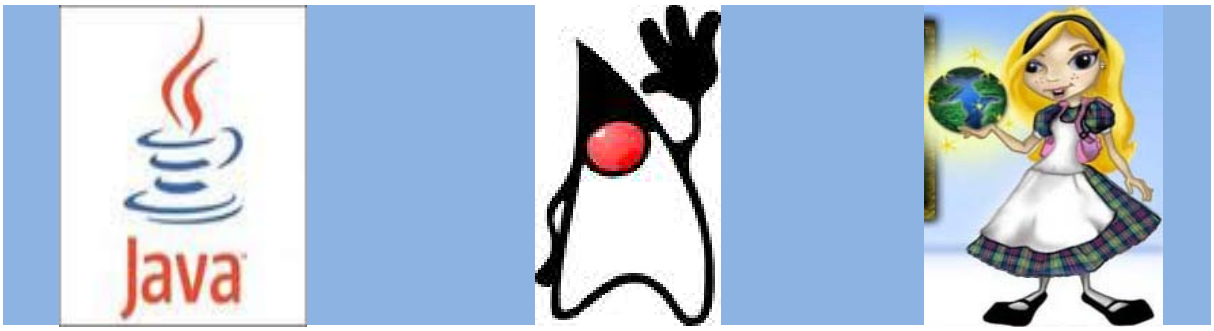

Structured Programming

Simplified With Alice and Java

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Introduction

In the many years of teaching Structured Programming at Southern Maine Community College I have yet found a text book that works for this class. Therefore, I have decided to write my own.

This book is intended to be a guide for CMPT 125 Structured Programming. This book is designed to teach the basics of structured programming using the Java language. The book is not intended to be a manual of how to program in Java. Java is a very complex subject and it takes years to learn. We will focus on the basics in this class. I encourage you to use the internet to read and learn as much about Java as possible while taking this class.

Java History

Since 1995, Java has changed the world

Today, with technology such a part of our daily lives, we take it for granted that we can be connected and access applications and content anywhere, at anytime. Because of Java, we expect digital devices to be smarter, more functional, and way more entertaining.

In the early 90s, extending the power of network computing to the activities of everyday life was a radical vision. In 1991, a small group of Sun engineers called the "Green Team" believed that the next wave in computing was the union of digital consumer devices and computers. Led by James Gosling, the team worked around the clock and created the programming language that would revolutionize our world – Java.

The Green Team demonstrated their new language with an interactive, handheld home-entertainment controller that was originally targeted at the digital cable television industry. Unfortunately, the concept was much too advanced for them at the time. But it was just right for the Internet, which was just starting to take off. In 1995 the team announced that the Netscape Navigator Internet browser would incorporate Java technology.

Today, Java not only permeates the Internet, but also is the invisible force behind many of the applications and devices that power our day-to-day lives. From mobile phones to handheld devices, games and navigation systems to e-business solutions, Java is everywhere! (http://www.java.com/en/javahistory/index.jsp)

Java History Timeline

1991	The Green Project Begins MS DOS is the dominant operating system Cell phones weigh half a pound "Biosphere 2" project begins
1992	"Oak" is the language *7 Debuts "Duke" is featured in the Interface Johnny Carson signs off "The Tonight Show" on NBC
1993	The Green Project becomes First Person Mosaic v1.0 is released "Cheers" ends an 11-year run
1994	WebRunner released — the first browser that supports moving objects and dynamic executable content The Apple QuickTake 100, the first consumer digital camera, goes on sale for less than $1,000 "Friends" debuts on NBC

1995	Java technology released to a select group on the Web site wicked.neato.org The San Jose Mercury News runs a front-page article about Java technology Name changed from "Oak" to "Java" Announced at Sun World -- Java technology is officially born
1996	The first JavaOne Developer Conference JDKtm 1.0 software is released Chess computer Deep Blue defeats Garry Kasparov for the first time "Dolly" the first cloned sheep is born
1997	Over 220,000 downloads of JDK 1.1 software occur in just three weeks JavaOne draws 8,000 attendees, becoming the world's largest developer conference Java Card 2.0 platform is unveiled 43% of U.S. families own a computer
1998	JDK 1.1 release downloads top 2 million Visa launches world's first smart card based on Java Card technology The Java Community Process (JCP) program formalized "Who Wants to Be a Millionaire?" premieres in the U.K
1999	Java 2 platform source code is released JavaOne draws 20,000 J2EE beta software is released "Star Wars Episode I: The Phantom Menace" released
2000	Over 400 Java User Groups are established worldwide Java Developer Connection program tops 1.5 million members Steve Jobs joins Scott McNealy on stage at JavaOne to announce a major commitment by Apple in support of Java technology Heavy Metal band Metallica sues Napster for copyright violations
2001	First international JavaOne conference in Yokohama Japan Over 1 million downloads of the Java Platform, Enterprise Edition (Java EE) SDK Google Inc. PageRank search algorithm patent awarded "The Lord of the Rings: The Fellowship of the Ring" is released
2002	J2EE SDK downloads reach 2 million 78% of executives view J2EE technology as the most effective platform for building and deploying Web services The Euro is introduced "The Osbournes" becomes a surprise hit on MTV
2003	Java technology runs in almost 550 million desktops Almost 75% of professional developers use Java programming language as their primary development language Commercial Voice-Over-Internet (VoiP) phone service begins "The Da Vinci Code" is published
2004	Java 2 Platform, Standard Edition 5 (Project Tiger) is released The Java technology-powered Mars Rover (Spirit) touches down on Mars Sun Java Studio Creator is launched
2005	Java technology celebrates its 10th birthday Approximately 4.5 million developers use Java technology Over 2.5 billion Java technology-enabled devices are available java.com bundles the Google Toolbar with the JRE download
2006	Rich Green announces at the JavaOne 2006 Conference that it's not a matter of when Sun will open source Java technology, but how. The NetBeans IDE 5.0 is released. Sun open-sourced Java EE components as the Glassfish Project to java.net. Java SE and ME initial components are released as open source. Pirates of the Caribbean: Dead Man's Chest is released.

(http://www.java.com/en/javahistory/timeline.jsp)

Alice

Carnegie Mellon Professor Randy Pausch (Oct. 23, 1960 - July 25, 2008) is behind the creation of Alice, a program used to create virtual worlds using 3D graphics. Objects in Alice can move, spin, change color and react to a mouse click. Randy created Alice to help make programming fun and easy. I am using Alice as an introduction to Java programming. So let's have a little fun before we jump into the Java world.

First we must begin by downloading and installing Alice. Alice is a free download from http://www.alice.org/ Select the Alice 2.0 designed for high school and college students. There really isn't an installation process for Alice. All that is needed is to extract the files into a folder where you want to run Alice from and run the alice.exe file. You may want to create a short cut on the desktop of the alice.exe application file for ease of running Alice. The programs that you create should be stored in a folder where you can easily find them.

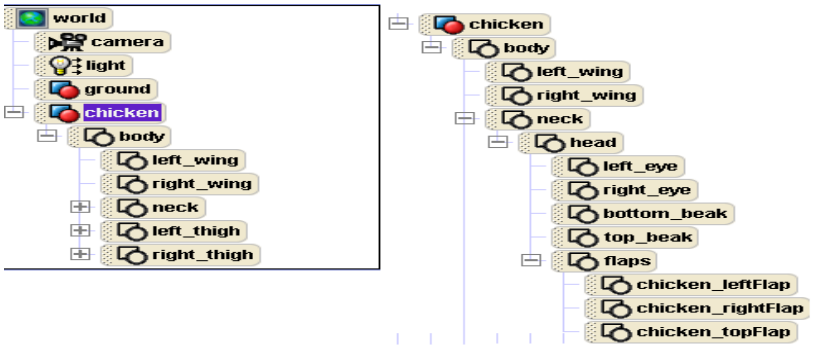
The Alice Environment

Alice programs or animations are created in the Alice *integrated development environment* (IDE). When you first start Alice a window will appear where you can select what you want to do as shown in the figure below.

The tutorials are a good place to start and I encourage you to at least go through Tutorial1 to get acquainted with the Alice environment. Play around with Alice and look at all of the examples.

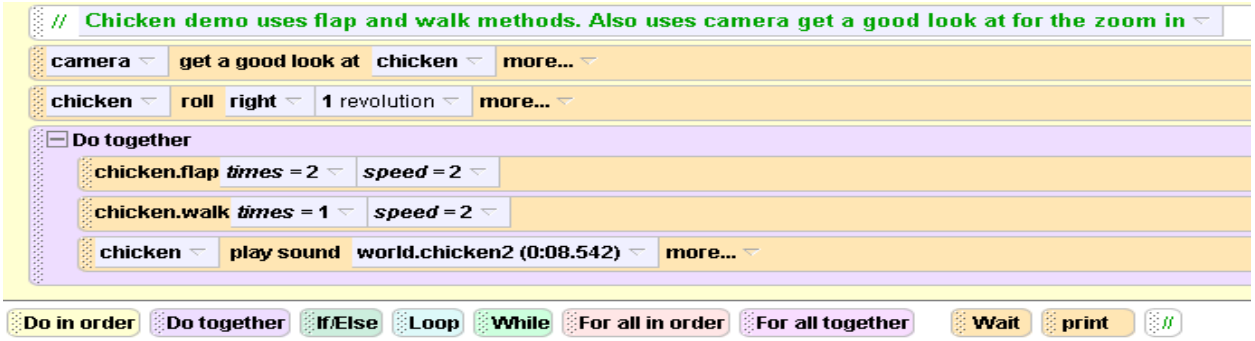
Objects in Alice

When you are ready to create your own world in Alice click on the Template tab or File…New World and select what environment you will create your world in. I will not go into great detail on how to build a world because the tutorials do a great job and you should start there. Everything in the Alice world is an object and you can have objects that are part of other objects. In the figure below the left side shows all of the objects in this world. Then I have drilled in on the chicken object going into the neck that contains the head and all of the objects on the head. Each of these objects can move independent of the other. This can be quite interesting because if you tell the head to move up one meter it will fly right off the chicken's body! To fix this problem you must move all of the objects of the head together.



Methods

A method is a set of statements that when called will execute. Every object has methods defined to make that object perform a movement or you can create your own. I have used the chicken.flap and chicken.walk methods that were written for the object. I have used a few *control statements* such as comments and Do together. These control statements can be dragged up from the bottom of the method editor section as shown in the figure below. By putting chicken.flap and chicken.walk and chicken.play sound in the Do together all of these actions will be perfomed at the same time. I have also used camera.get a good look at to zoom in and see the chicken up close.



Assignments

1. Download and install Alice from: http://www.alice.org/ Alice 2.0 for high school and college students.

2. View A Alice Demonstration from the Alice site All About Alice.

3. View the Tutorials in Alice.

Programming Projects

1. Create a world in Alice where a penguin walks across the ice and dives into a hole.

2. Create a world using the vehicle gallery where multiple planes are flying through the sky at multiple speeds.

3. Create a world of your choice. Be creative and try out as many of Alice's feature as you can.