

Application No. C210K857

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Question No.: 7

### 7.1 2-dimension

Size of 2-D grid:  $(L_1, L_2)$

$L_1$ : length of grid in  $x_1$  direction

$L_2$ : length of grid in  $x_2$  direction

Coordinates  $(x_1, x_2)$  to Index  $(I)$ :

$$I = x_1 + L_1 * x_2$$

Index  $(I)$  to Coordinates  $(x_1, x_2)$ :

$$x_2 = I // L_1$$

$$x_1 = I \% L_1$$

### 7.2 d-dimension

Size of d-D grid:  $(L_1, L_2, L_3, \dots, L_d)$

$L_1$ : length of grid in  $x_1$  direction

$L_2$ : length of grid in  $x_2$  direction

...

$L_d$ : length of grid in  $x_d$  direction

Coordinate  $(x_1, x_2, x_3, \dots, x_d)$  to Index  $(I)$ :

$$\begin{aligned} I &= x_1 + (L_1 * x_2 + (L_1 * L_2 * x_3 + \dots + (L_1 * L_2 * \dots * L_{d-1}) * x_d) \\ &= x_1 + \sum_{i=2}^d (x_i * \prod_{j=1}^{i-1} L_j) \end{aligned}$$

Index  $(I)$  to Coordinates  $(x_1, x_2, x_3, \dots, x_d)$ :

$$x_d = I // (L_1 * L_2 * L_3 * \dots * L_{d-1}) = I // \prod_{i=1}^{d-1} L_i$$

$$x_{d-1} = [I - (\prod_{i=1}^{d-1} L_i) * (x_d)] // \prod_{i=1}^{d-2} L_i$$

