* **ASAP :**

Objective func^{n} : $c^T t$

$c^T = [1 \quad 1 \quad 1 \quad \_ \quad 1]$

(1) Unique start Time
(2) Data dependency constraints

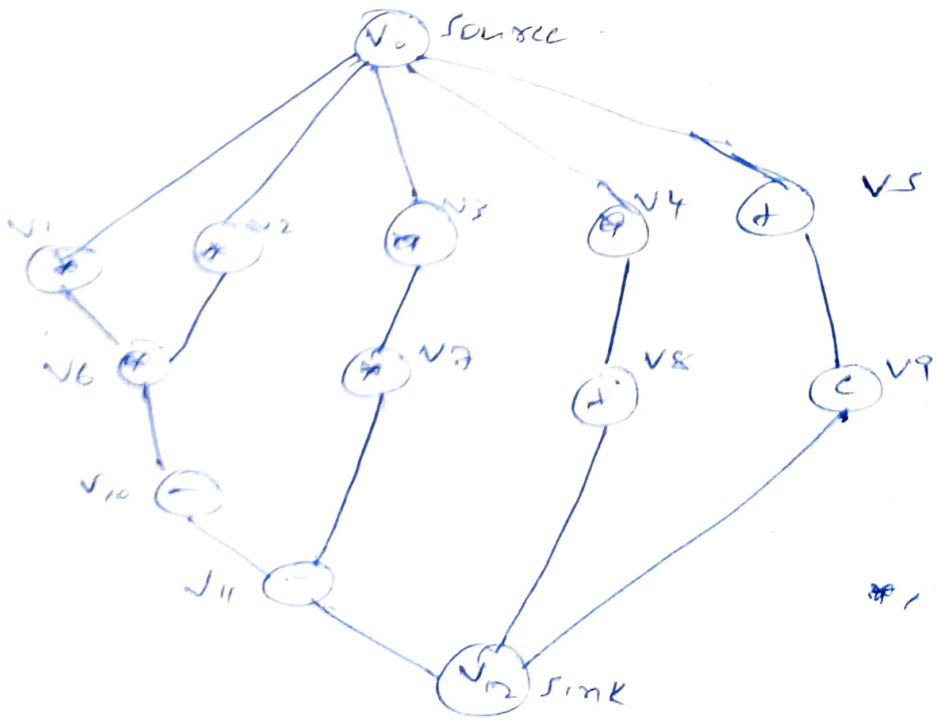
* **RR-LC :**

Objective func^{n} : $c^T . a$

$c^T = [c_1 \quad c_2 \quad \_\_\_ \quad c_k]$ $\quad c_i \Rightarrow$ Value corresponding to the appropriate area occupied by the hardware

(1) Unique start Time
(2) Data dependency constraints
(3) Resource constraints where a_{ik} is a variable
(4) Latency constraints

*



*, −, +, < ⇒ single cycle

MP-LC :

$x = 4$

Mobility of V_1, V_{21}, V_6, V_{10} and V_{11} is zero (∵ Given $\lambda = 4$)

$V_1 \Rightarrow x_{11}$ $V_2 \Rightarrow x_{21}$ $V_6 \Rightarrow x_{62}$ $V_{10} \Rightarrow x_{10,3}$ $V_{11} \Rightarrow x_{11,4}$

$V_3 \Rightarrow x_{31}, x_{32}$ $V_7 \Rightarrow x_{71}, x_{73}, x_{72}$

$V_4 \Rightarrow x_{41}, x_{42}, x_{43}$ $V_8 \Rightarrow x_{82}, x_{83}, x_{84}$

$V_5 \Rightarrow x_{51}, x_{52}, x_{53}$ $V_9 \Rightarrow x_{92}, x_{93}, x_{94}$

Unique start time :

$x_{11} = 1$ $x_{21} = 1$

$x_{31} + x_{32} = 1$ $x_{73} + x_{72} = 1$

$x_{41} + x_{42} + x_{43} = 1$

Dependency Constraints :

(V_1, V_2) : $2 \cdot x_{62} \geq 1 \cdot x_{41} + 1$

(V_4, V_8) : $2x_{82} + 3x_{83} + 4x_{84} \geq x_{41} + 2x_{42} + 3x_{43} + 1$

Resource Constraints:

For time stamp 1:

Mult: $x_{11} + x_{21} + x_{31} + x_{41} \leq a_1$

ALU: $x_{51} \leq a_2$

For time stamp 2:

mult: $x_{62} + x_{32} + x_{42} + x_{72} \leq a_1$

ALU: $x_{82} + x_{52} + x_{92} \leq a_2$

Latency Constraint:

$1 \times x_{12,1} + 2 \times x_{12,2} + \cdots + 5 \times x_{12,5} \leq \lambda + 1$

20/2/23

Multiprocessor Scheduling:

Assumption

(A1) All operations can be executed by same resource (ALU)

Earlier $a_1, a_2, \ldots, a_{max} \Rightarrow$ Now a (mixture of) ALU → No. of processing units

(A2) All operations have unit execution time

Scheduling problem is strongly NP-complete