

# CSE 521 Algorithms

Dynamic Programming: Code Gen

Load  $R_{reg_i} \leftarrow R_j$

Load  $R_i \leftarrow Mem_j$

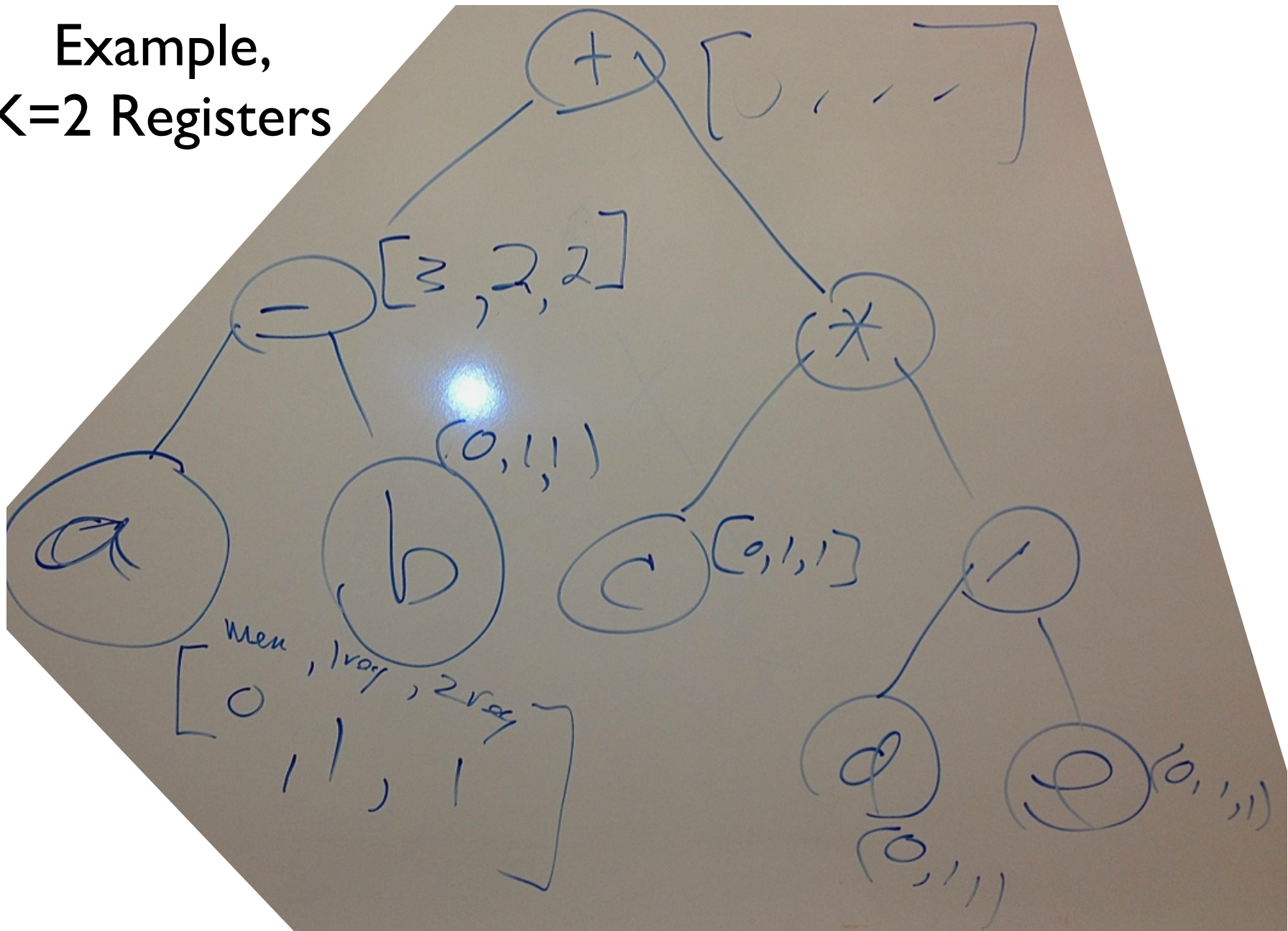
Store  $R_i, Mem_j$

OP  $R_i \leftarrow R_i$   $\left( \begin{array}{c} + \\ - \\ / \\ * \end{array} \right) R_j$

" " Mem\_j

1 x 500

Example,  
K=2 Registers



OPT (node  $n$ , using  $i \leq 2$  registers)

= Min: over instruction templates matching node  $n$

①  $\left[ \begin{array}{l} + \left( \begin{array}{l} \text{evaluate left subtree into } R_0 \text{ with } i \text{ regs} \\ \dots \text{ Right } \dots \dots \dots R_1 \dots \dots \dots i-1 \text{ regs} \end{array} \right. \end{array} \right.$

$\hookrightarrow$  Add  $R_0 \leftarrow R_0 + R_1$

②  $\left[ \begin{array}{l} \text{eval Right w/ } i \\ \dots \text{ left w/ } i-1 \\ \text{then op.} \end{array} \right.$

③ evaluate Right into memory (2 regs)  
eval left into  $R_0$  w/ 2 regs  
 $R_0$  op Mem