Faculty of Computers & Information
**Distributed Systems**
Instructor: **Dr. Anas Youssef**

**Midterm Exam**
Time: **60 minutes**
Number of Pages: **2**
Total marks: **20**

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| **Student Name** | |
| **Student Section Number** | |

**Question 1:** **(5 Marks)**

**Choose the correct answer in each of the following questions from 1 to 5:**

**(1) Each of the following is a goal for building a distributed system except for:**
(A) fault detection (B) load balancing (C) fault tolerance (D) enhanced availability

**(2) Parallel systems (PSs) differ from distributed systems (DSs) in:**
(A) PSs have different types of processors while DSs have identical processors
(B) PSs have distributed memory while DSs have shared memory
(C) PSs perform homogenous tasks while DSs perform heterogenous tasks
(D) PSs perform heterogenous tasks while DSs perform homogenous tasks

**(3) Which of the following is considered an advantage of a Distributed System?**
(A) All the nodes in the distributed system are connected to each other (B) It can be scaled as required
(C) Failure of one node does not lead to the failure of the entire distributed system (D) All of the above

**(4) The capability of a distributed system to tolerate an increased service load while providing same efficiency is called**
(A) flexibility (B) tolerance (C) load balancing (D) scalability

**(5) What is meant by Inter-Process Communication (IPC)?**
(A) communication within the process (B) communication between two different processes
(C) communication between two different threads within the same process (D) Both B and C

**Question 2:** **(5 Marks)**

(a) Briefly describe the difference between **integrity** and **confidentiality** while securing distributed systems.

Integrity : Protection against alteration
confidentiality : Protection against unauthorized individual information

(b) Briefly **describe** the role of the **middleware layer** in any distributed system.

is a layer of software (system) between Applications and Operating System powering the nodes of a distributed system.



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(c) One of the challenges of a distributed system is **openness**. Describe briefly what is meant by an **open distributed system** and how to address this challenge.

refers to a system that is designed to interact with other systems .
by allowing different components to communicate and collaborate

To address this challenge: Middleware, Standardization,
service-oriented architecture, well-defined APIs

**Question 3:** **(10 Marks)**

(a) What is the role of the **port number** when creating a Java socket?

- serverSocket to implement server,
- socket to implement client,
- serverSocket take port number as parameter and socket take localhost and server port
- we must start server first then client and server accept connect

(b) The following line of Java code will create a **TCP server** at localhost port 1254: **True** or **False**. **Why**? **Socket** s = new **Socket**("localhost," 1254);

- False
- Because this code will create a Client socket not a Server

(c) Which of the following three types of thread architectures can provide more thread parallelism at the server: **Thread per request**, **Thread per connection** or **Thread per remote object**? **Why**?

"Thread per request" architecture offers more thread parallelism at the server as it allows concurrent processing of multiple independent requests.

(d) To execute the following code, firstly, thread1 will run, secondly thread2 will run and finally, thread3 will run: **True** or **False** and **why?**

```
Thread thread1 = new Thread();
Thread thread2 = new Thread();
Thread thread3 = new Thread();
thread1.start();
thread2.start();
thread3.start();
```

- False
- Threads doesn't have priorities
- They run randomly



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