

# Systolic Array

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| 📅 Version  | @March 14, 2022 |
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Concept

DG

**Vector**

Design Flow

Regular DG

Projection, Process Vector, Scheduling Vector

Edge Mapping

The End

## Concept

### DG

- DG: describe basic datapath and relations between different elements in algorithm
  - **Nodes**: computing in a system
  - **Edges**: priority constraints
  - No delay elements

### Vector

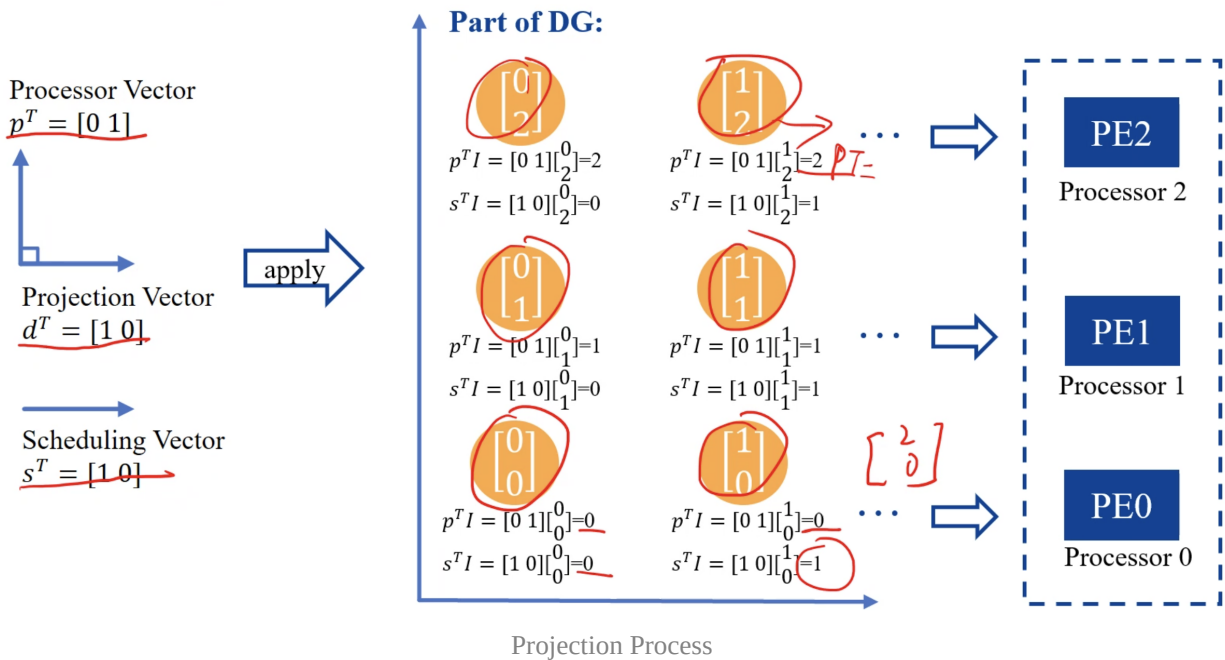
- $I^T$ 
  - represent **location** of a computing element
- $d^T, p^T d = 0$  is necessary
  - projection vector
- $p^T$ 
  - process vector (or space vector),  $p^T I$  represents  $I$  will be executed by the processor
- $s^T$

- scheduling vector

## Design Flow

### Regular DG

### Projection, Process Vector, Scheduling Vector



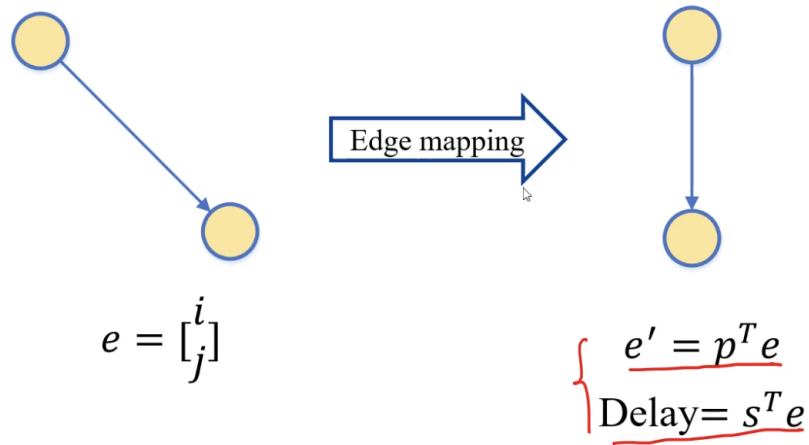
- Different Vectors mean different application

$p^T e$  represents **Process Data Flow Direction**,  $s^T e$  represents **Timing Data Flow Direction**

- B1
  - Broadcast Input, Weights Stay, Move Results
- B2
  - Broadcast Input, Move Weights, Result Stay
- F

- Fan-In Results, Move Inputs, Weights Stay

## Edge Mapping



- method
  - syllabus: input, weight, output
  - formula:
    - $e'$  means data flow direction in Arch
    - $\text{Delay}$  means delay in Arch

$$e' = p^T e$$

$$\text{Delay} = s^T e$$

**The End**