Strathmore
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES (SCES)
BACHELOR OF INFORMATICS AND COMPUTER SCIENCE (BICS)
END OF SEMESTER EXAMINATION
ICS 2101 – OBJECT-ORIENTED PROGRAMMING II

DATE: 11th November 2020 Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One (30 marks)

a) *Exception handling* is one process that most young developers ignore despite its significance. Describe the three common types of exceptions in object-oriented programming (OOP), mentioning under each an example. **(6 marks)**

b) The use of databases in OOP is one of the key steps towards creating a distributed system. JDBC provides a standard library for accessing relational databases. By using the JDBC API, one can access a wide variety of SQL databases with the same Java syntax. Describe the 6 significant steps that one must adhere to to facilitate database connection using JDBC. Ensure there is some *Java* code snippet to demonstrate each step. **(9 marks)**

c) Web applications have revolutionized the clients interact with different services. Servlets are an OOP concept that was created to facilitate the creation of Java programs that would run on a web server and be deployed through web browsers. Among the multiple classes and interfaces in the Servlet API, we have the Servlet interface. Describe the *three* life-cycle methods that reside in this interface, stating their functions, and using Java, write the syntax of each of these methods. **(9 marks)**

d) Remote Method Invocation (RMI) is an important API that supports the interaction of remote objects through elaborate interfaces. Draw a diagram to describe the various components that facilitate an RMI process, describing each of the components. **(6 marks)**

Question Two (15 marks)

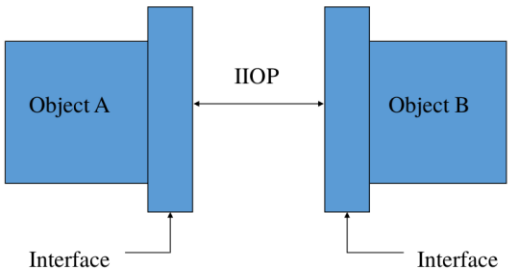
a) Multitasking can be obtained using either threads (multithreading) or processes (multiprocessing). Outlining at least two characteristics of each, distinguish between a *thread* and a *process.* **(4 marks)**

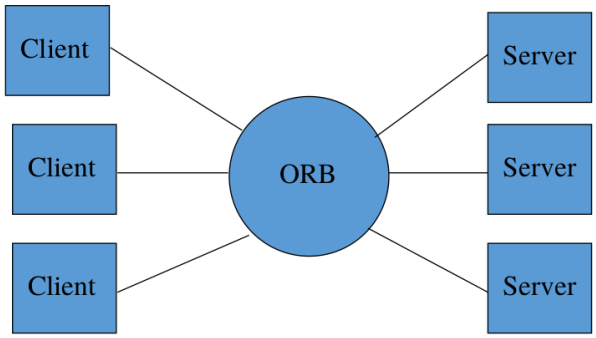
b) A thread's life cycle is usually comprised of 5 states. Each of these states is usually initiated by corresponding method(s). Describe the 5 states of a thread's life cycle, at each stage identifying the methods responsible for the transitions from one state to the other. **(7 marks)**

c) The JVM has two predominant thread scheduling techniques that it employs given the context. Describe these two techniques. **(4 marks)**

Question Three (15 marks)

a) The diagrams below indicate the interaction of objects, clients, and objects remotely through an architecture that facilitates such interaction in OOP that facilitates distributed system implementation. Name and define the technology, and in an elaborate explanation, explain how the objects in such an environment would communicate. **(6 marks)**





b) With still the technology in (a) above in mind, identify and describe the language used to facilitate the communication between the interfaces of the remote systems. Write a simple interface using the language identified. **(5 marks)**

c) Name and describe two other technologies that are similar to the technology identified in 3(a). **(4 marks)**

Question Four (15 marks)

a) *Enterprise Beans* are an important aspect of OOP in the creation of a distributed system. Using an elaborate diagram, describe the various components that form the ecosystem of an Enterprise system. **(6 marks)**

b) Describe the three types of enterprise java beans common in OOP, in each instance, giving an example of each. **(5 marks)**

c) Describe any *three* components that must go into the creation of an enterprise bean. **(4 marks)**

Question Five (15 marks)

a) A conglomerate has been running a legacy Information System implemented in C programming language for long years. As a developer lead in that company, you are tasked with creating a vital extension to the system that requires integration to the legacy system for effective working. You decide on using Java due to some of the rich features it has. However, you will need to research on a technology that would make your two components (the legacy system in C and your extension in Java) compatible.

   i. Describe your findings of the technology to be implemented that would facilitate the integration of your extension and the legacy system without changing of either of the source code. **(3 marks)**
   ii. Using a diagram, explain the working of the technology described above. **(4 marks)**

b) Greenfoot and Alice are two Java tools that are important in the early introduction to gaming and animation in OOP. Describe these two tools, highlighting at least 2 characteristics of each. **(4 marks)**

c) There are two common ways of creating a thread in Java. Using Java snippets, describe these two ways that a thread can be created. **(4 marks)**