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| **https://upload.wikimedia.org/wikipedia/commons/thumb/4/4e/VU_Logo.png/260px-VU_Logo.png** | **Parallel and Distributed Computing (CS621)**  Assignment # 02 Fall 2023 | **Total marks= 20**  **Deadline Date:  16 January, 2024** |
| Please carefully read the following instructions before attempting assignment.  **RULES FOR MARKING**  It should be clear that your assignment would not get any credit if:   * The assignment is submitted after the due date. * Strict action will be taken if submitted solution is copied from any other student or from the internet.   **You should consult the recommended books to clarify your concepts as PPTs are not sufficient.**  **UPLOADING INLINE ASSIGNMENT INSTRUCTION**  **Follow the given instructions to submit Inline assignments:**  **Microsoft Word (doc/docx) and Adobe Acrobat (pdf) file uploading options will not be available in inline assignment submission.**   * Students can submit HTML, Images, and plain text only in this inline Mode. You may also insert an image file/table. * Students can insert the images or snapshots in the following formats.   A blue and white text  Description automatically generated   * Images and tables can be inserted using the following highlighted option in the interface.     **OBJECTIVE**  The objective of this assignment is to:   * Basic understanding of decomposition of computation to be executed in parallel. * Learn and practice of dividing a computation into sub units/tasks. | | |
| **NOTE**  **No assignment will be accepted *after the due date via email in any case* (whether it is the case of** load shedding or internet malfunctioning etc.). Hence refrain from uploading assignment in the last hour of deadline. It is recommended to upload solution at least two days before its closing date.  If you find any mistake or confusion in assignment (Question statement), please consult with your instructor before the deadline. After the deadline, no queries will be entertained in this regard.  For any query, feel free to email at:  CS621@vu.edu.pk | | |

**Questions Statement Marks: 20(10+5+5)**

Decomposition is the process of breaking a computation into smaller parts, so that some or all of them can be executed in parallel. Decomposition can be illustrated in the form of a directed graph with nodes corresponding to tasks and edges indicating that the result of one task is required for processing the next. Such a graph is called a task dependency graph. Table 01 shows a relational database of Sales persons which stores information about different salesmen like their ID, name, city, year, and sales among others. Every row in the table is a record that has all the details about a specific salesman. Consider the computations performed in processing the following query:

City=(“Karachi” OR “Lahore”) AND YEAR= (“2022” OR ”2020”) AND Sales = (”$8000” OR ”$14000” OR ”$9000” AND Name="Ali").

Based on the above information, do the following:

1. Construct task dependency graph for the given query.
2. Find Critical path (by mentioning each node value in a sequence).
3. Compute Average degree of concurrency of task dependency graph (where the amount of work required to complete the task at each node is: 12)

Table 01: A database table storing salesman details:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **Name** | **City** | **Year** | **Sales** |
| 2114 | Ali | Karachi | 2020 | $8000 |
| 2214 | Asad | Lahore | 2021 | $9000 |
| 2314 | Sajjad | Islamabad | 2022 | $11000 |
| 2114 | Ali | Karachi | 2023 | $9000 |
| 2235 | Irfan | Queta | 2019 | $12000 |
| 2214 | Asad | Lahore | 2020 | $7000 |
| 2114 | Ali | Karachi | 2022 | $14000 |
| 2235 | Irfan | Queta | 2023 | $11000 |
| 2314 | Sajjad | Islamabad | 2021 | $12000 |

**Best of Luck!!!**