Ch5 note

p5-1~p5-12 note

1. 同個hyperplane為相同執行順序
2. 同個projection為同樣一顆processor
3. normal vector ($\vec{s}$) 垂直於hyperplane，length由DG維度決定
4. components of the scheduling vector $\vec{s}$ must be co-prime(互質)
5. schedule of node i = inner product of $\vec{s}$ & i
6. nodes on the same hyperplane should not be assigned to the same processor to preserve computing parallelism

- Observe partial ordering(precedence relation)
  $\vec{s^t} \cdot \vec{e} \geq 0$ for all $\vec{e}$ (單位向量)
- Preserve parallelism
  $\vec{s^t} \cdot \vec{d} \neq 0$ for projection vector $\vec{d}$

7. Type of schedules

- default schedule => $\vec{s} = \vec{d}$
- Resursion schdule => $\vec{s}$ is parallel to one of axis in the index space of the DG, usually the recursion direction
- Systolic schedule => at least one delay on each edge of SFG

8. example 在講義5-9~5-11

- pipeline period $\alpha = \vec{s^t} \cdot \vec{d}$ (number of clock cycles between two successive computations)

P5-13~

1. $\vec{P}$ is the processor basis or processor allocation matrix, and their dim is (N-1) * N(N is DG dimension)

- spatial mapping
- $P\cdot \vec{e} = 0$, where $\vec{d}$ is projection vector
- process index $\vec{n}$ = $ P \cdot \vec{i}$

2. Timing mapping

- time index t = $\vec{s^t} \cdot \vec{i}$, $\vec{s^t}$ is the scheduling vector

3. Transfer matrix is $T=\begin{bmatrix}{\vec{s^t}}\P\\end{bmatrix}$

4. Mapping procedures

- Node mapping

$$ \begin{bmatrix} \vec{t(\vec{i})} \ \vec{n} \end{bmatrix} = \begin{bmatrix} \vec{s^t} \ P \end{bmatrix} \cdot \begin{bmatrix} \vec{i} \end{bmatrix} $$

$\vec{i}$ is DG node, $t(\vec{i})$ is schedule, $\vec{n}$ is Processor index

- Arc mapping

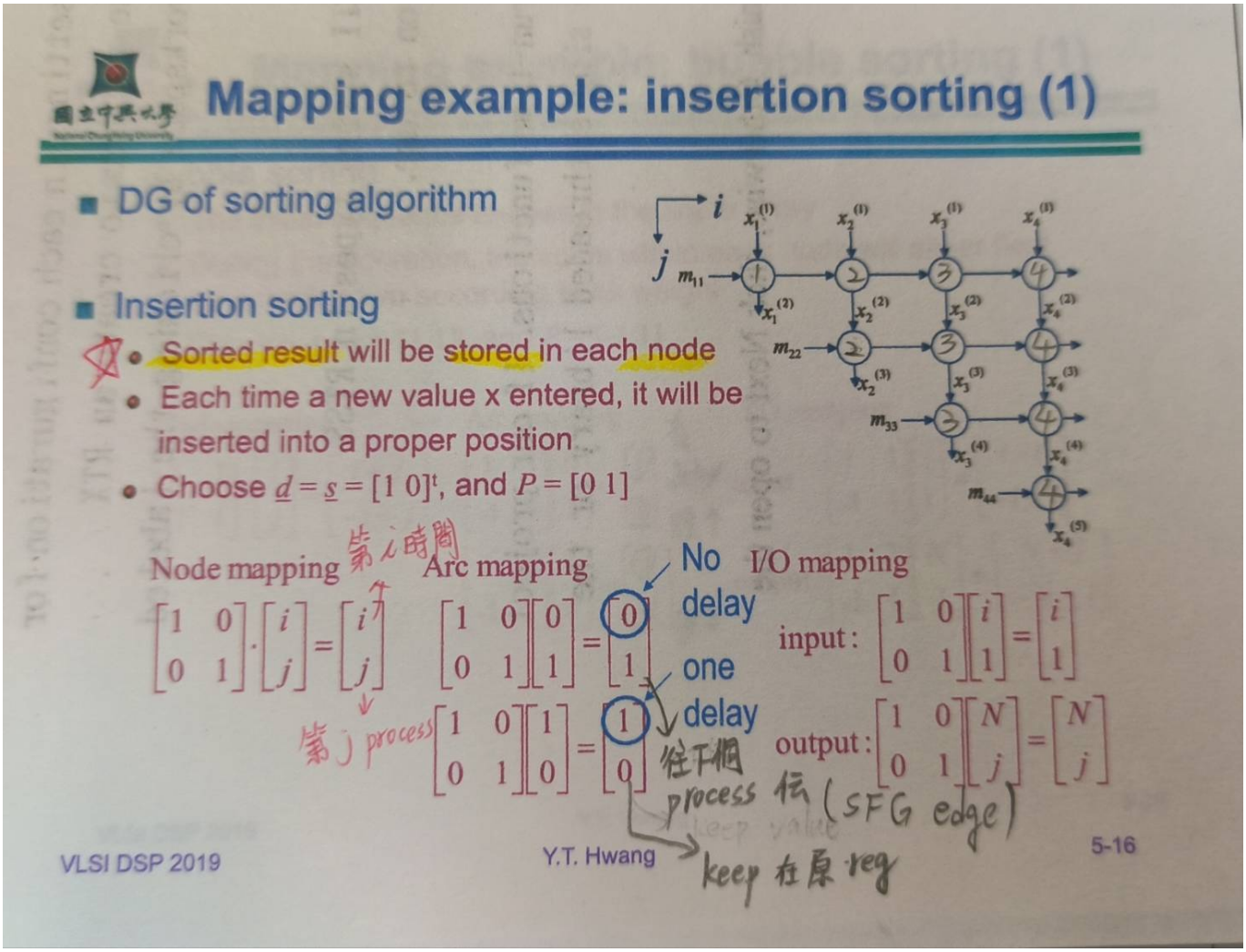
$$ \begin{bmatrix} \vec{D(\vec{e})} \ \vec{e} \end{bmatrix} = \begin{bmatrix} \vec{s^t} \ P \end{bmatrix} \cdot \begin{bmatrix} \vec{a} \end{bmatrix} $$

$\vec{a}$ is DG arc, $D(\vec{e})$ is edge delay, $\vec{e}$ is SFG edge

- IO mapping

$$ \begin{bmatrix} \vec{t(\vec{c})} \ \vec{n} \end{bmatrix} = \begin{bmatrix} \vec{s^t} \ P \end{bmatrix} \cdot \begin{bmatrix} \vec{c} \end{bmatrix} $$

$\vec{c}$ is I/O node, $t(\vec{c})$ is schedule, $\vec{n}$ is Processor index



Ref

[1] 如何在 Markdown 輸入數學公式及符號

[2] Markdown 文本居中、字体颜色以及数学公式