

Rewriting

$$\text{map}(f) \equiv \text{pipeline}(\text{unpacker}, \text{form}(f), \text{parser})$$

$$\begin{aligned} \text{pipe}(\text{seq}(f), \text{seq}(g)) &\equiv \text{pipe}(\text{form}(\text{seq}(f)), \text{seq}(g)) \\ &\equiv \text{pipe}(\text{seq}(f), \text{form}(\text{seq}(g))) \\ &\equiv \text{pipe}(\text{form}(\text{seq}(f)), \text{form}(\text{seq}(g))) \end{aligned}$$

Δ skeletons (skeletons composite)

$$\Delta ::= \text{seq}(f) \mid \text{pipe}(\Delta, \Delta) \mid \text{form}(\Delta) \mid \text{map}(\Delta) \mid \text{reduce}(\Delta) \mid \dots$$

$$\Delta \equiv \text{form}(\Delta)$$

form introduction rule

$$\Delta \rightarrow \text{form}(\Delta)$$

$$\text{form}(\Delta) \rightarrow \Delta$$

$$\text{comp}(\Delta, \Delta) \equiv \text{pipe}(\Delta, \Delta)$$

use same resources for Δ_1, Δ_2

different set of resources for Δ_1 & Δ_2

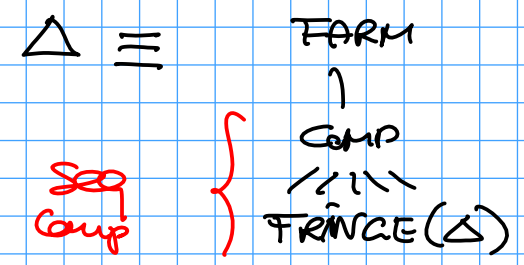
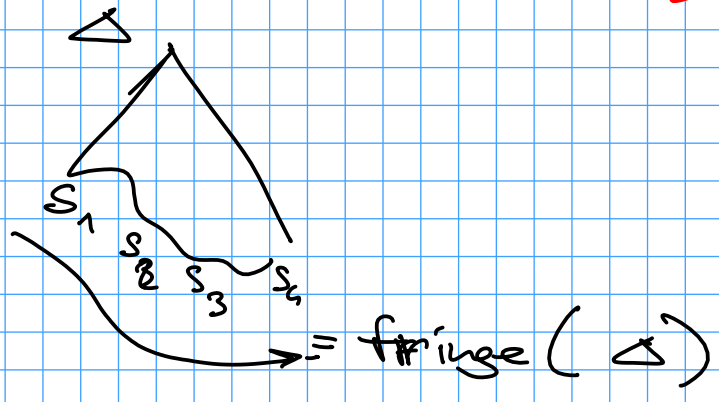
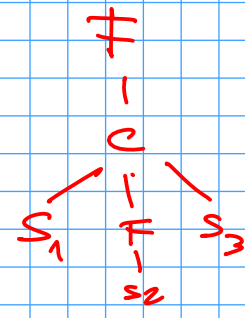
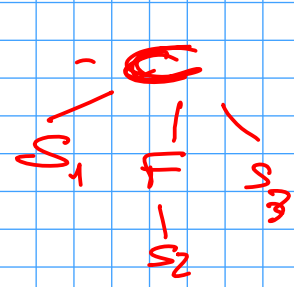
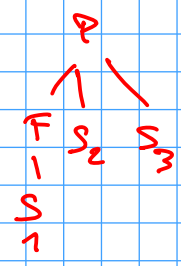
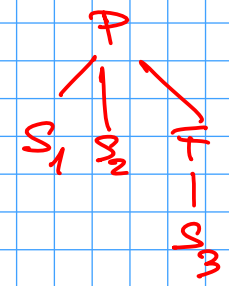
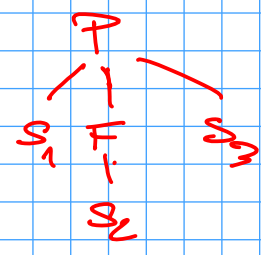
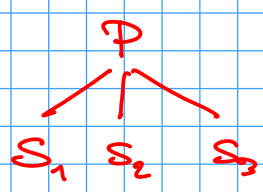
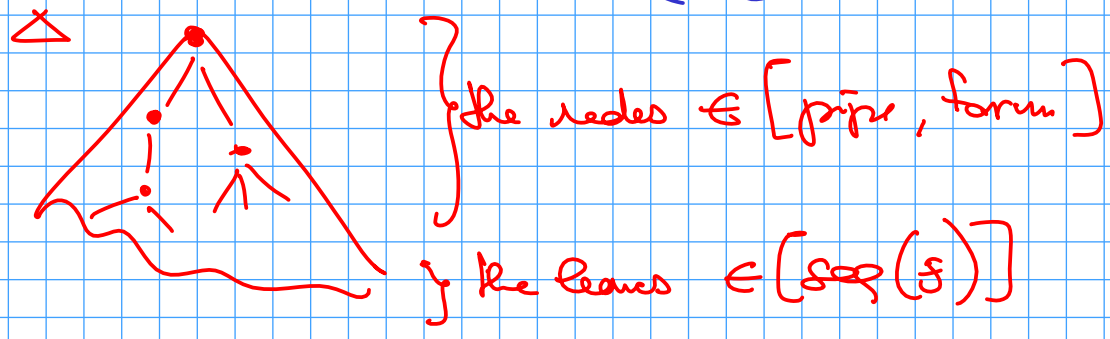
$$\text{map}(\text{comp}(f, g)) \equiv \text{comp}(\text{map}(f), \text{map}(g))$$

map fusion

$$\begin{aligned} \text{map}(\text{comp}(f, g)) &\rightarrow \text{comp}(\text{map}(f), \text{map}(g)) \\ &\quad \uparrow \quad \uparrow \end{aligned}$$

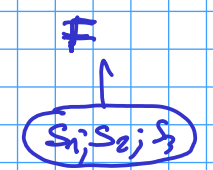
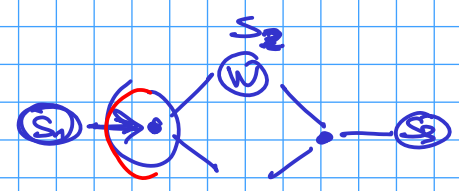
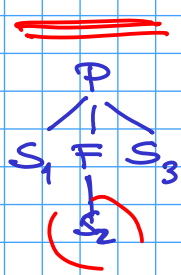
$$\begin{aligned} \text{map}(\text{comp}(f, g)) &\equiv \text{pipe}(\text{map}(f), \text{map}(g)) \\ &\quad \leftarrow \quad \leftarrow \\ &\quad \rightarrow \end{aligned}$$

"NORMAL FORM" concept (for stream parallel only) !
 skeleton trees



Claim: $T_S(\text{FARM}(\text{COMP}(\text{FRINGE}(\Delta)))) \leq T_S(\Delta)$

Alderson
 Donald
 FCS 199



$T_S = \max \left\{ T_{S_1}, \frac{T_F}{nw}, T_{S_3} \right\} \text{ then } \text{then } \text{then } \text{then } \text{then}$

