PRIFYSGOL CYMRU; UNIVERSITY OF WALES

DEGREE EXAMINATIONS MAY/JUNE 2002

SWANSEA

Computer Science

CS 338 Internet Computing

Attempt 2 questions out of 3

Time allowed: 2 hours

Students are permitted to use the dictionaries provided by the University

Students are NOT permitted to use calculators

CS_338
INTERNET COMPUTING

(Attempt 2 questions out of 3)

Question 1

(a) Briefly outline the security constraints that are *usually* imposed on Java Applets, together with a short explanation of their reasons. What implications do these security restrictions have for data storage by applets? In some instances, some or all of these restrictions are relaxed. Give an example of a situation where this might be desirable.   **[10 marks]**

(b) Here is a short section of code representing a server application that sends "Hello World!" over a socket to some client.

```
import java.net.*;
import java.io.*;
import java.lang.*;

public class HelloWorld {

   public static void main(String argv[]) {
      try {
         ServerSocket sSoc = new ServerSocket(1664);
         Socket inSoc = sSoc.accept();
         PrintStream FibOut =
            new PrintStream(inSoc.getOutputStream());
         FibOut.println("Hello world!");
      }
      catch (Exception e) {
         System.out.println("Oh Dear! " +
            e.toString());
      }
   }
}
```

Explain how the code above works, paying particular attention to the communication aspects. Write a corresponding simple client for this server. Note that you may choose to write either an application or an applet, and minor syntactic/API errors will be ignored.   **[10 marks]**

(c) A programmer has developed an applet that communicates with a server application, and is in the process of testing it. S/he is using a network of workstations that share a common filestore (much like the Linux laboratory) and has created a short HTML document to invoke the applet. To test the server and applet, s/he does the following: (1) starts up the server on a remote machine, and (2) goes to her/his browser's "*open file…*" dialogue and clicks on the HTML document. The applet fails with a security exception: why is this and what should s/he do instead?   **[5 marks]**

Question 2

(a) Explain the difference between a *class*, an *abstract class*, and an *interface* in Java. What must you do to obtain executable code from (1) an abstract class; and (2) an interface? **[5 marks]**

(b) RMI is generally considered to be a "better" method of building distributed applications in Java than sockets. Give reasons why this is the case. **[5 marks]**

(c) You are asked to reimplement the Fibonacci server from the course notes, using RMI instead of sockets, and making the client an application instead of an applet. *Sketch* the required server and client code. How would you go about making the client an applet? (Hint: think about how security is handled in recent JDK releases.) **[10 marks]**

(d) CORBA can be seen as a language-independent, and more sophisticated, alternative to RMI. However, the process of mapping interfaces in CORBA IDL to Java is complicated by two factors. Explain *one* of these factors.
[5 marks]

Question 3

(a) Distinguish between the following methods of generating dynamic content in web pages.
• Client-side scripting; and
• Server-side scripting.
State the advantages and disadvantages of each. In what circumstances would you choose each of the above? **[10 marks]**

(b) CGI is another method of generating dynamic web content, that is often considered to have significant disadvantages: what are these? What *advantages* can you think of for CGI? **[5 marks]**

(c) Suppose you are asked to implement an online questionnaire system, in which a web-based interface is used to collect information from users, and store it in a pre-existing database. The questionnaire is quite complex, with various relationships between questions: for example, "If question X is answered 'yes', then question Y should be skipped". Demand for the questionnaire is expected to be very high. What technologies are available to you for each part of the system? Which ones would you choose and why?
[10 marks]