IE 172 Laboratory 0: Setting Up Python and Eclipse

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1 Laboratory Description and Procedures

1.1 Learning Objectives

1. Understand the purpose and uses of an integrated development environment (IDE).
2. Understand how to install and use the `Eclipse IDE` with `Python` and the `PyDev`.
3. Understand how to develop a simple Python application using `Eclipse` from scratch.
4. Understand how to import existing Python code into an `Eclipse` project.
5. Understand how to debug a Python application using `Eclipse`.

1.2 Key Words

1. Source file
2. Python
3. Module
4. IDE
5. Eclipse
6. PyDev
7. Debug

1.3 Installing Eclipse, Python, and PyDev

The purpose of this lab is to install the integrated development environment (IDE) and interpreter we will be using in the course this semester. An IDE is an application for developing and debugging software applications. You have probably used the `Eclipse` IDE with Java in a previous class. This semester, we will be using the `Eclipse` IDE with Python as our development environment.

Python is an interpreted language, which means that there is no separate compile step required before the code is run. A Python program is read and the commands are interpreted in sequence. In some cases, the interpreter will compile Python code for more efficient future execution, but this is not a separate step. The interpreter and debugger are open source tools that are freely available and distributable. Installation and use of these tools is simple.

The primary tools we will be using in this class for development will be the Python programming language and the Eclipse Integrated Development Environment along with the PyDev plug-in. We will also be using a number of other Python packages that we'll install as we go along. All of the tools we will be using are freely downloadable and can be installed on a wide range of hardware in different configurations and on different OSs. The instructor can help you with installation in your preferred environment. The instruction below give you a few different options and should work on both Windows and OS X. If you are using Linux, things are even easier.

1. First, download Eclipse 4.5.1 from the "Latest Release" section of

   `http://download.eclipse.org/eclipse/downloads/`

   If you're on Windows, use the 32-bit version, since some of the packages we'll use are only available in 32-bit. On OS X, there is no choice.

2. Eclipse is implemented in Java, so you can unzip the downloaded archive to either your `H:\` drive, a pen drive, or your laptop, as desired. No installation is required (but you must have Java installed).

3. Once downloaded, open the Eclipse application by double clicking on `Eclipse\Eclipse.exe`.

4. It is recommended that you choose your workspace directory as `Eclipse\workspace` to keep everything in one place.

5. Install the PyDev plug-in by choosing "Install New Software" from the "Hlpe" menu and adding the site

   `http://pydev.org/updates`

6. Finally, download and install 32-bit Python 2.7 from either

   `http://anaconda.com`

   or

   `http://winpython.sourceforge.net`

   The former works on both Windows and OS X. The latter works only on Windows and is a "portable" distribution, which is what you need if you want to work off of a pen drive. Another option on OS X, which will be easier in the long-run is to install `homebrew` and get Python using the command `brew install python`.

Now that we have both Eclipse and Python, let's test the interpreter.

1. Open the interactive interpreter. This can be done in different ways, depending on which version of Python you've installed, but searching for and double-clicking on `python.exe` should work with all versions of Python in Windows. You can probably do this from the Start menu as well. In OS X, open a terminal and type `python`.

2. Now try typing

```
>>> print "Hello World"
Hello World
```

Congratulations, you've now written your first Python program! Next, we'll create a new Python program in PyDev.

1. Start Eclipse and create a new PyDev project by selecting File → New → Project and then selecting the option for creating a PyDev project.

2. Click on the link to configure the interpreter and browse to the location of the interpreter you installed.

3. Type Lab0 as the project name and click on the Finish button to create the project.

4. Right click on the project name in the Package Explorer and choose New → Python Module.

5. Choose the name hello.

6. Type your program as before.

   ```
   print "Hello World"
   ```

7. Run your program by choosing Run → Run and then choosing the option to execute as Python Run or hitting ctrl-F11.

An important component of the overall system we will be using is the debugger, which allows you to find errors in your code by examining its state as it is running. The debugger we will use is part of the PyDev environment. To debug your program, follow these steps:

1. First, put a breakpoint on the line with the print statement by right-clicking in the margin on the far left of the source window.

2. Choose Run → Debug (or hit F11) and step through your program with the appropriate button or with F6.

2 Laboratory Assignments

2.1 Programming (50 points)

1. Install Eclipse, PyDev, and Python as above.

2. Following the steps outlined above, develop a simple application that prints Hello World to the console window.

3. Change your program so that it prints out the number 1 through 10 to the screen.

4. Test the debugger by following the instructions above and then stepping through your program one line at a time. Debug the program bug.py and determine what goes wrong.

5. Extend the Fraction class given in the text book by adding absolute value (abs), subtraction (sub) and multiplication (mul) methods.