**CS614 Assignment #2 Spring 2024**

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**Solution:**

**Answer 1:**

Given:

Number of stages (M) = 3.

Sequential execution time for one widget (T)

Ideal time for pipelined execution of one widget = T.

Time for sequential execution of N tasks = N×T.

**Solution 1:**

Speed-up Formula:



Speed-up(S) for 15 Widgets:



Speed-up(S) for 30 Widgets:



**Answer 2:**

**Given Bitmap Index for "Year of Admission”:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Student\_ID** | **Name** | **Gender** | **City** | **Department** | **Year of Admission** |
| STD101 | ALI KHAN | M | Lahore | Computer Science | 2021 |
| STD102 | SAIMA RAUF | F | Karachi | Business Administration | 2020 |
| STD103 | UMAIR ZAHID | M | Lahore | Computer Science | 2022 |
| STD104 | FATIMA ALI | F | Lahore | Mathematics | 2021 |
| STD105 | AHMED RAZA | M | Karachi | Business Administration | 2020 |

**Bitmap Index Table for "Year of Admission":**

|  |  |  |  |
| --- | --- | --- | --- |
| **Year of Admission** | **2020** | **2021** | **2022** |
| **STD101** | 0 | 1 | 0 |
| **STD102** | 1 | 0 | 0 |
| **STD103** | 0 | 0 | 1 |
| **STD104** | 0 | 1 | 0 |
| **STD105** | 1 | 0 | 0 |

This bitmap index provides a quick way to filter students based on their year of admission.