



**Bahria University**  
Discovering Knowledge

**BAHRIA UNIVERSITY,**  
**(Karachi Campus)**  
*Department of Software Engineering*  
**Assignment #03– Spring 2023**  
**Problem Based Learning**

COURSE TITLE:	<u><b>D&amp;AA</b></u>	COURSE CODE:	<u><b>CSC-321</b></u>
Class:	<u><b>BSE 4A&amp;B</b></u>	Shift:	<u><b>Morning</b></u>
Course Instructor:	<b>ENGR. BUSHRA FAZAL KHAN</b>	Assignment Date:	<b>05-Jun-2023</b>
Max. Marks:	<b>4 Points(CLO3)</b>	Assignment Due:	<b>09- Jun -2023</b>

**INSTRUCTION:**

You have to complete this assignment in a group maximum of three (04) students. This assignment is based on the following PBL attributes:

- a) The problem must be ill-structured and allow for free inquiry.
- b) The problem should require students to make reasoned decisions and to defend them
- c) (investigation and critical analysis).

If used for a group activity, the problem should involve collaboration and group discussions.

**PROBLEM**

Sarim has 4096 tennis balls and each tennis ball has an positive integer with base 10 written on it, they all are distinct. He wants to sort them, instead of using conventional techniques he chose to devise his own. His technique comprise of following steps:

- (a) Calculate the  $\log_2(4096)$  i.e.  $\log_2(4096) = 12$  i.e. (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B)
- (b) Re-write all the numbers on the balls with base 12 e.g. 10 will become A, 24 will be rewritten as 20 and so on ..
- (c) Now first sort all the balls with the most significant digit (MSD) using counting sort and group those who have the same MSD.
- (d) Repeat this on each group until u reach the least significant digit (LSD)
- (e) Claim that the resultant is sorted

[1]. Write a pseudocode and prove the algorithm is correct.

[2]. Propose a better design approach for the problem and give your reasoning.