



# Arhitectura Sistemelor de Calcul



Computer Science  
& Engineering  
Department

**Universitatea Politehnica Bucuresti**  
**Facultatea de Automatica si Calculatoare**

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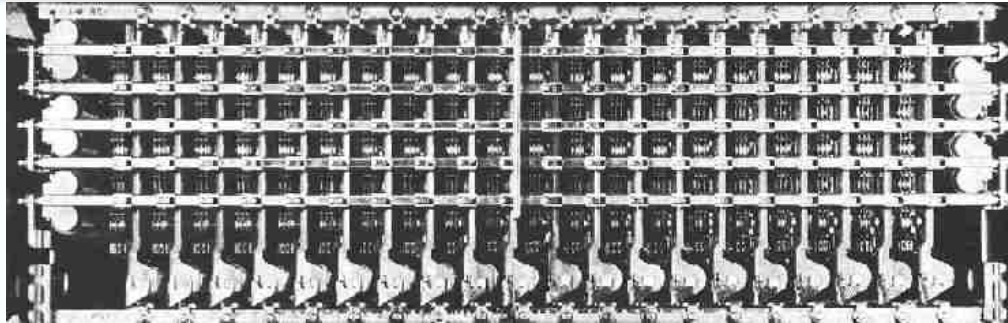


- Exemple de CrossBar Switch
- Comutatoare Neierarhice
- Exemple Practice de Comutatoare:
  - Comutatoare Procesor Memorie
- Ierarhia de memorii – Bottleneck-ul SC
- Localitatea datelor
- Cache – design, implementari si exemple



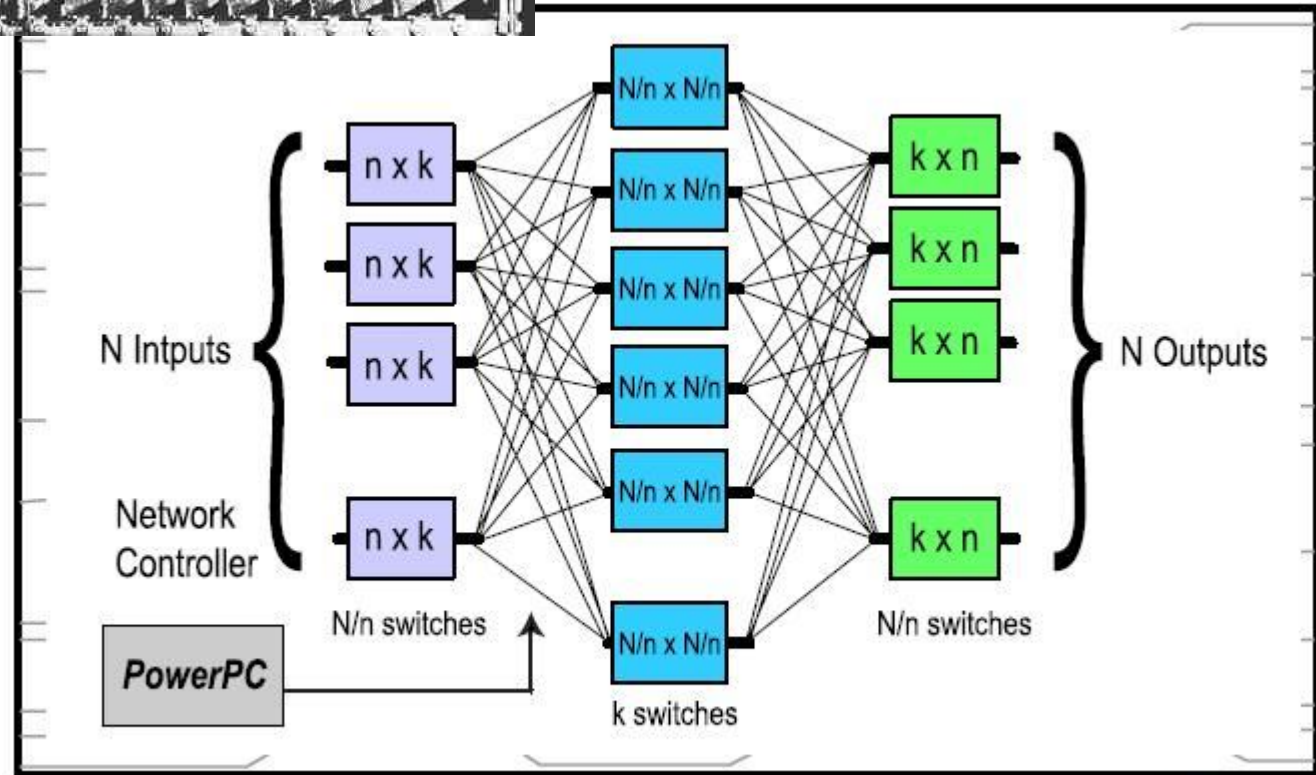
# Exemple de CrossBar Switch

3



- Cross bar de la Bell System din 1960 cu 20 de verticale si 10 nivele

- Un crossbar performant, eficient si non-blocant in FPGA-urile Virtex-II si Virtex-II Pro/ProX





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# Comutatoare Neierarhice

5

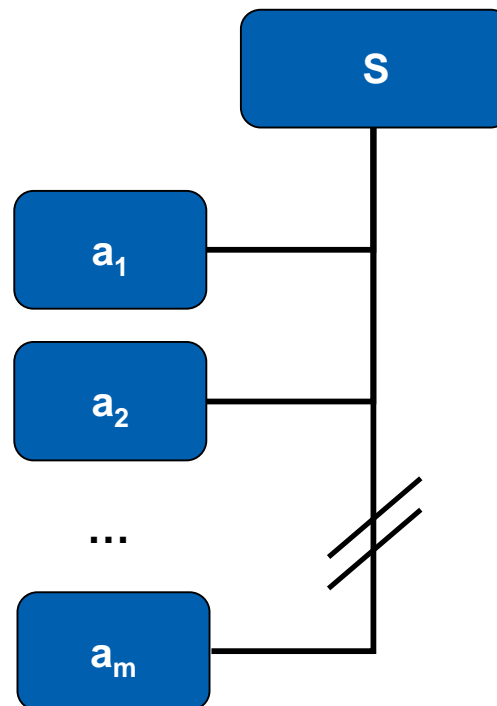
- Asigura conexiunea intre elemente de acelasi tip (e.g. P-P; M-M)
- Tipuri:
  - Comutatoare Duplex
  - Legatura multipla – tip central
  - Trunchi K neierarhic
- Structurile cu comutatoare asigura infrastructura de comunicatie



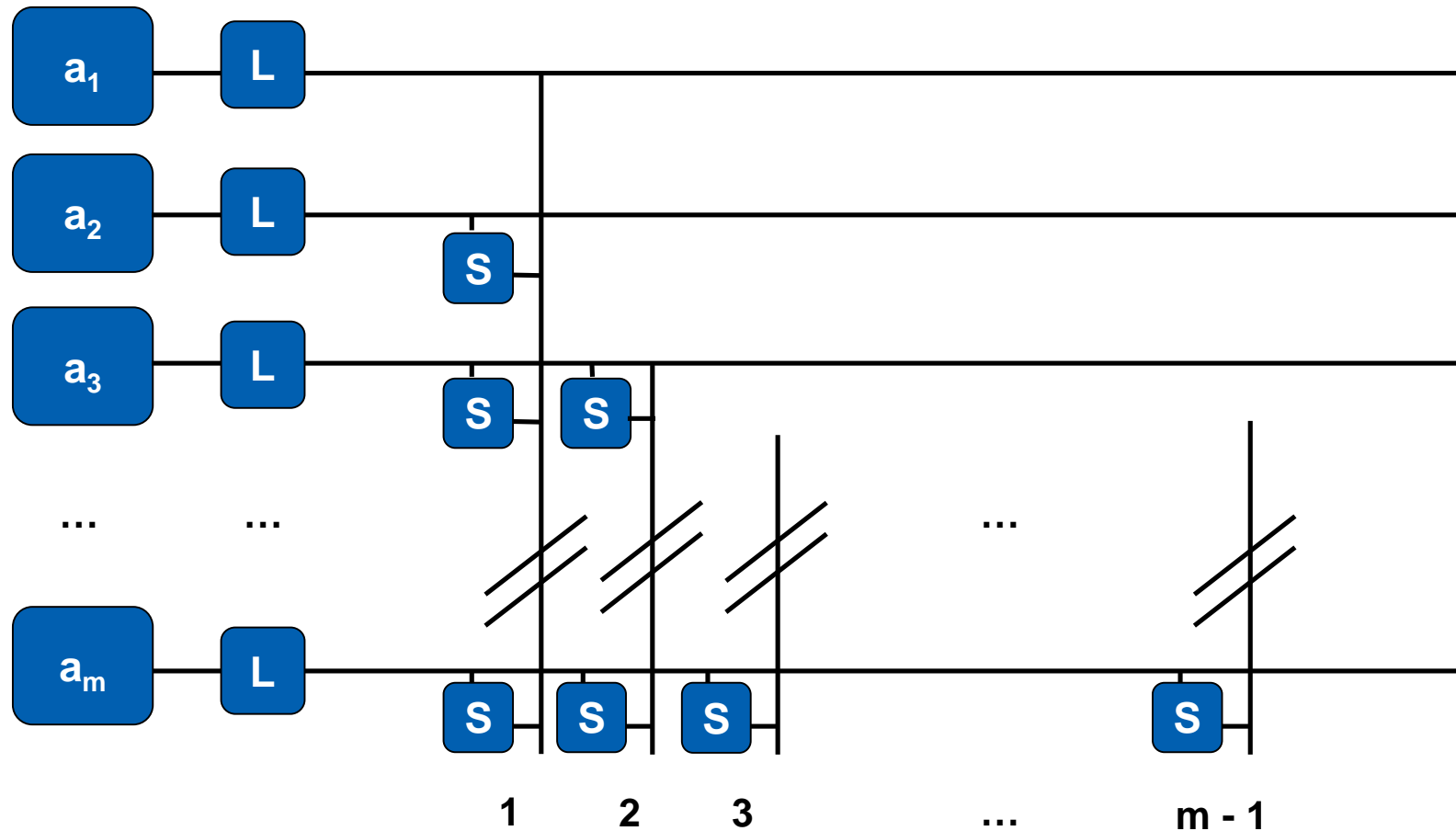
# Comutatoare Neierarhice

6

- Comutatoare Duplex Neierarhice:
  - $S(D_n; m_a, c:1; m_{Sp})$



- Bus Inlantuit

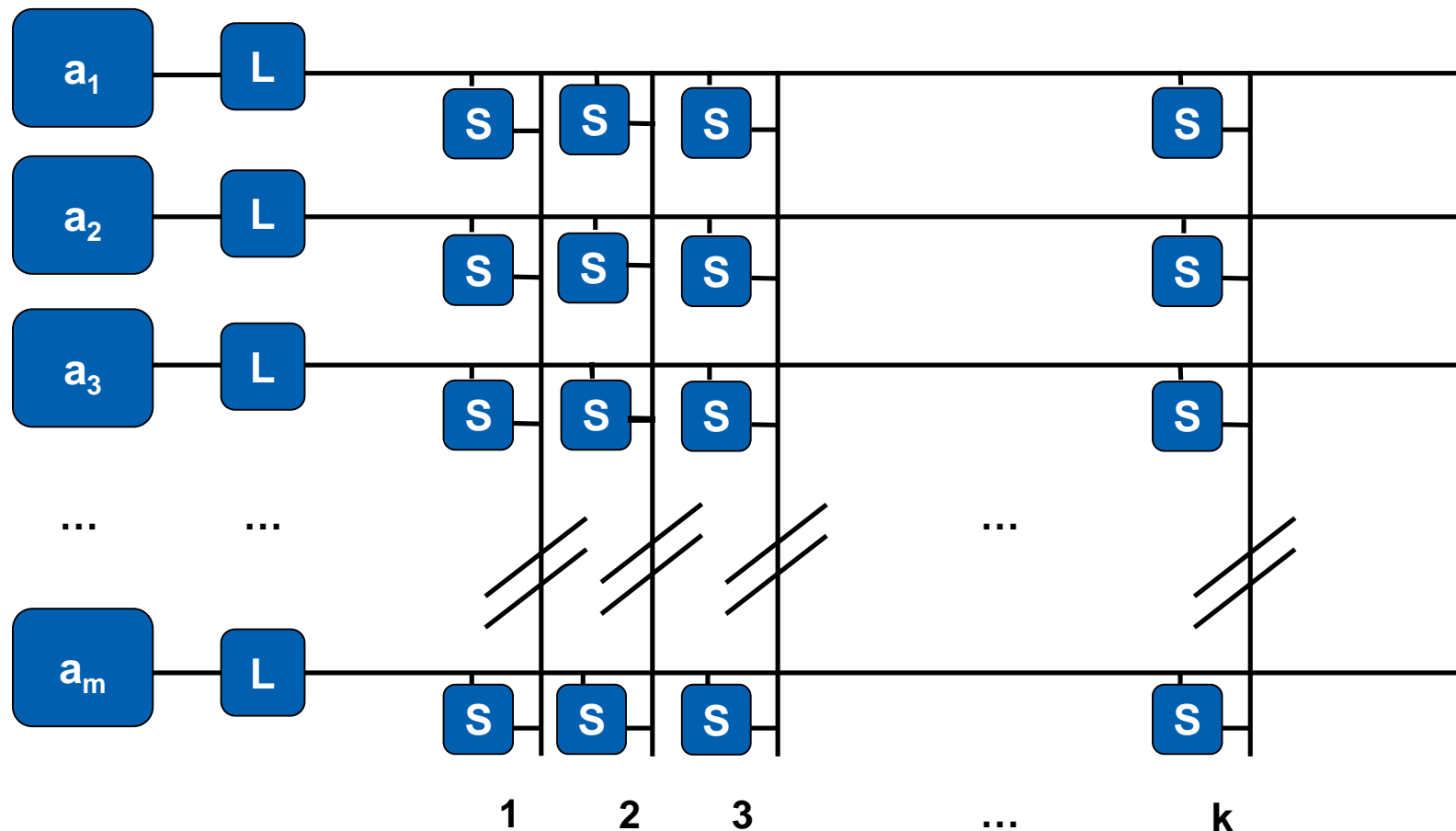




# Comutatoare Neierarhice

8

- Trunchi-K neierarhic:
  - $S(tk; ma, c:\min(k,m/2); m*k Sp)$







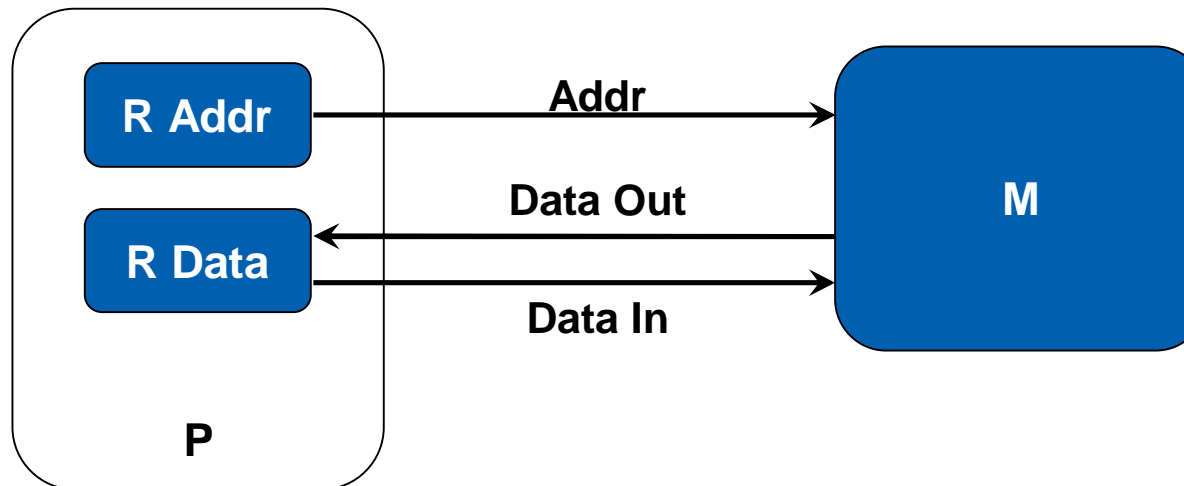
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# Comutatoare Procesor Memorie

10

- Switch Processor Memory  $\rightarrow S_{PM}$
- Liniile de adrese si date sunt complet separate



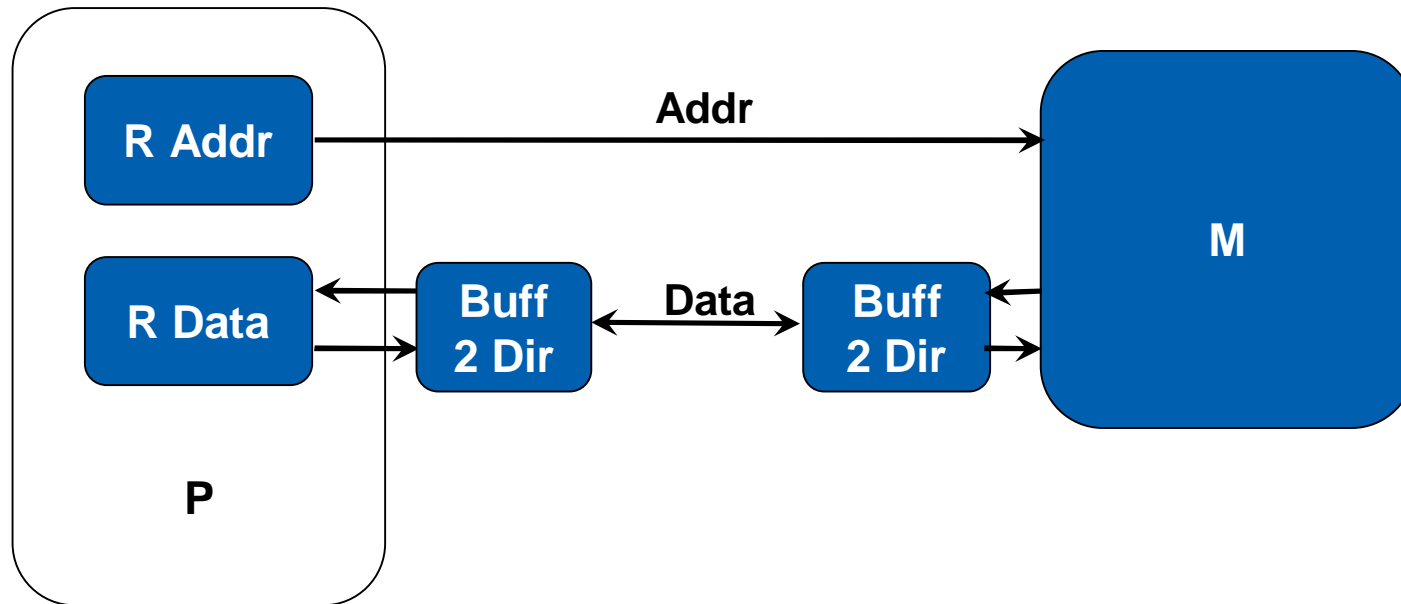
**R/W – Disjuncte  $\rightarrow$  No Switch!**  
**(nu se justifica ambele linii)**



# Comutatoare Procesor Memorie

11

- Switch Processor Memory  $\rightarrow S_{PM}$
- DIIn si DOut sunt multiplexate prin magistrala de **date**



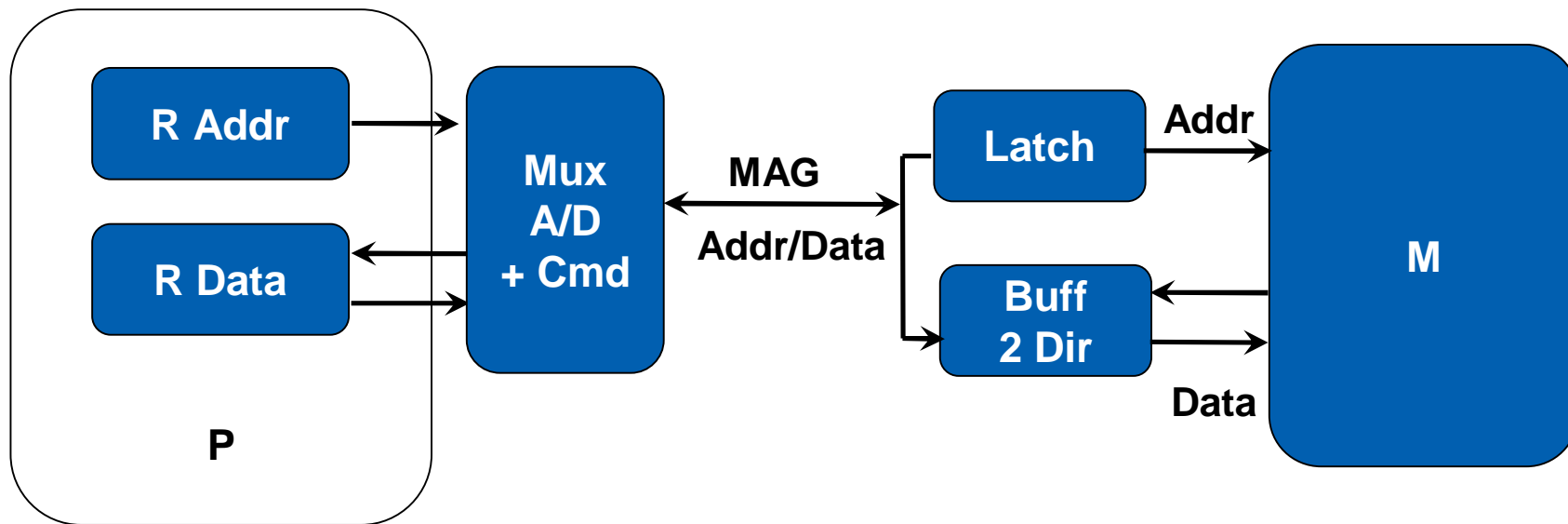
**Bufferele sunt fie MUX fie TS**



# Comutatoare Procesor Memorie

12

- Switch Processor Memory  $\rightarrow S_{PM}$
- Addr, DIn si DOut sunt multiplexate prin **aceeasi** magistrala



**Bufferele sunt fie MUX fie TS**