RESEARCH ON THE ALGORITHM WITH DIAGONAL ACTIVITION FOR NON CONFLICT SCHEDULE IN CASE OF A LARGE SIZE SWTCHING MATRIX

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A research on the algorithm with diagonal activation for non conflict schedule related to performance and memory resource in case of a large size switching matrix is done. It is calculated the performance and memory resource for different switching matrix types and sizes.

1. Introduction

The traffic via Crossbar switching nodes is casual and depends on the users.
The conflicts are available in the following two cases:

- When one source of massage requests communication to two or more massage receivers
- When one massage receiver receives communication requests from two or more massage sources.

The evasion of the conflicts is directly related to the switching node performance.
The status of the switch of the switching node is represented with the so called connection matrix. For N x N dimensional switch the dimension of the connection matrix T is N x N also, where every member $T_{ij} = 1$ if the connection request from i-source to j- receiver exists. In the opposite case $T_{ij} = 0$.
A conflict situation arises if any row of the connection matrix has more than a single 1, which corresponds to the case when one source requests a connection with more than one receiver. The presence of more than a single 1 in any column of the matrix T also indicates a conflict situation, it means that two or more sources have requested a connection with the same receiver.[1].

2.Description of an algorithm for non conflict schedule with diagonally activated switching matrix

The non conflict schedule is obtained by consecutively activation of diagonally placed requests. Those requests are in parallel of the main matrix diagonal. In every one moment only the requests located on one of parallel diagonals of the main one are active. The last activated requests are those located on the main matrix diagonal. It is used knowledge that diagonally placed requests run in one the same time do not provoke conflicts. The software model **SMADA** corresponding to the

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algorithm is written using MATLAB language and run on DELL Precision 420 workstation.

3. SMADA examination

In Table 1 are presented the results of **SMADA** examination. They are related to the performance and memory resource in case of large switch matrix size. Figure 1 and Figure 2 illustrate graphically the results from Table1.

N	Performance [Sec.]	Memory[bytes]
500	35,0940	10 008 008
1000	104,1090	40 016 008
1500	226,4690	90 024 008
2000	542,4060	160 032 008
2500	817,0150	250 040 008
3000	1333,3000	360 048 008
3500	1857,9000	490 056 008
4000	2328,2000	640 064 008
4500	3792,1000	810 072 008

Table 1: In Table 1 are presented the results of **SMADA** examination.

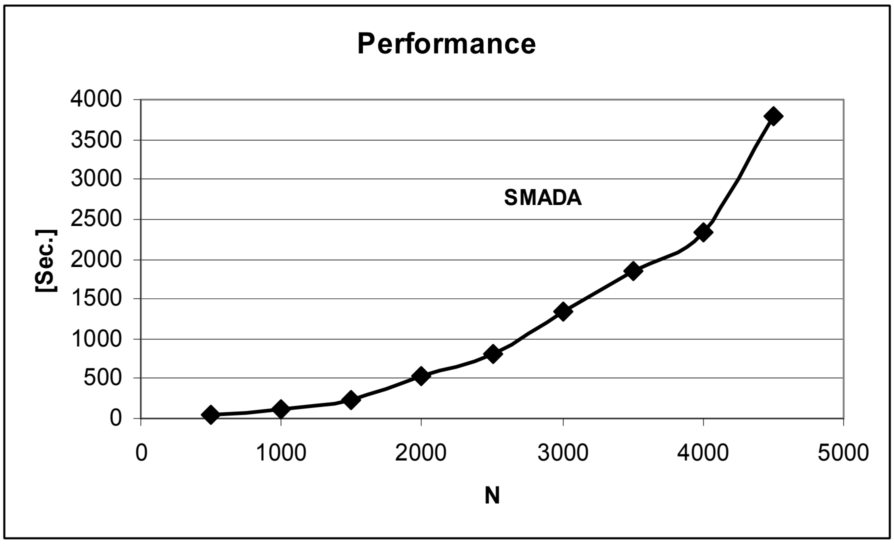

Figure 1: **SMADA** performance.

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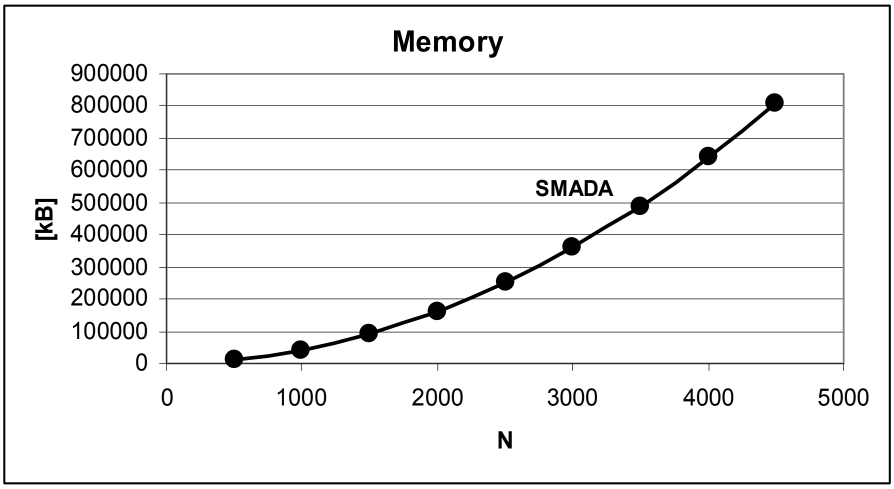

Figure 2: **SMADA** memory resource.

4. Software model performance

A software models performance **(P)** is defined as a ratio of the non- nil resolutions to the total number of the solutions. **R(v)** is the set of the nil solutions, **R(w)** is the set of the non-nil solutions, and **R** is a set of the all solutions.[1]

$$R = R(v) + R(w) \qquad (1)$$

$$P = (R(w) / R).100[\%] \qquad (2)$$

From formula 2 it is visible that when the nil solutions **R(v)** vanish to nil, than the performance **P** vanish to 100%.

To facilitate the performance examination, five kinds of matrixes for simulation of the input connectivity matrix **T** are chosen. The special input matrixes **2A, 2B, 2C, 2D** and **2E** are represented on Figure 3. [1]

From the input matrixes structure represented on Figure. 3 it is clear that the availability of big amount on nil diagonals brings the lower performance. It is important to be mentioned, that there is a direct proportional relationship between the nil diagonals of the input matrix **T** and the number of the nil resolutions.

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$$\begin{matrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{matrix}$$

2A

$$\begin{matrix} 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \end{matrix}$$

2B

$$\begin{matrix} 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \end{matrix}$$

2C

$$\begin{matrix} 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 & 1 \end{matrix}$$

2D

$$\begin{matrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 \end{matrix}$$

2E

Figure 3: Special input matrixes.

SMADA	P[%]	P[%]	P[%]	P[%]	P[%]
N	**2A**	**2B**	**2C**	**2D**	**2E**
500	0,100	0,300	99,69	99,79	50,05000
1000	0,050	0,150	99,84	99,89	50,02500
1500	0,033	0,100	99,89	99,86	50,01660
2000	0,025	0,075	99,92	99,94	50,00125

Table 2: Represents the results of **SMADA** performance (**P**) examination for different input matrixes in percents.

Figure 4 it is graphical view of the results from Table2.

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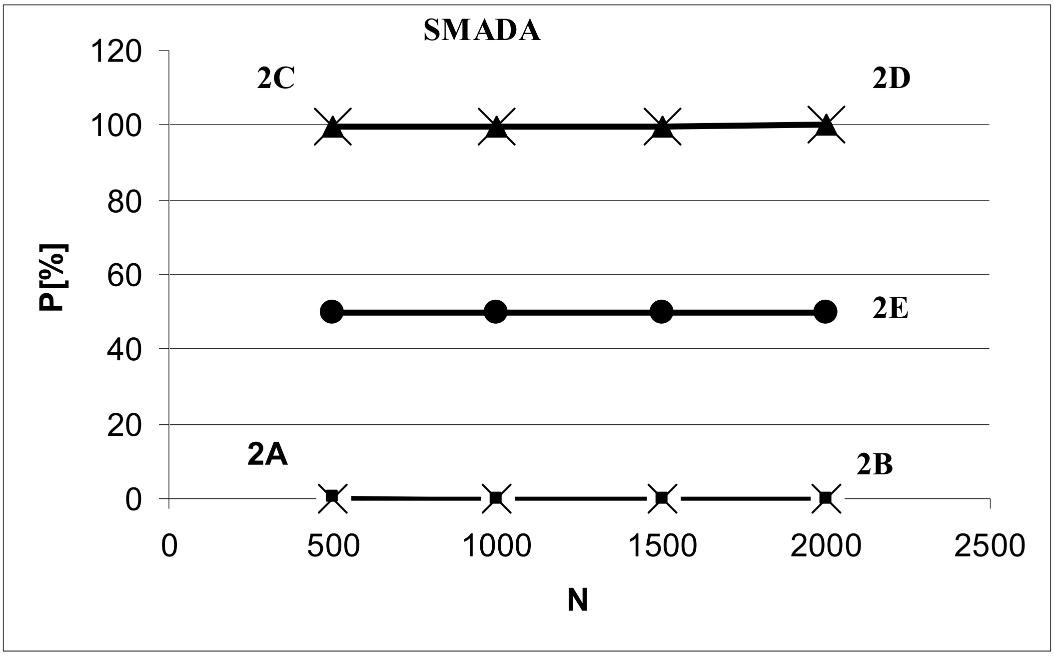

Figure 4: Graphical view of the results from Table2.

5.Conclusion

From the **SMADA** examined performance (**P)** for different input matrixes and different N becomes clear that P is a linear function of N for 2A and 2B Increasing N leads to P reduction and P is under 1%. For input matrixes 2C, 2D and 2 E , P is not dependant of N. Increasing P for input matrixes 2A ,2B and 2E,could be done by the nil solutions elimination.

P for **SMADA** is more than 99% for the widespread traffic type – casual, represented by 2D input matrix.

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