

$$\begin{array}{ccccccc}
 X^{a_1} & & X^{a_2} & & \dots & & X^{a_n} \\
 g_1 \swarrow & & \downarrow g_2 & & & & \searrow g_n \\
 & & X \times X \times \dots \times X & & & & \\
 & & \downarrow f & & & & \\
 & & X & & & & 
 \end{array}$$