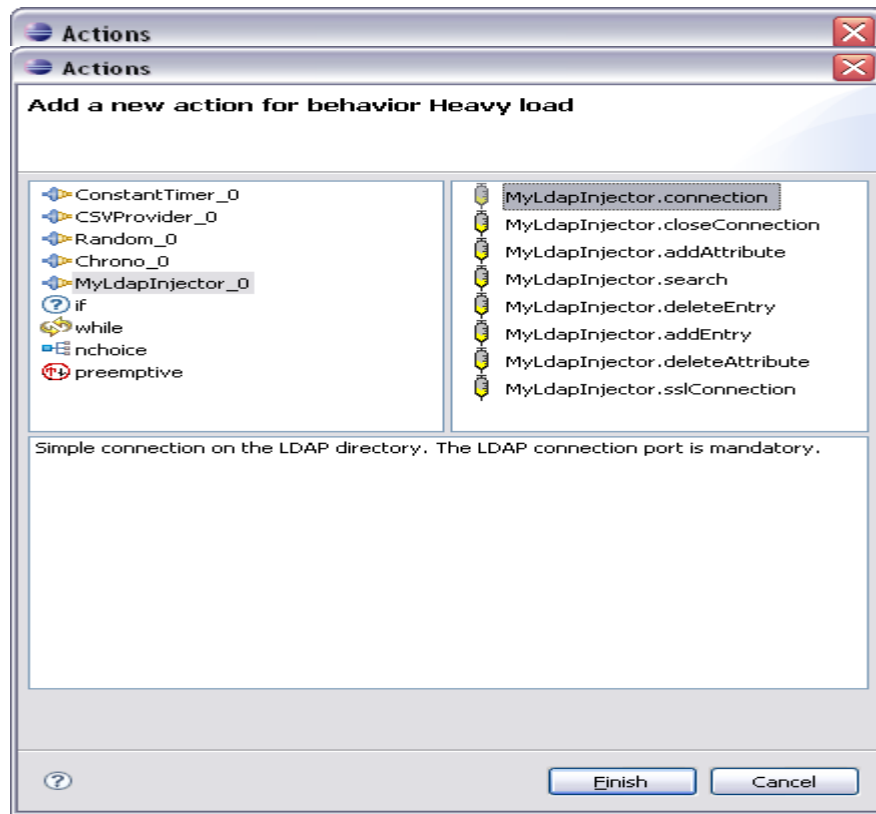


To include actions in your while loop you should select the while action in the Behavior tree before to  click on the Add button .

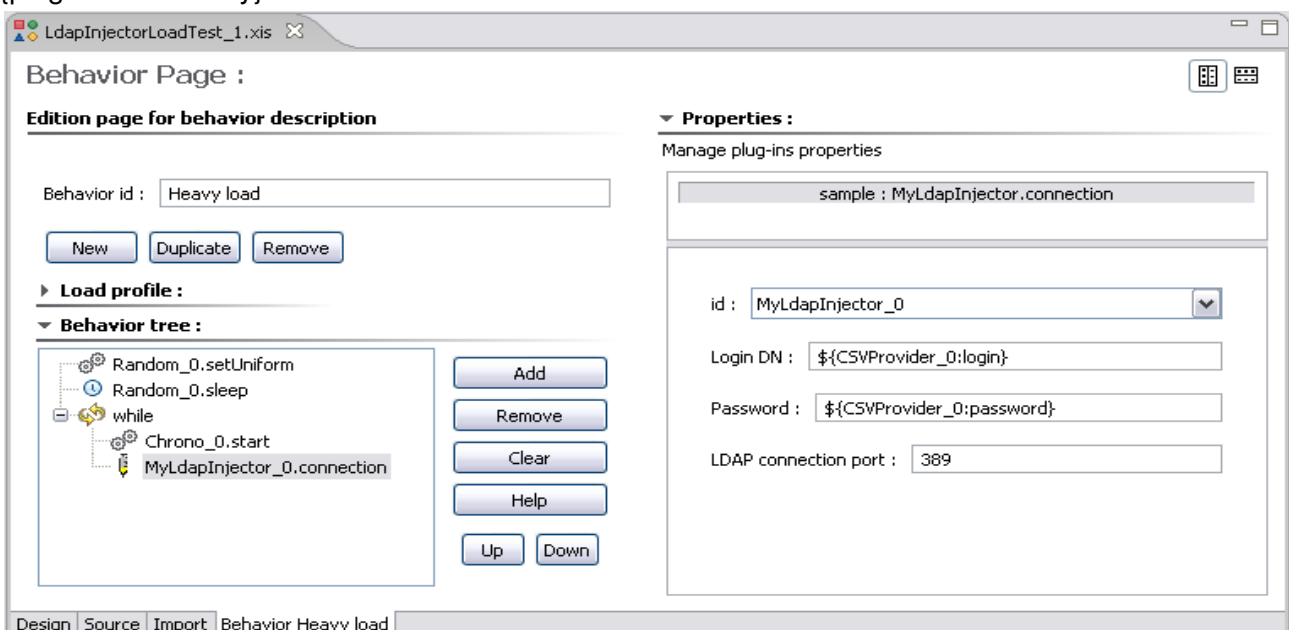
The first action that we will add is starting the chronometer :

Then we will do a connection and disconnection on the LDAP directory.

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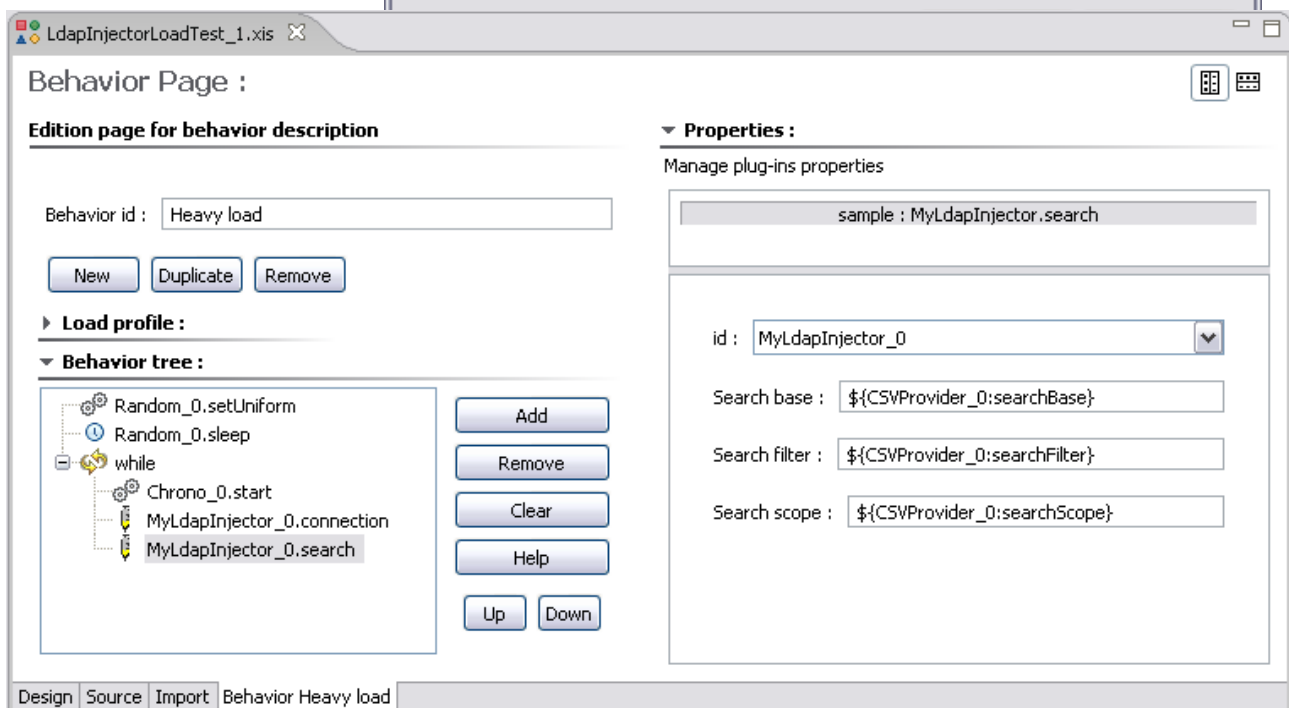
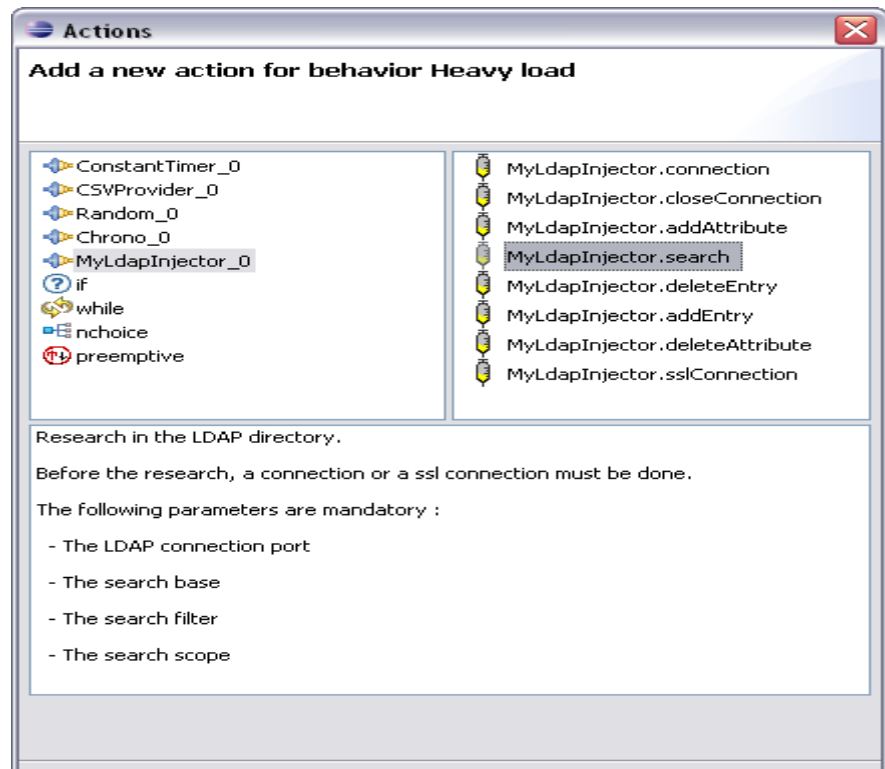


At this time we will have to set the LDAP connection parameter's value. These values are provided by the CSV file. To get this value from the reading line of the CSV file we need to indicate the reference of the plug-in which provides the value and the name of the attribute needed. In our case the CSVProvider plug-in provides the login and the password. Use this specific String format : `${pluginIdentifier:key}`



Then we add actions to make a search on the LDAP directory : we need to connect to it, make a search and disconnect.

To set the connection and search action parameter's we use the same method as the first connection action.

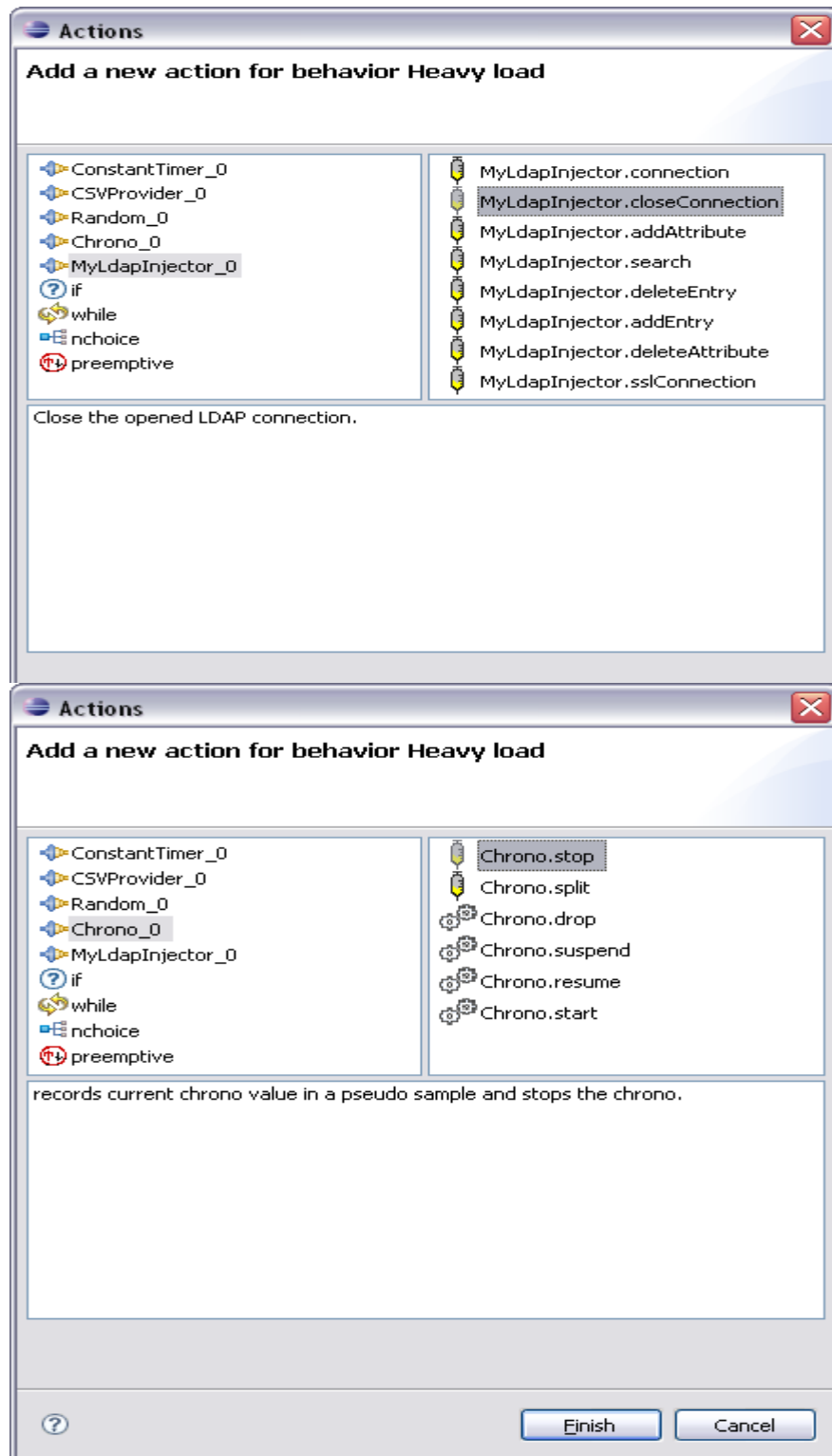


Once the research done we have to close the connection.

Click on the add button and choose the `MyLdapInjector.closeConnection` action.

Now we have to stop the chrono to be able to get the total duration time of one loop with the `Chrono.stop` action. Click on the add button and choose the `Chrono_0.stop` action.

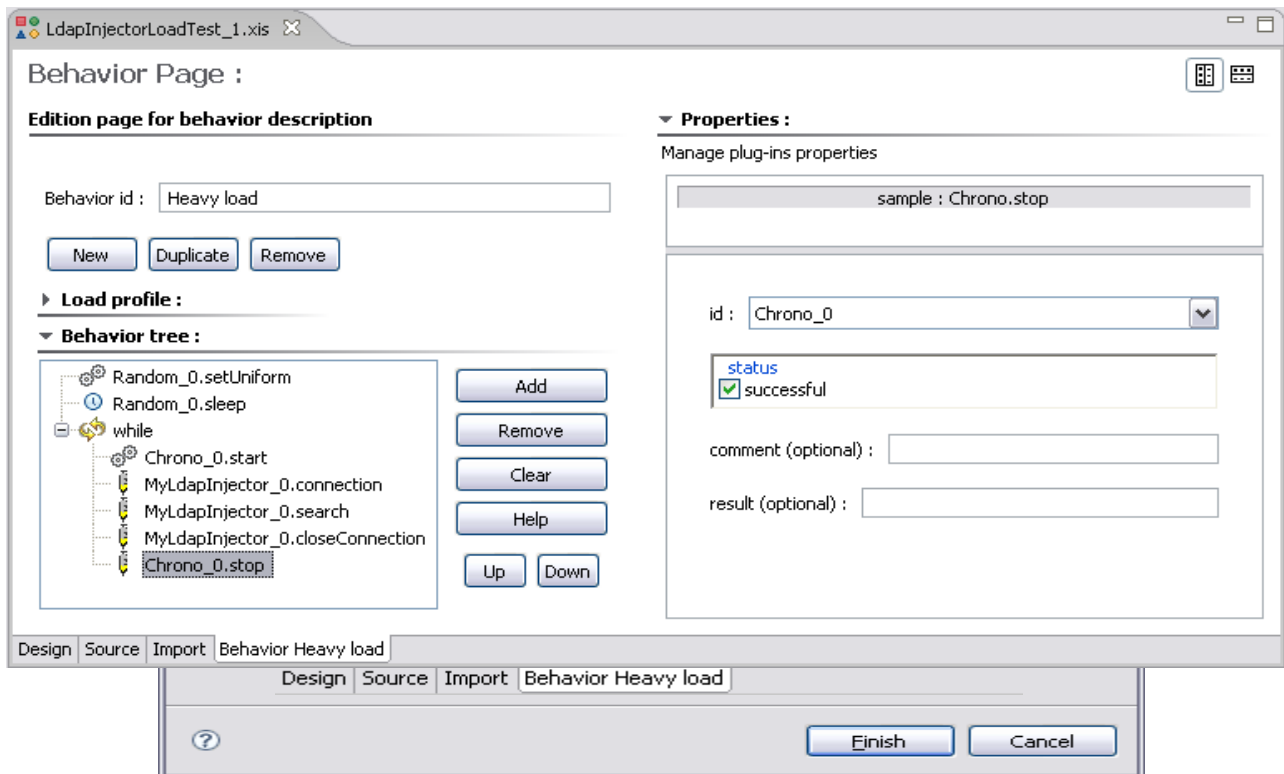
–How To develop and use CLIF ISAC plug-ins



Click on the add button to add a CSVProvider\_0.next action.

It will get the following line of the CSV file. If there is no more line it will exit the loop otherwise it will restart at the beginning of the loop with new value provided by the new line got by the CSVProvider.





## Load Profiles

Load profiles enable predefining how the population of each behavior will evolve, by setting the number of active instances according to time. A load profile is a sequence of lines. For each load profile, a flag states if active instances shall be stopped to enforce a decrease of the population, or if the extra behaviors shall complete in a kind of a “lazy” approach.

To create a load profile you should be on the Behavior Page and click on the Load profile link



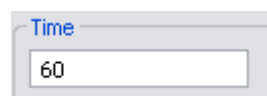
and after it on the Set profile button :



Be carefull, the time box contains the time in seconds since the start of the test and not the time in seconds of the ramp we are defining.

Now we want a ramp that increases the number of simultaneous scenarii. It begins at time 0 during 60 seconds and increases the number of simultaneous scenarii from 0 to 60.

Enter 60 in the Time text field :



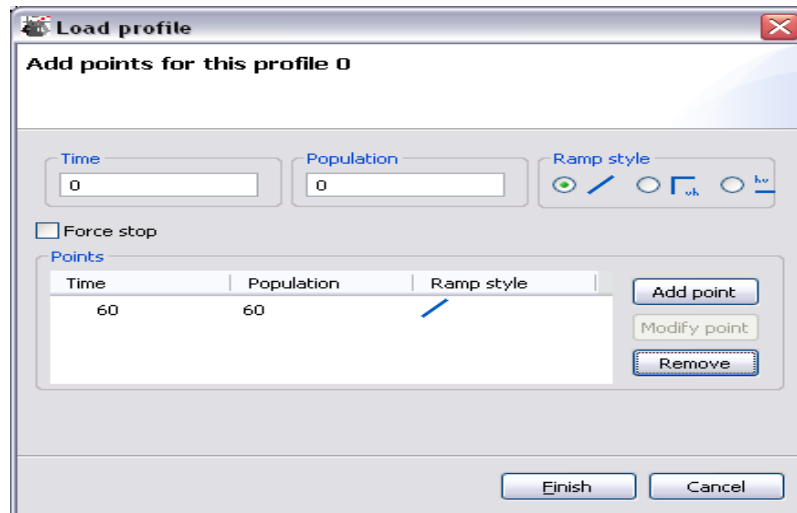
Enter 60 in the Population text field :

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Choose the ramp style :



To save these settings click on the Add point button :



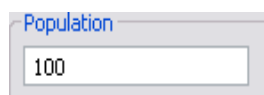
After we want a stable number of simultaneous scenarii during 2 minutes (120 seconds); so the profile duration will be about 180 seconds. And at the end of the 2 minutes, the number of simultaneous scenarii will rise to 100 scenarii.

Now we want a ramp that increase the number of simultaneous scenarii. It begins at time 0 during 60 seconds and increase the number of simultaneous scenarii from 0 to 60.

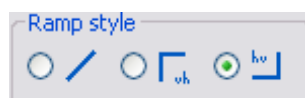
Enter 60 in the Time text field :



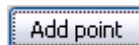
Enter 60 in the Population text field :



Choose the ramp style :



To save these settings click on the Add point button :



**Load profile**

Add points for this profile Heavy load

Time: 240

Population: 100

Ramp style: ☐ ☒ ☐ ☐ ☐ ☐

☐ Force stop

Time	Population	Ramp style
60	60	<input checked="" type="radio"/>
180	100	<input type="radio"/>

Buttons: Add point, Modify point, Remove

Buttons: Finish, Cancel

And finally we want to decrease the number of simultaneous scenarii from 100 to 0 during 60 seconds.

Enter 60 in the Time text field :

Enter 60 in the Population text field :

Population: 0

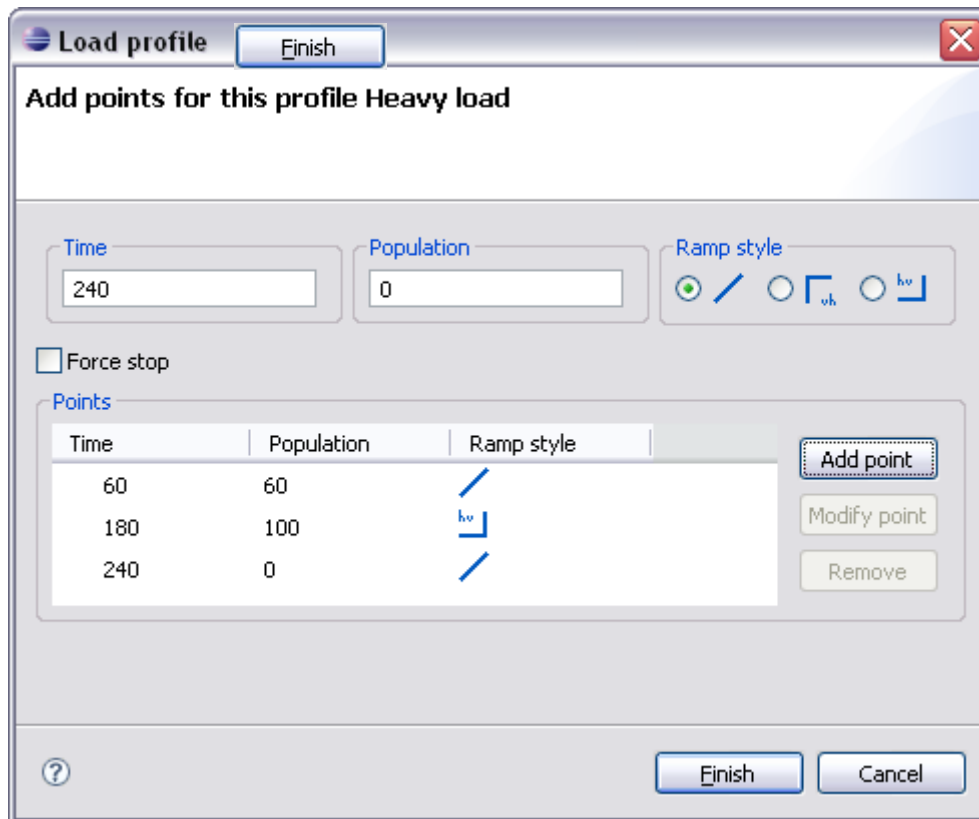
Choose the ramp style :

Ramp style: ☒ ☐ ☐ ☐ ☐

To save these settings click on the Add point button :

Add point

– How To develop and use CLIF ISAC plug-ins

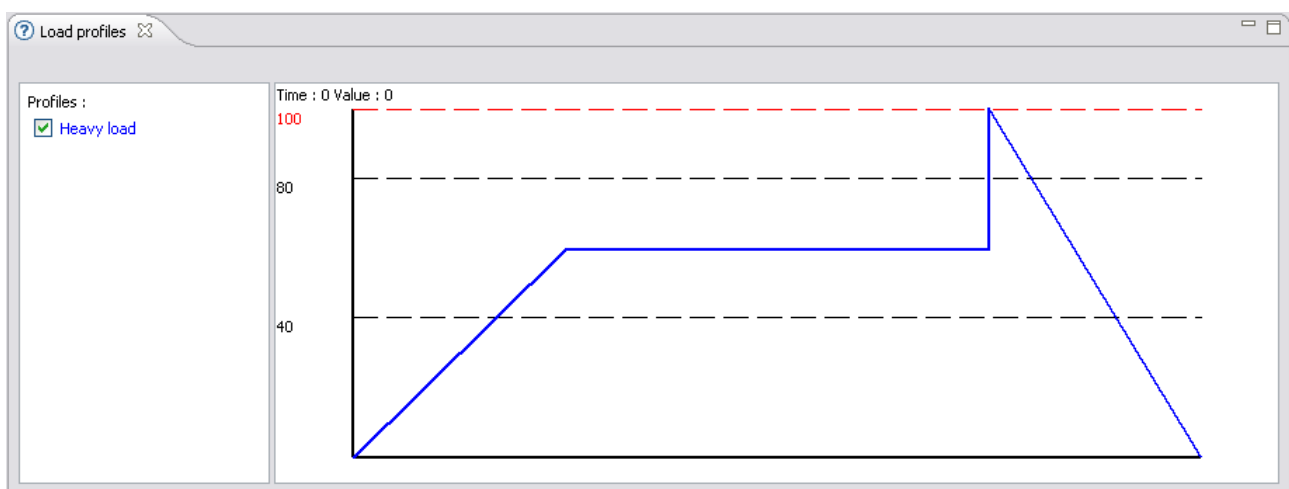


The "Load profile" dialog box is used to define a load profile. It features a title bar with a "Finish" button and a close button. The main area is titled "Add points for this profile Heavy load". It contains input fields for "Time" (240) and "Population" (0), and a "Ramp style" section with radio buttons for different styles. A "Force stop" checkbox is also present. Below these is a "Points" table with columns for Time, Population, and Ramp style. The table contains three rows: (60, 60, /), (180, 100, hv), and (240, 0, /). To the right of the table are buttons for "Add point", "Modify point", and "Remove". At the bottom are "Finish" and "Cancel" buttons.

Time	Population	Ramp style
60	60	/
180	100	hv
240	0	/

Click on the Finish button :

You can see the load profile form watching the "Load profiles" view :



## 4. 4. Define your test plan

### 4.1. Description of the context

In our case we want to test an LDAP directory. To test it and to get the results during the loading test we will deploy injectors and probes.

We want to test the LDAP directory sending requests from two injectors deployed on two different servers. To be able to see the server's CPU usage rate we will deploy on each of them a CPU probe.

To be able to get necessary information to generate a load test report for our LDAP directory we will deploy a CPU probe and a JVM probe on the LDAP server.

Before to start we have to introduce the term of « blade ». A blade is an active component that can be deployed within a CLIF application, under control of the supervisor component, that provides statistical information about its execution (for monitoring purpose), and produce results stored by the storage component. Blades exist either as load injectors or probes.

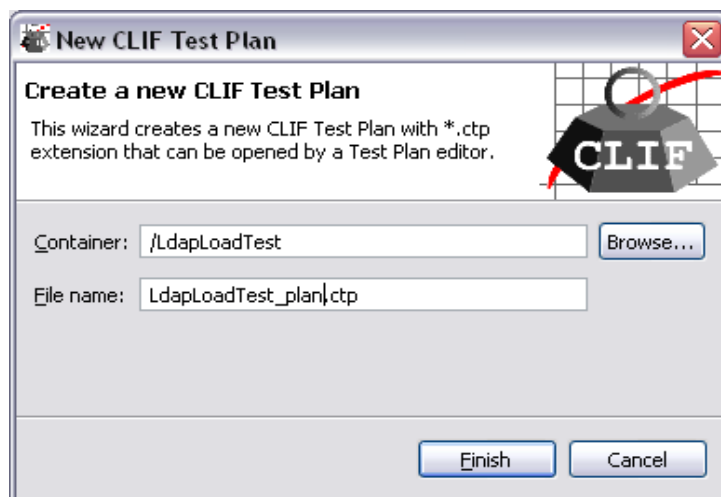
### 4.2. Creating your test plan

This test plan will be created at the same location of the ISAC scenario file.

Select your LdapInjectorLoadTest project. Right click on it and choose Clif testPlan



Then enter your test plan name and click on the Finish button :



### 4.3. Add Probes and Injectors to your test plan

In our case we will add :

- Two injectors, one on each server used to inject requests on the LDAP directory.
- Three CPU probes, one on each injector server and one on the server where the LDAP directory is installed.
- One memory probe, on the server where the LDAP directory is installed.

Click on the add button

Add

Then you have to set the properties of the component you want to add :

#### ▼ Properties

Manage injector and probe properties

Id* :	<input type="text" value="0"/>
Server* :	<input type="text" value="local host"/> <input type="button" value="Refresh"/>
Role* :	<input type="text" value="probe"/> <input type="button" value="▼"/>
Class* :	<input type="text"/>
Arguments :	<input type="text"/>
Comment :	<input type="text"/>

As we want to add three probes we have to set the Server name or the IP address of the server where the probes will be deployed.

To be able to set the Server name or the IP address you have to start your CLIF registry and launch your CLIF server (refer to chapter 5.3 Running a registry, 5.4 Configuring a CLIF server, 5.5 Running a CLIF server).

Otherwise you will not be able to change the server name which is local host by default.

For example :

```
Id : 0
Server : 10.0.0.1
Role : probe
Class : cpu
Arguments : 1000 600 (a measure will be taken each 1000 ms and during 600 s)
Cpu probe deployed on 10.0.0.1
```

Click on the add button :

```
Id : 1
Server : 10.0.0.2
Role : probe
```

Class : cpu  
 Arguments : 1000 600 (a measure will be taken each 1000 ms and during 600 s)  
 Cpu probe deployed on 10.0.0.2

Click on the add button :

Id : 2  
 Server : 10.0.0.3  
 Role : probe  
 Class : cpu  
 Arguments : 1000 600 (a measure will be taken each 1000 ms and during 600 s)  
 Cpu probe deployed on 10.0.0.3

Don't forget to save your test plan clicking on File -> Save (or Ctrl+s)

Now we have this view :

## Test Plan Editor

### Injectors and probes

All injectors and probes in the test plan

cpu							Add
Id	Server	Role	Class	Arguments	Comment		Remove
2	10.0.0.3	probe	cpu	1000 600	Cpu probe deployed on 10.0.0.3		Remove All
1	10.0.0.2	probe	cpu	1000 600	Cpu probe deployed on 10.0.0.2		
0	10.0.0.1	probe	cpu	1000 600	Cpu probe deployed on 10.0.0.1		

We do the same thing with the jvm probe

Id : 3  
 Server : 10.0.0.2  
 Role : probe  
 Class : jvm  
 Arguments : 1000 600 (a measure will be taken each 1000 ms and during 600 s)  
 Memory probe deployed on 10.0.0.2

Now we have this view :

And finally with the injectors :

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### Test Plan Editor

#### Injectors and probes

All injectors and probes in the test plan

cpu jvm

Id	Server	Role	Class	Arguments	Comment
3	10.0.0.2	probe	jvm	1000 600	Jvm probe deployed on 10.0.0.2

Add

Remove

Remove All

Id : 4

Server : 10.0.0.1

Role : injector

Class : IsacRunner

Arguments : LdapInjectorLoadTest\_1.xis

Injector deployed on 10.0.0.1

Id : 5

Server : 10.0.0.3

Role : injector

Class : IsacRunner

Arguments : LdapInjectorLoadTest\_1.xis

Injector deployed on 10.0.0.3

Now we have this view :

### Test Plan Editor

#### Injectors and probes

All injectors and probes in the test plan

cpu jvm injector

Id	Server	Role	Class	Arguments	Comment
5	10.0.0.3	injector	IsacRunner	LdapInjectorLoadTest_1.xis	Injector deployed on 10.0.0.3
4	10.0.0.1	injector	IsacRunner	LdapInjectorLoadTest_1.xis	Injector deployed on 10.0.0.1

Add

Remove

Remove All

## 4.4. Deploying and executing your test plan

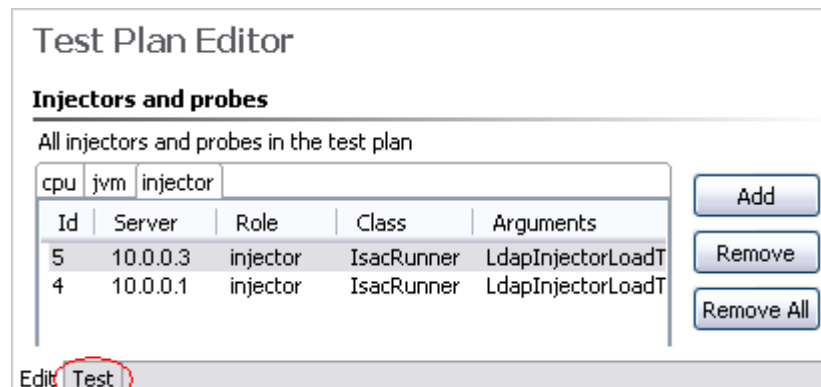
Your code server path should include the directory where your scenario file is, in order to benefit from the automatic remote loading of the scenario file by every remote ISAC execution engine you may have defined in your test plan.

In our case, to be able to test the Ldap directory we also need to include the directory where your csv file is in order to access to the connection and research parameters. (refer to chapter 5.3 Running a registry).



Now you can open your testplan. A new tabulation named “test” appears.

Click on it.



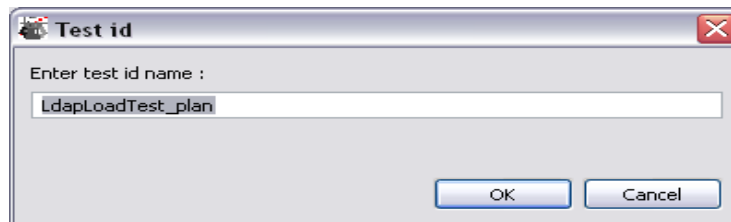
On this tabulation you can see the status of all your blades :

And the global status of your testplan : Global state:  
undeployed

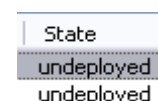
Click on the deploy button



Once the deployment of all your blades done (global state = deployed) you can initialize it (button : ) and choose the testplan you want to initialize :



Once the initialization done you can see it on the monitor tabulation :

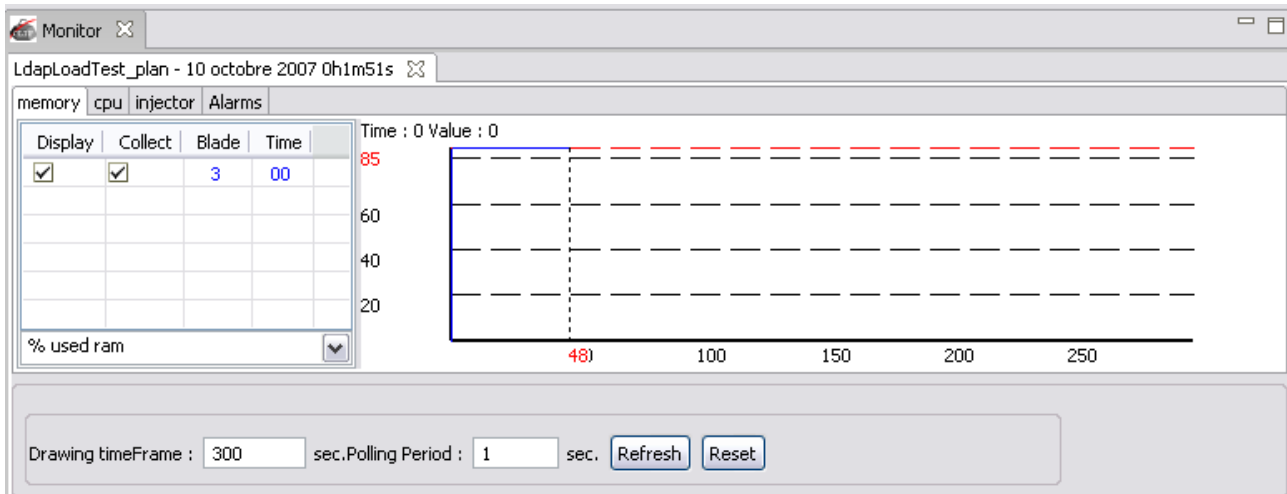


As soon as the test plan is deployed and initialized, the monitoring area pops up in the test plan window's bottom part. This area holds a set of tabbed panels:

- one for all injectors
- one for each probe family

For each panel, the user may set the monitoring timeframe, the polling period, and start or stop the monitoring process. Moreover, a checkbox table at the left side of each panel makes it possible to selectively disable or enable the collect and display of monitoring data, for each blade.

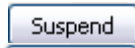
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Now you can start the injection by clicking on the start button :



And then you can suspend , stop or change dynamically some arameters of the load test.



Several parameters of the execution engine may be modified, including at runtime, using the Parameters button :

- about the engine itself (size of the thread pool, polling period for load profile management, tolerance on deadlines);
- about the active scenario, in particular the number of active instances (population) of each behavior.

Once the load test completed you have access to the collect action :



Collecting CLIF data will generate reports files. These text files are stored in :

/path\_to\_clif\_directory/clif-1.2.2-console/plugins/org.objectweb.clif.console.plugin\_1.2.2/report

## 5. CLIF server

### 5.1. Requirements

To see the technical requirements refer to chapter 1.2 Technical requirements

You need to download and unzip the [clif-server-1.2.2.zip](#) archive on the platforms on which you'll deploy the CLIF servers.

### 5.2. Rationale

CLIF servers are necessary to deploy any test plan, since they host load injectors and probes. CLIF servers are designated by a name, which is registered in a Registry. In order to run, CLIF servers must be able to find this Registry, which implies that :

1. the Registry must be running before a CLIF server can be launched;
2. parameters must be given to tell the CLIF servers where to find the Registry and register themselves.

### 5.3. Running a registry

There are three ways of starting a registry :

1. running the Java Swing console GUI
2. using the Eclipse-based console GUI
3. using the appropriate command

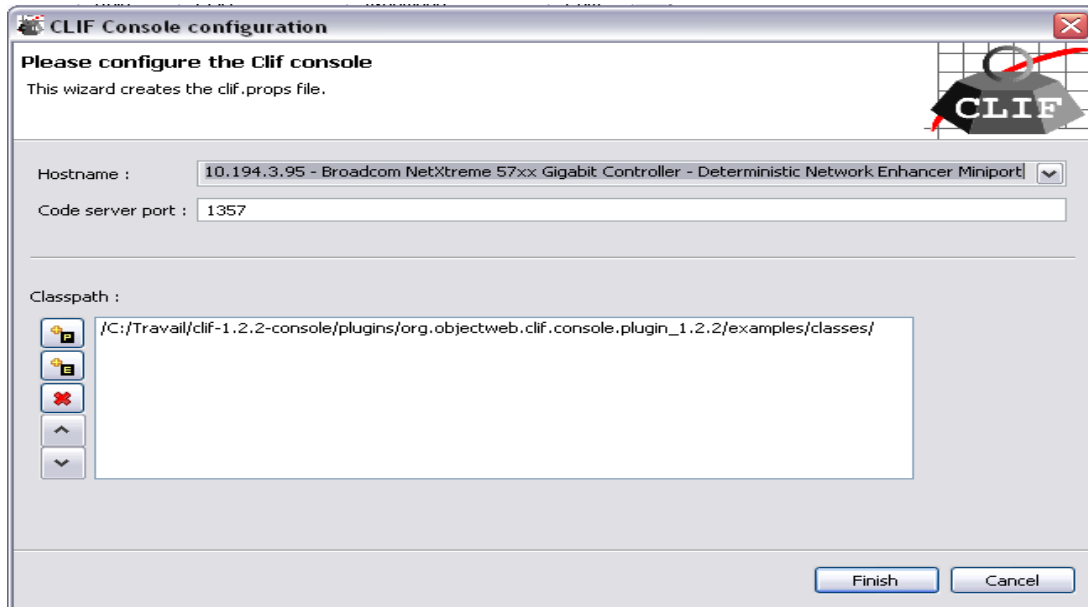
In our case (test an LDAP directory) we will use the Eclipse-based console GUI:

Click on the start registry button :  in the task button bar




Then you can set :

- the host name which identifies the server where the registry will be launched,
- the code server port
- and the classpath which is the path to access to the ctp, xis, csv (etc) files.


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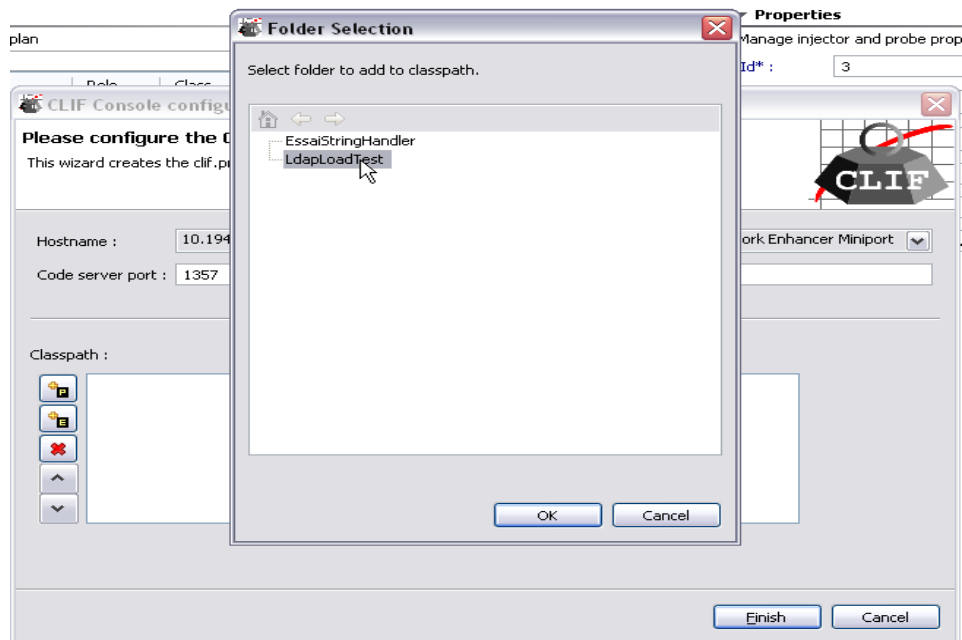
You can add or delete paths using these buttons :

-  to add projects path
-  to add externals path
-  to delete the selected path

In our case we will delete the default path and add our project path.

Select the default Classpath and click on this button : 

Then on the add projects path button  and choose your project path :



And finally click on Finish to start the registry.

## 5.4. Configuring a CLIF server

You may configure CLIF either by editing file `clif.props` in the `etc/` subdirectory, or by using command `"ant config"`. In the latter case, the following questions will be asked :

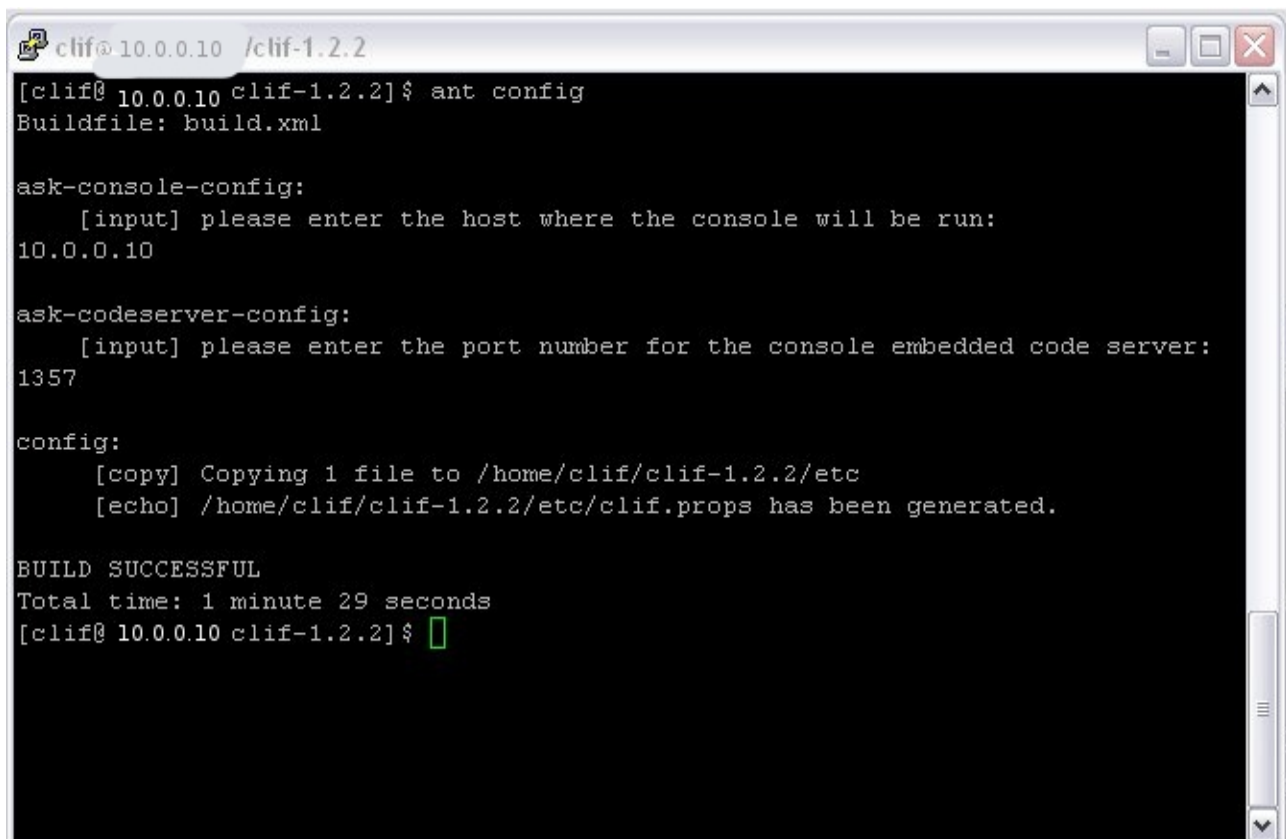
- *please enter the host where the console will be run:*  
enter the IP address or name of the computer where you will run the Registry, either embedded in the Swing or Eclipse GUI, or launched by command line.
- *please enter the port number for the console embedded code server:*  
enter the port number used by the code server, for example 1357.

This configuration operation must be done everywhere you want to run a CLIF server or a console. You may also make this configuration step only once, and copy the resulting file `etc/clif.props` wherever needed.

In our case we will deploy a CLIF server on :

- Server 1 : 10.0.0.1
- Server 2 : 10.0.0.2
- Server 3 : 10.0.0.3

The console will be run on 10.0.0.10 and the code server will be the default one 1357 :



```
clif@10.0.0.10 /clif-1.2.2
[clif@ 10.0.0.10 clif-1.2.2]$ ant config
Buildfile: build.xml

ask-console-config:
  [input] please enter the host where the console will be run:
10.0.0.10

ask-codeserver-config:
  [input] please enter the port number for the console embedded code server:
1357

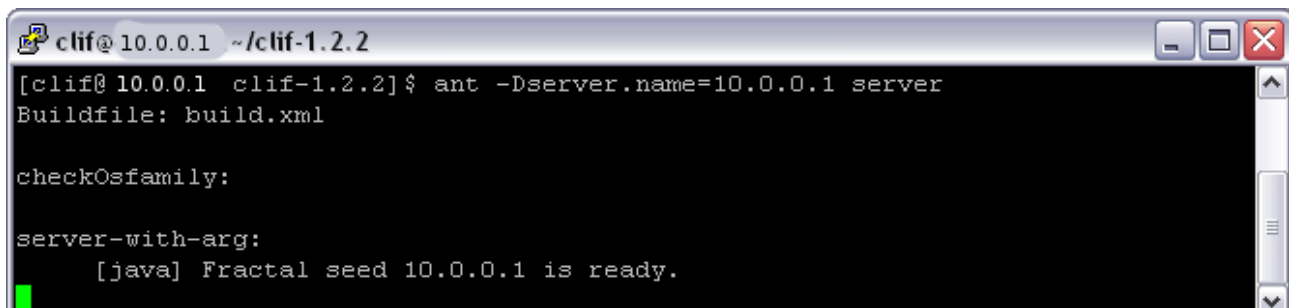
config:
  [copy] Copying 1 file to /home/clif/clif-1.2.2/etc
  [echo] /home/clif/clif-1.2.2/etc/clif.props has been generated.

BUILD SUCCESSFUL
Total time: 1 minute 29 seconds
[clif@ 10.0.0.10 clif-1.2.2]$
```

## 5.5. Running a CLIF server

CLIF must be configured on each host you plan to run a CLIF server, accordingly to where your Registry is running. Your Registry must be running to be able to launch Clif server. (cf chapter 4.3)  
Then, run a CLIF server with command :

- **ant server** to create a CLIF server that registers with the local host name as CLIF server name
- **ant -Dserver.name=myFirstServer server** to create a CLIF server that registers with the provided name

A terminal window titled 'clif@ 10.0.0.1 ~/clif-1.2.2' with standard window controls. The terminal shows the command '[clif@ 10.0.0.1 clif-1.2.2]\$ ant -Dserver.name=10.0.0.1 server' being executed. The output includes 'Buildfile: build.xml', 'checkOsfamily:', 'server-with-arg:', and '[java] Fractal seed 10.0.0.1 is ready.' followed by a green cursor.

```
clif@ 10.0.0.1 ~/clif-1.2.2
[clif@ 10.0.0.1 clif-1.2.2]$ ant -Dserver.name=10.0.0.1 server
Buildfile: build.xml

checkOsfamily:

server-with-arg:
    [java] Fractal seed 10.0.0.1 is ready.
```

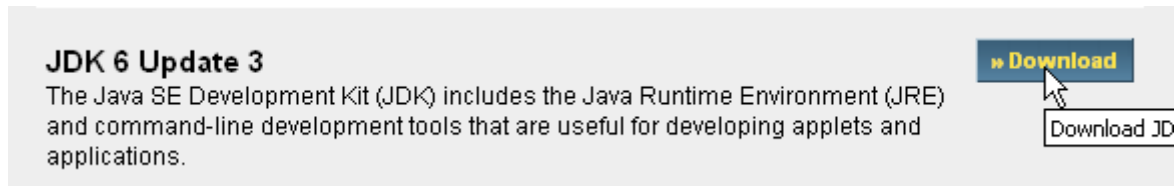
## 6. Appendix A : Install mandatory requirements

### 6.1. Download requirements

#### 6.1.1. Sun J2SDK™ 1.5 (1.5 version or greater is mandatory)

Click on the following link : <http://java.sun.com/javase/downloads/?intcmp=1281>




Click on the download button of the current version of the JDK :



Accept the licence agreement :



Select the platform where CLIF will be used :

Windows Platform - Java(TM) SE Development Kit 6 Update 3			
<input checked="" type="checkbox"/> 			
Download the full version as a <b>single file</b> .			
<input type="checkbox"/>	 <a href="#">Windows Offline Installation, Multi-language</a>	jdk-6u3-windows-i586-p.exe	65.64 MB
<input type="checkbox"/>	 <a href="#">Windows Online Installation, Multi-language</a>	jdk-6u3-windows-i586-p-iftw.exe	373.39 KB

or

Linux Platform - Java(TM) SE Development Kit 6 Update 3			
<input checked="" type="checkbox"/>			
<input type="checkbox"/>	↓ <a href="#">Linux RPM in self-extracting file</a>	jdk-6u3-linux-i586-rpm.bin	61.64 MB
<input type="checkbox"/>	↓ <a href="#">Linux self-extracting file</a>	jdk-6u3-linux-i586.bin	65.40 MB

and save the downloading file on your computer.

Once the download done, you can launch the installation on the environment you want to install it.

#### 6.1.2. Apache ant utility version 1.5.4 or greater

Click on the following link : <http://ant.apache.org/bindownload.cgi>

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Click on the current release of apache ant utility depending of the platform where CLIF will be used (For windows select the .zip file and for linux the .tar.gz file) :

### Current Release of Ant

Currently, Apache Ant 1.7.0 is the best available version, see the [release notes](#).

#### Note

Ant 1.7.0 has been released on 19-Dec-2006 and may not be available on all mirrors for a few days.

#### Tar files may require gnu tar to extract

Tar files in the distribution contain long file names, and may require gnu tar to do the extraction.

- .zip archive: [apache-ant-1.7.0-bin.zip](#) [PGP] [SHA1] [MD5]
- .tar.gz archive: [apache-ant-1.7.0-bin.tar.gz](#) [PGP] [SHA1] [MD5]
- .tar.bz2 archive: [apache-ant-1.7.0-bin.tar.bz2](#) [PGP] [SHA1] [MD5]

Then save the downloading file on your computer.

Once the download done, you can unzip the archive file where you want on your platform.

## 6.2. Environement variables setting

### 6.2.1. Windows OS

Now you have to set the following environnement variable :

- JAVA\_HOME=C:\Program Files\Java\jdk1.6.0\_03
- ANT\_HOME=C:\Program Files\apache-ant-1.7.0

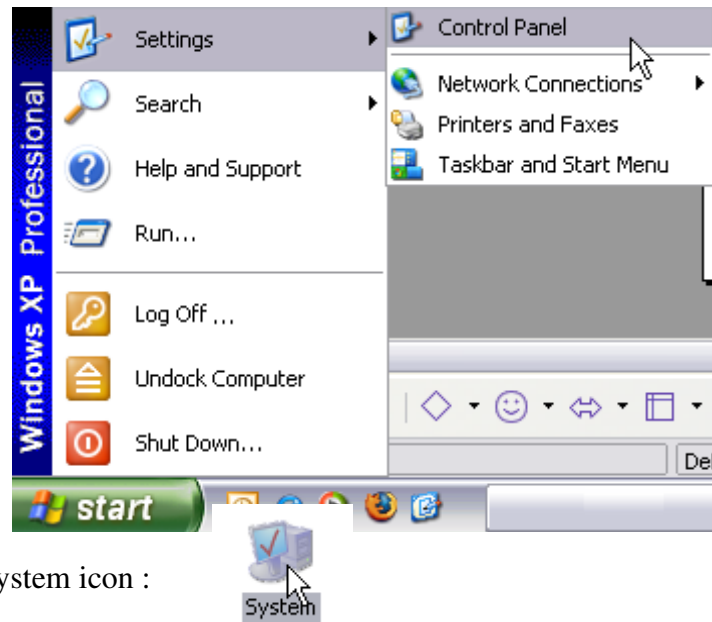
And to modify :

- PATH=<value already in path>;%JAVA\_HOME%\bin;%ANT\_HOME%\bin

Go to :

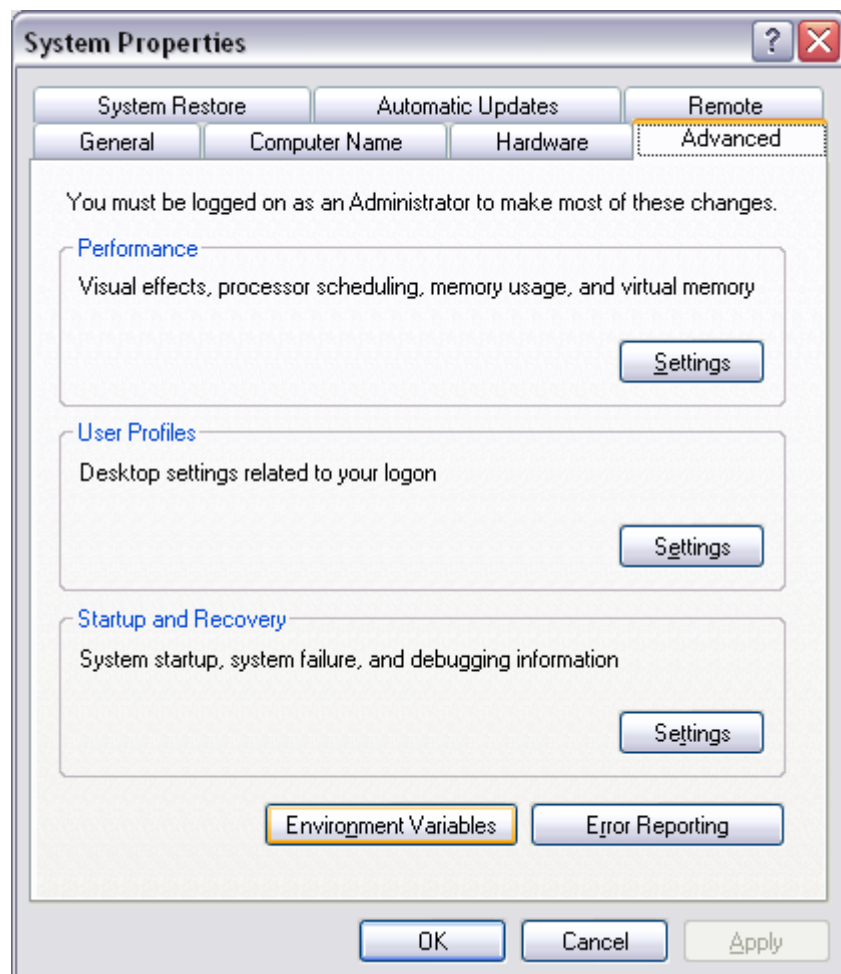
Start > Settings > Control Panel





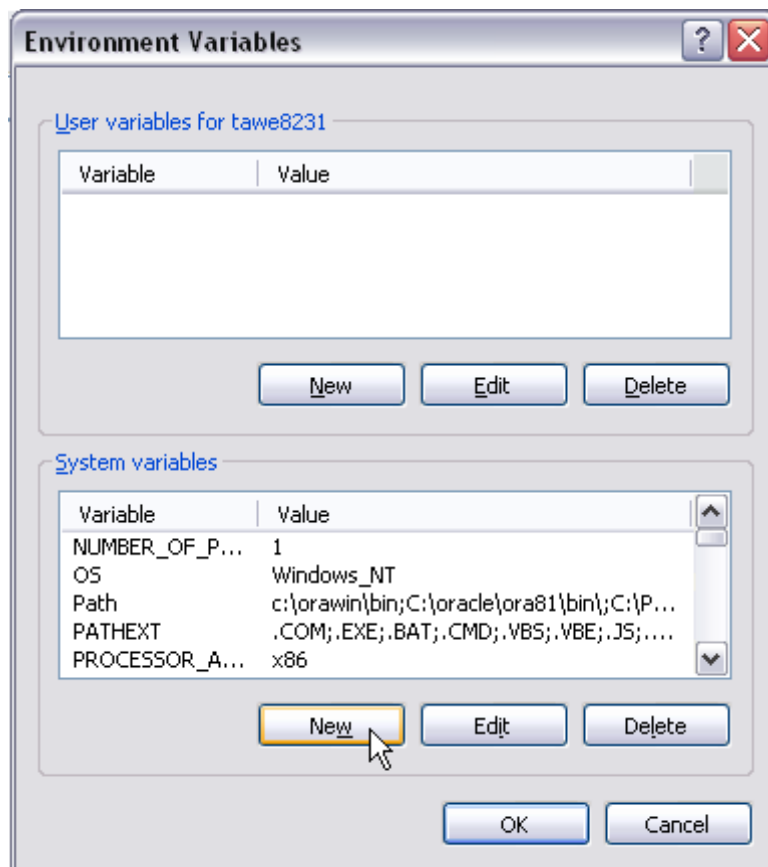
Double click on the system icon :

Choose advanced tab and click on the environment Variables button :

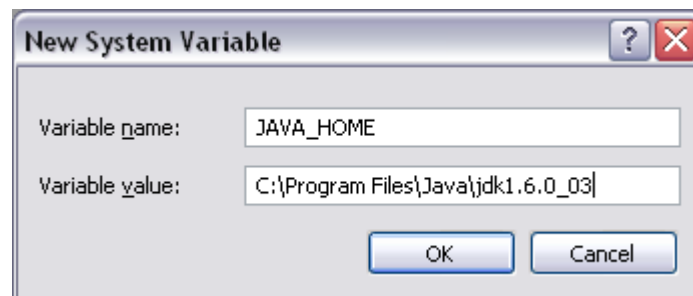


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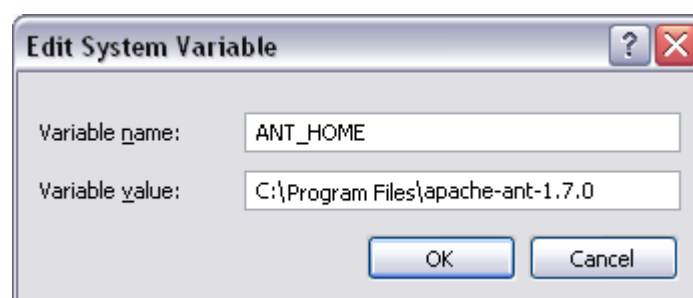
Now click on the New button of the System variables parameters group :



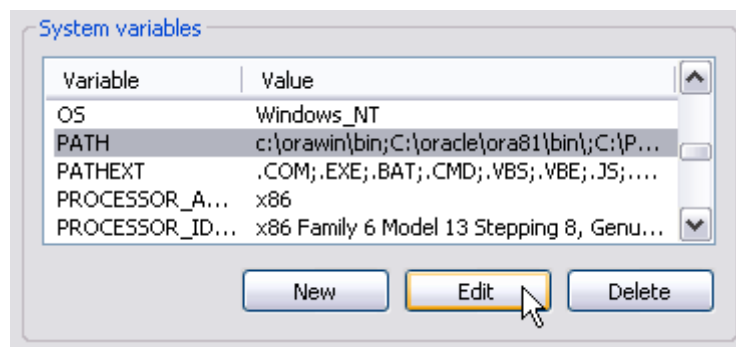
Then enter the variable name and its value :



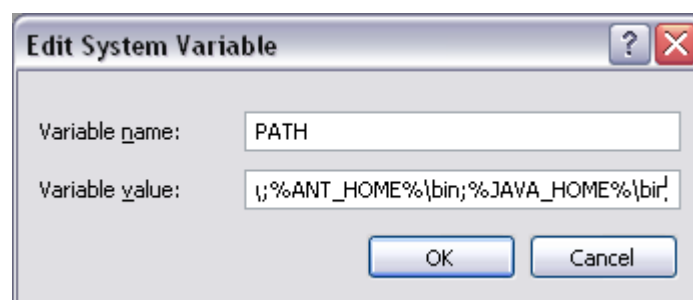
Do the same thing for ANT\_HOME variable :



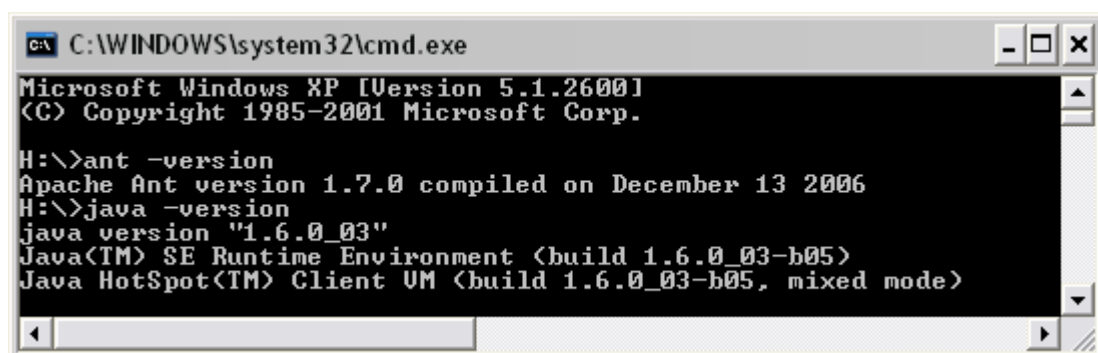
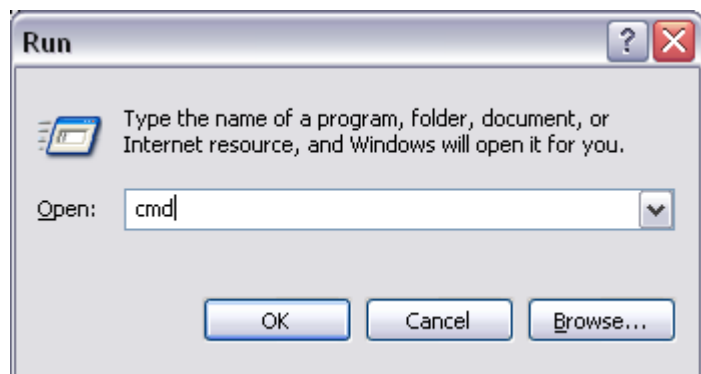
Now modify the PATH variable. Select the PATH variable and click on the Edit button :



Now add the reference to the ANT\_HOME\bin and JAVA\_HOME\bin repertory at the end of the PATH line :



Now you just have to check if the good java version and ant version are used by your system.



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### 6.2.2. Linux OS

Now you have to set the following environment variable :

- JAVA\_HOME=/usr/lib/jdk1.6.0\_03
- ANT\_HOME=/usr/lib/apache-ant-1.7.0

And to modify :

- PATH=\$PATH:\$HOME/bin:\$ANT\_HOME/bin:\$JAVA\_HOME/bin

Go to the root directory of your user account.

Modify the .bash\_profile file with the following command line : vi .bash\_profile

If this file doesn't exist you can create it.

Put in it the following line :

```
# .bash_profile
# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs
ANT_HOME=/usr/lib/apache-ant-1.7.0
JAVA_HOME=/usr/lib/jdk1.6.0_03
PATH=$PATH:$HOME/bin:$ANT_HOME/bin:$JAVA_HOME/bin

export ANT_HOME
export JAVA_HOME
export PATH
unset USERNAME
```

Now you have to logg off from your platform and then logg on to reload the .bash\_profile file.

Now you just have to check if the good java version and ant version are used by your system.

```
[clif@ ~]$ ant -version
Apache Ant version 1.7.0 compiled on December 13 2006
[clif@ ~]$ java -version
java version "1.6.0_02"
Java(TM) SE Runtime Environment (build 1.6.0_02-b05)
Java HotSpot(TM) Server VM (build 1.6.0_02-b05, mixed mode)
[clif@ ~]$ █
```

### 6.2.3. Mac OS X

[TODO]