

Expanding Diagrams for the Maybe Monad

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1 Strong monad diagrams

$$\begin{array}{ccc} 1 \times (A + 1) & \xrightarrow{r_A} & TA \\ & \searrow t_{1,A} & \downarrow r_A + \text{id}_1 \\ & & (1 \times A) + 1 \end{array}$$

$$\begin{array}{ccc} (A \times B) \times (C + 1) & \xrightarrow{\text{st}_{A \times B, C}} & ((A \times B) \times C) + 1 \\ \downarrow \alpha_{A, B, C+1} & & \downarrow \alpha_{A, B, C} + \text{id}_1 \\ A \times (B \times (C + 1)) & \xrightarrow{\text{id}_A \times \text{st}_{B, C}} A \times ((B \times C) + 1) \xrightarrow{\text{st}_{A, B \times C}} & (A \times (B \times C)) + 1 \end{array}$$

$$\begin{array}{ccccc}
A \times B & & & & \\
\downarrow \text{id}_A \times \eta_B & \searrow \eta_{A \times B} & & & \\
A \times (B + 1) & \xrightarrow{\text{st}_{A, B}} & (A \times B) + 1 & & \\
\uparrow \text{id}_A \times \mu_B & & \nwarrow \mu_{A \times B} & & \\
A \times ((B + 1) + 1) & \xrightarrow{\text{st}_{A, B+1}} & (A \times (B + 1)) + 1 & \xrightarrow{\text{st}_{A, B} + \text{id}_1} & ((A \times B) + 1) + 1
\end{array}$$