Started on	Monday, 29 April 2024, 9:15 AM
State	Finished
Completed on	Monday, 29 April 2024, 9:25 AM
Time taken	9 mins 53 secs
Grade	**5.67** out of 6.00 (**94.44**%)

Question 1

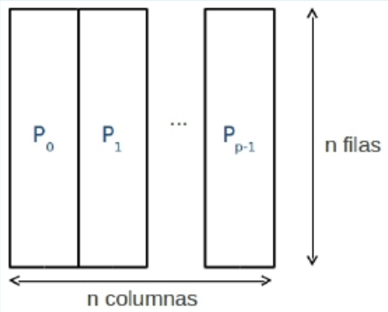
Correct

Mark 3.00 out of 3.00

Given this code 1:

```
for (i=1; i<n; i++)
   for (j=1; j<n; j++) {
      B[i][j] = A[i][j-1]+A[i-1][j]+A[i][j];
  }
```

Assuming that we define a task as the body of the innermost loop and that its execution time is t_c , calculate T_1 and T_∞ .
And assuming that we are using a distributed memory machine and that we are doing a distribution of the matrices A and B by columns, as shown below:



Calculate T_P (including both the computation time and data sharing overhead) for thiscode and the parallelization strategy you proposed, assuming that the cost for a messageof B elements is $t_s + B \times t_w$.
We ask you to answer by indicating the correct answer to each of the questions below. You can make the window wider to see the mathematical expressions more clearly.

T_1 = $(n-1) \times (n-1) \times t_c \approx n^2 \times t_c$ ✔

T_∞ = t_c ✔

T_P = $(n-1) \times (n-1)/P \times t_c + 1 \times (t_s + (n-1) \times t_w) \approx n^2 /P \times t_c + (t_s + n \times t_w)$ ✔

- $\approx (n/P + B - 1) \times (B \times n/P) \times t_c + (n/P + B - 2) \times (t_s + B \times t_w)$
- $(n-1) + (n-2) \times t_c = (2 \times n - 3) \times t_c \approx 2 \times n \times t_c$
- t_c
- $(n-1) \times (n-1)/P \times t_c + 1 \times (t_s + B \times t_w) \approx n^2 /P \times t_c + (t_s + B \times t_w)$
- $(n-1) \times (n-1)/P \times t_c \approx n^2/P \times t_c$
- $\approx (n/B + P - 2) \times (B \times n/P) \times t_c + (n/B + P - 1) \times (t_s + B \times t_w)$
- $(n-1) \times (n-1)/P \times t_c + 1 \times (t_s + (n-1) \times t_w) \approx n^2 /P \times t_c + (t_s + n \times t_w)$
- $(n-1) \times (n-1) \times t_c \approx n^2 \times t_c$
- $\approx (n/B + P - 1) \times (B \times n/P) \times t_c + (n/B + P - 2) \times (t_s + B \times t_w)$

Your answer is correct.

Question 2

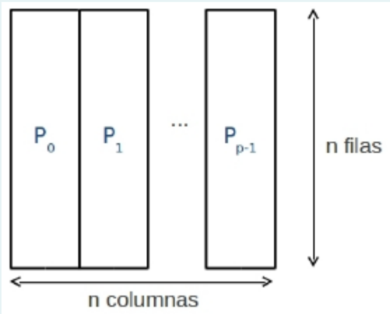
Correct

Mark 2.67 out of 3.00

Given this code 2:

```
for (i=1; i<n; i++)
   for (j=1; j<n; j++) {
     A[i][j] = A[i][j-1]+A[i-1][j]+A[i][j];
  }
```

Assuming that we define a task as the body of the innermost loop and that its execution time is t_c , calculate T_1 and T_∞ .
And assuming that we are using a distributed memory machine and that we are doing a distribution of matrix A by columns, as shown below:



Calculate T_P (including both the computation time and *data sharing* overhead) for this code and the parallelization strategy you proposed, assuming that the cost for a message of X elements is $t_s + X \times t_w$. In case the parallelization strategy requires the application of *blocking*, we will use B for the block size.
We ask you to answer by indicating the correct answer to each of the questions below. You can make the window wider to see the mathematical expressions more clearly.

T_1 = $(n-1) \times (n-1) \times t_c \approx n^2 \times t_c$

T_∞ = $(n-1) + (n-2) \times t_c = (2 \times n - 3) \times t_c \approx 2 \times n \times t_c$

T_P = $\approx (n/B + P - 1) \times (B \times n/P) \times t_c + (n/B + P - 2) \times (t_s + B \times t_w)$

- $(n-1) \times (n-1)/P \times t_c \approx n^2/P \times t_c$
- $(n-1) \times (n-1)/P \times t_c + 1 \times (t_s + (n-1) \times t_w) \approx n^2/P \times t_c + (t_s + n \times t_w)$
- t_c
- $\approx (n/P + B - 1) \times (B \times n/P) \times t_c + (n/P + B - 2) \times (t_s + B \times t_w)$
- $\approx (n/B + P - 1) \times (B \times n/P) \times t_c + (n/B + P - 2) \times (t_s + n \times t_w)$
- $(n-1) \times (n-1)/P \times t_c + 1 \times (t_s + B \times t_w) \approx n^2/P \times t_c + (t_s + B \times t_w)$
- $\approx (n/B + P - 1) \times (B \times n/P) \times t_c + (n/B + P -$

Your answer is correct.

- $(n-1) + (n-2) \times t_c = (2 \times n - 3) \times t_c \approx 2 \times n \times t_c$
- $(n-1) \times (n-1) \times t_c \approx n^2 \times t_c$
- $\approx (n/B + P - 2) \times (B \times n/P) \times t_c + (n/B + P - 1) \times (t_s + B \times t_w)$