



$$\begin{array}{c}
\frac{\frac{\frac{\Gamma; \text{Akt} \vdash \text{Akt} \quad \Gamma; \text{Enz} \vdash \text{Enz}}{\Gamma; \text{Akt}, \text{Enz} \vdash \text{Akt} \otimes \text{Enz}} \otimes \frac{\Gamma; \text{Gabl} \vdash \text{Gabl}}{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl}} \otimes \frac{\Gamma; \text{KdStarPg} \vdash \text{KdStarPg}}{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl}, \text{KdStarPg} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg}} \otimes \frac{\Gamma; \text{P3'k} \vdash \text{P3'k}}{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl}, \text{KdStarPg}, \text{P3'k} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k}} \otimes \frac{\Gamma; \text{Pip2} \vdash \text{Pip2}}{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl}, \text{KdStarPg}, \text{P3'k}, \text{Pip2} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k} \otimes \text{Pip2}} \otimes \frac{\Gamma; \text{Pten} \vdash \text{Pten}}{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl}, \text{KdStarPg}, \text{P3'k}, \text{Pip2}, \text{Pten} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k} \otimes \text{Pip2} \otimes \text{Pten}} \otimes \\
\frac{\frac{\Gamma; \text{KdStar} \vdash \text{KdStar} \quad \Gamma; \text{Pg} \vdash \text{Pg}}{\Gamma; \text{KdStar}, \text{Pg} \vdash \text{KdStar} \otimes \text{Pg}} \quad \frac{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl}, \text{KdStar}, \text{P3'k}, \text{Pg}, \text{Pip2}, \text{Pten}, \text{KdStar} \otimes \text{Pg} \multimap \text{KdStarPg} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k} \otimes \text{Pip2} \otimes \text{Pten}}{\Gamma; \text{Akt}, \text{Enz}, \text{Gabl}, \text{KdStar}, \text{P3'k}, \text{Pg}, \text{Pip2}, \text{Pten} \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k} \otimes \text{Pip2} \otimes \text{Pten}} \multimap_{D_C} \\
\frac{\Gamma; \Delta \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k} \otimes \text{Pip2} \otimes \text{Pten}}{\Gamma; \Delta \vdash \text{Akt} \otimes \text{Enz} \otimes \text{Gabl} \otimes \text{KdStarPg} \otimes \text{P3'k} \otimes \text{Pip2} \otimes \text{Pten}} \star
\end{array}$$
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$$\begin{array}{c}
\frac{\frac{\frac{\Gamma: p1 \vdash p1}{\Gamma: p1, p10 \vdash p1} \otimes \frac{\Gamma: p10 \vdash p10}{\Gamma: p1, p10 \vdash p10} \otimes \frac{\Gamma: p17 \vdash p17}{\Gamma: p1, p10, p17 \vdash p1} \otimes \frac{\Gamma: p23 \vdash p23}{\Gamma: p1, p10, p17, p23 \vdash p1} \otimes \frac{\Gamma: p29 \vdash p29}{\Gamma: p1, p10, p17, p23, p29 \vdash p1} \otimes \frac{\Gamma: p30 \vdash p30}{\Gamma: p1, p10, p17, p23, p29, p30 \vdash p1} \otimes \frac{\Gamma: p4 \vdash p4}{\Gamma: p1, p10, p17, p23, p29, p30, p4 \vdash p1} \otimes \frac{\Gamma: p7 \vdash p7}{\Gamma: p1, p10, p17, p23, p29, p30, p4, p7 \vdash p1} \otimes \frac{\Gamma: p8 \vdash p8}{\Gamma: p1, p10, p17, p23, p29, p30, p4, p7, p8 \vdash p1} \otimes \frac{\Gamma: p9 \vdash p9}{\Gamma: p1, p10, p17, p23, p29, p30, p4, p7, p8, p9 \vdash p1} \otimes \frac{\Gamma: p6 \vdash p6}{\Gamma: p1, p10, p17, p23, p29, p30, p4, p7, p8, p9, p6 \vdash p1} \otimes \frac{\Gamma: p3 \vdash p3}{\Gamma: p1, p10, p17, p23, p29, p30, p4, p7, p8, p9, p6, p7, p9 \vdash p1} \otimes \frac{\Gamma: p0 \vdash p0}{\Gamma: p1, p10, p17, p23, p29, p30, p4, p7, p8, p9, p6, p7, p9 \vdash p1} \otimes \frac{\Gamma: \Delta \vdash p1}{\Gamma: p0, p0 \multimap p30 \multimap p29 \multimap p23 \multimap p17 \multimap p10 \multimap p9 \multimap p7 \multimap p6 \multimap p3 \multimap p1} \otimes \frac{\Gamma: p0 \vdash p1}{\Gamma: \Delta \vdash p1 \otimes p10 \otimes p17 \otimes p23 \otimes p29 \otimes p30 \otimes p4 \otimes p7 \otimes p8} \otimes \frac{\Gamma: \Delta \vdash p1 \otimes p10 \otimes p17 \otimes p23 \otimes p29 \otimes p30 \otimes p4 \otimes p7 \otimes p8}{\Gamma: \Delta \vdash p1 \otimes p10 \otimes p17 \otimes p23 \otimes p29 \otimes p30 \otimes p4 \otimes p7 \otimes p8} \star \\
\hline
\Gamma: p0, p0 \multimap p30 \multimap p29 \multimap p23 \multimap p17 \multimap p10 \multimap p9 \multimap p7 \multimap p6 \multimap p3 \multimap p1 \otimes p10 \otimes p17 \otimes p23 \otimes p29 \otimes p30 \otimes p4 \otimes p7 \otimes p8 \multimap D_C
\end{array}$$

2





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file: MCC/AutoFlight_afcs_02_b_1_1.p (258 ms)
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file:  MCC/AutoFlight_afcs_02_b_5_1.p (1037 ms)
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file: MCC/AutoFlight_afcs_03_b_1_1.p (621 ms)
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file: MCC/AutoFlight_afcs_03_b_5_1.p (2215 ms)
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$$\begin{array}{c}
\frac{\Gamma : p181 \vdash p181 \quad \Gamma : p186 \vdash p186}{\Gamma : p181, p186 \vdash p181 \otimes p186} \otimes \frac{\Gamma : p294 \vdash p294}{\Gamma : p181, p186, p294 \vdash p181 \otimes p186 \otimes p294} \otimes \frac{\Gamma : p4 \vdash p4}{\Gamma : p181, p186, p294, p4 \vdash p181 \otimes p186 \otimes p294 \otimes p4} \otimes \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : p186, p294, p3, p3 \multimap p181 \otimes p4 \vdash p181 \otimes p186 \otimes p294 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p181 \otimes p186 \otimes p294 \otimes p4}{\Gamma : p186, p294, p3 \vdash p181 \otimes p186 \otimes p294 \otimes p4} D_C \star \\
\frac{\Gamma : p185 \vdash p185}{\Gamma : p185, p3, p185 \multimap p294 \otimes p186 \vdash p181 \otimes p186 \otimes p294 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p181 \otimes p186 \otimes p294 \otimes p4}{\Gamma : p185, p3 \vdash p181 \otimes p186 \otimes p294 \otimes p4} D_C \star \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1 \multimap p185 \otimes p3 \vdash p181 \otimes p186 \otimes p294 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p181 \otimes p186 \otimes p294 \otimes p4}{\Gamma : p1 \vdash p181 \otimes p186 \otimes p294 \otimes p4} D_C \star \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p2, p2 \multimap p1 \vdash p181 \otimes p186 \otimes p294 \otimes p4} \multimap \frac{\Gamma : p1 \vdash p181 \otimes p186 \otimes p294 \otimes p4}{\Gamma : p2 \vdash p181 \otimes p186 \otimes p294 \otimes p4} D_C \multimap \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p2 \vdash p181 \otimes p186 \otimes p294 \otimes p4} \multimap \frac{\Gamma : p0 \vdash p181 \otimes p186 \otimes p294 \otimes p4}{\Gamma : \Delta \vdash p181 \otimes p186 \otimes p294 \otimes p4} D_C \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_04\_b.10\_1.p (117074 ms)

$$\begin{array}{c}
\frac{\Gamma : p242 \vdash p242 \quad \Gamma : p250 \vdash p250}{\Gamma : p242, p250 \vdash p242 \otimes p250} \otimes \frac{\Gamma : p351 \vdash p351}{\Gamma : p242, p250, p351 \vdash p242 \otimes p250 \otimes p351} \otimes \frac{\Gamma : p368 \vdash p368}{\Gamma : p242, p250, p351, p368 \vdash p242 \otimes p250 \otimes p351 \otimes p368} \otimes \frac{\Gamma : p369 \vdash p369}{\Gamma : p242, p250, p351, p368, p369 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369} \otimes \frac{\Gamma : p386 \vdash p386}{\Gamma : p242, p250, p351, p368, p369, p386 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386} \otimes \frac{\Gamma : p4 \vdash p4}{\Gamma : p242, p250, p351, p368, p369, p386, p4 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \otimes \\
\frac{\Gamma : p352 \vdash p352}{\Gamma : p242, p250, p351, p352, p369, p386, p4 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \frac{\Gamma : p335 \vdash p335}{\Gamma : p242, p250, p335, p352, p369, p386, p4 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} D_C \multimap \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p250, p3, p335, p352, p369, p386, p3 \multimap p242 \otimes p4 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4}{\Gamma : p250, p3, p335, p352, p369, p386, p3 \vdash p242 \otimes p4 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} D_C \star \\
\frac{\Gamma : p249 \vdash p249}{\Gamma : p249, p3, p352, p369, p386, p249 \multimap p335 \otimes p250 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \frac{\Gamma : p248 \vdash p248}{\Gamma : p248, p3, p369, p386 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \\
\frac{\Gamma : p247 \vdash p247}{\Gamma : p247, p3, p352, p369, p386 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \frac{\Gamma : p246 \vdash p246}{\Gamma : p246, p3, p246 \multimap p386 \otimes p247 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1 \multimap p246 \otimes p3 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \frac{\Gamma : p2 \vdash p2}{\Gamma : p2, p2 \multimap p1 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p2 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} \multimap \frac{\Gamma : p0 \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4}{\Gamma : \Delta \vdash p242 \otimes p250 \otimes p351 \otimes p368 \otimes p369 \otimes p386 \otimes p4} D_C \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_04\_b.1\_1.p (1086 ms)

$$\begin{array}{c}
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : p2 \vdash p2}{\Gamma : p0, p0 \multimap p2 \vdash p2} \multimap \frac{\Gamma : p0 \vdash p2}{\Gamma : \Delta \vdash p2} D_C \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_04\_b.5\_1.p (4650 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\frac{\frac{\frac{\Gamma : p248 \vdash p248 \quad \Gamma : p3 \vdash p3}{\Gamma : p248, p3 \vdash p248 \otimes p3} \otimes \frac{\Gamma : p369 \vdash p369}{\Gamma : p248, p3, p369 \vdash p248 \otimes p3 \otimes p369} \otimes \frac{\Gamma : p386 \vdash p386}{\Gamma : p248, p3, p369, p386 \vdash p248 \otimes p3 \otimes p369 \otimes p386} \otimes \frac{\Gamma : p247 \vdash p247}{\Gamma : p247, p3, p386, p247 \vdash p248 \otimes p3 \otimes p369 \otimes p386} \otimes \frac{\Gamma : \Delta \vdash p248 \otimes p3 \otimes p369 \otimes p386}{\Gamma : p247, p3, p386 \vdash p248 \otimes p3 \otimes p369 \otimes p386} \star}{\Gamma : p246 \vdash p246} \otimes \frac{\Gamma : \Delta \vdash p248 \otimes p3 \otimes p369 \otimes p386}{\Gamma : p246, p3, p246 \vdash p248 \otimes p3 \otimes p369 \otimes p386} \star}{\Gamma : p246, p3, p246 \vdash p248 \otimes p3 \otimes p369 \otimes p386} \otimes \frac{\Gamma : p246, p3 \vdash p248 \otimes p3 \otimes p369 \otimes p386}{\Gamma : p1 \vdash p1} \star}{\Gamma : p1 \vdash p1} \otimes \frac{\Gamma : p1 \vdash p248 \otimes p3 \otimes p369 \otimes p386}{\Gamma : p2 \vdash p2} \star}{\Gamma : p0 \vdash p0} \otimes \frac{\Gamma : p0, p0 \vdash p2 \vdash p248 \otimes p3 \otimes p369 \otimes p386}{\Gamma : p0 \vdash p248 \otimes p3 \otimes p369 \otimes p386} \star}{\Gamma : \Delta \vdash p248 \otimes p3 \otimes p369 \otimes p386} \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_05\_b.1.1.p (1814 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p0 \vdash p0 \quad \Gamma : p2 \vdash p2}{\Gamma : p0, p0 \vdash p2 \vdash p2} \otimes \frac{\Gamma : p0 \vdash p0}{\Gamma : \Delta \vdash p2} \star}{\Gamma : p0 \vdash p0} \otimes \frac{\Gamma : p0, p0 \vdash p2 \vdash p2}{\Gamma : \Delta \vdash p2} \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_05\_b.5.1.p (7526 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\frac{\frac{\frac{\Gamma : p3 \vdash p3 \quad \Gamma : p309 \vdash p309}{\Gamma : p3, p309 \vdash p3 \otimes p309} \otimes \frac{\Gamma : p461 \vdash p461}{\Gamma : p3, p309, p461 \vdash p3 \otimes p309 \otimes p461} \otimes \frac{\Gamma : p478 \vdash p478}{\Gamma : p3, p309, p461, p478 \vdash p3 \otimes p309 \otimes p461 \otimes p478} \star}{\Gamma : p308 \vdash p308} \otimes \frac{\Gamma : \Delta \vdash p3 \otimes p309 \otimes p461 \otimes p478}{\Gamma : p3, p308, p478, p308 \vdash p3 \otimes p309 \otimes p461 \otimes p478} \star}{\Gamma : p307 \vdash p307} \otimes \frac{\Gamma : \Delta \vdash p3 \otimes p309 \otimes p461 \otimes p478}{\Gamma : p3, p307, p307 \vdash p3 \otimes p309 \otimes p461 \otimes p478} \star}{\Gamma : p1 \vdash p1} \otimes \frac{\Gamma : \Delta \vdash p3 \otimes p309 \otimes p461 \otimes p478}{\Gamma : p1, p1 \vdash p3 \otimes p309 \otimes p461 \otimes p478} \star}{\Gamma : p2 \vdash p2} \otimes \frac{\Gamma : p2, p2 \vdash p1 \vdash p3 \otimes p309 \otimes p461 \otimes p478}{\Gamma : p0 \vdash p0} \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_06\_b.1.1.p (2507 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p0 \vdash p0 \quad \Gamma : p2 \vdash p2}{\Gamma : p0, p0 \vdash p2 \vdash p2} \otimes \frac{\Gamma : p0 \vdash p0}{\Gamma : \Delta \vdash p2} \star}{\Gamma : p0 \vdash p0} \otimes \frac{\Gamma : p0, p0 \vdash p2 \vdash p2}{\Gamma : \Delta \vdash p2} \star
\end{array}$$

file: MCC/AutoFlight\_afcs\_06\_b.5.1.p (10496 ms)







$$\begin{array}{c}
\frac{\Gamma: a \vdash a \quad \Gamma: c'cap \vdash c'cap}{\Gamma: a, c'cap \vdash a \otimes c'cap} \otimes \frac{\Gamma: da \vdash da}{\Gamma: a, c'cap, da \vdash a \otimes c'cap \otimes da} \otimes \frac{\Gamma: dr \vdash dr}{\Gamma: a, c'cap, da, dr \vdash a \otimes c'cap \otimes da \otimes dr} \otimes \frac{\Gamma: ma \vdash ma}{\Gamma: a, c'cap, da, dr, ma \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma} \otimes \frac{\Gamma: mr'cap \vdash mr'cap}{\Gamma: a, c'cap, da, dr, ma, mr'cap \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap} \otimes \frac{\Gamma: r'cap \vdash r'cap}{\Gamma: a, c'cap, da, dr, ma, mr'cap, r'cap \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \star \\
\frac{\Gamma: ma \vdash ma \quad \Gamma: a'cap \vdash a'cap}{\Gamma: a'cap, ma \vdash ma \otimes a'cap} \otimes \frac{\Gamma: a'cap, c'cap, da, dr, ma, mr'cap, r'cap, ma \otimes a'cap \multimap a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap}{\Gamma: \Delta \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \multimap \\
\frac{\Gamma: da \vdash da \quad \Gamma: ma'cap \vdash ma'cap}{\Gamma: da, ma'cap \vdash da \otimes ma'cap} \otimes \frac{\Gamma: a'cap, c'cap, da, dr, ma, mr'cap, r'cap, da \otimes ma'cap \multimap ma \otimes da \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap}{\Gamma: a'cap, c'cap, da, dr, ma'cap, mr'cap, r'cap \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \multimap \\
\frac{\Gamma: a'cap, c'cap, da, dr, ma'cap, mr'cap, r'cap \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap}{\Gamma: \Delta \vdash a \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \star
\end{array}$$

file: MCC/CircadianClock\_circadian\_clock-000001\_5\_1.p (1510 ms)

$$\begin{array}{c}
\frac{\Gamma: a'cap \vdash a'cap \quad \Gamma: c'cap \vdash c'cap}{\Gamma: a'cap, c'cap \vdash a'cap \otimes c'cap} \otimes \frac{\Gamma: da \vdash da}{\Gamma: a'cap, c'cap, da \vdash a'cap \otimes c'cap \otimes da} \otimes \frac{\Gamma: dr \vdash dr}{\Gamma: a'cap, c'cap, da, dr \vdash a'cap \otimes c'cap \otimes da \otimes dr} \otimes \frac{\Gamma: ma \vdash ma}{\Gamma: a'cap, c'cap, da, dr, ma \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma} \otimes \frac{\Gamma: mr'cap \vdash mr'cap}{\Gamma: a'cap, c'cap, da, dr, ma, mr'cap \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap} \otimes \frac{\Gamma: r'cap \vdash r'cap}{\Gamma: a'cap, c'cap, da, dr, ma, mr'cap, r'cap \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \star \\
\frac{\Gamma: da \vdash da \quad \Gamma: ma'cap \vdash ma'cap}{\Gamma: da, ma'cap \vdash da \otimes ma'cap} \otimes \frac{\Gamma: a'cap, c'cap, da, dr, ma'cap, mr'cap, r'cap, da \otimes ma'cap \multimap ma \otimes da \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap}{\Gamma: a'cap, c'cap, da, dr, ma'cap, mr'cap, r'cap \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \multimap \\
\frac{\Gamma: a'cap, c'cap, da, dr, ma'cap, mr'cap, r'cap \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap}{\Gamma: \Delta \vdash a'cap \otimes c'cap \otimes da \otimes dr \otimes ma \otimes mr'cap \otimes r'cap} \star
\end{array}$$

file: MCC/CloudDeployment\_deploy\_2\_a\_100\_1.p (73332 ms)

$$\begin{array}{c}
\frac{\Gamma: p2 \vdash p2 \quad \Gamma: p28 \vdash p28}{\Gamma: p2, p28 \vdash p2 \otimes p28} \otimes \frac{\Gamma: p30 \vdash p30}{\Gamma: p2, p28, p30 \vdash p2 \otimes p28 \otimes p30} \otimes \frac{\Gamma: p32 \vdash p32}{\Gamma: p2, p28, p30, p32 \vdash p2 \otimes p28 \otimes p30 \otimes p32} \otimes \frac{\Gamma: p4 \vdash p4}{\Gamma: p2, p28, p30, p32, p4 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4} \otimes \frac{\Gamma: p56 \vdash p56}{\Gamma: p2, p28, p30, p32, p4, p56 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56} \otimes \frac{\Gamma: p63 \vdash p63}{\Gamma: p2, p28, p30, p32, p4, p56, p63 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63} \otimes \frac{\Gamma: p65 \vdash p65}{\Gamma: p2, p28, p30, p32, p4, p56, p63, p65 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65} \otimes \frac{\Gamma: p67 \vdash p67}{\Gamma: p2, p28, p30, p32, p4, p56, p63, p65, p67 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67} \star \\
\frac{\Gamma: p0 \vdash p0}{\Gamma: p0, p0 \multimap p67 \otimes p63 \otimes p65 \otimes p56 \otimes p32 \otimes p30 \otimes p28 \otimes p4 \otimes p2 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67} \multimap \\
\frac{\Gamma: p0 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67}{\Gamma: \Delta \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67} \star
\end{array}$$

file: MCC/CloudDeployment\_deploy\_2\_a\_10\_1.p (73172 ms)

$$\begin{array}{c}
\frac{\Gamma: p2 \vdash p2 \quad \Gamma: p28 \vdash p28}{\Gamma: p2, p28 \vdash p2 \otimes p28} \otimes \frac{\Gamma: p30 \vdash p30}{\Gamma: p2, p28, p30 \vdash p2 \otimes p28 \otimes p30} \otimes \frac{\Gamma: p32 \vdash p32}{\Gamma: p2, p28, p30, p32 \vdash p2 \otimes p28 \otimes p30 \otimes p32} \otimes \frac{\Gamma: p4 \vdash p4}{\Gamma: p2, p28, p30, p32, p4 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4} \otimes \frac{\Gamma: p56 \vdash p56}{\Gamma: p2, p28, p30, p32, p4, p56 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56} \otimes \frac{\Gamma: p63 \vdash p63}{\Gamma: p2, p28, p30, p32, p4, p56, p63 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63} \otimes \frac{\Gamma: p65 \vdash p65}{\Gamma: p2, p28, p30, p32, p4, p56, p63, p65 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65} \otimes \frac{\Gamma: p67 \vdash p67}{\Gamma: p2, p28, p30, p32, p4, p56, p63, p65, p67 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67} \star \\
\frac{\Gamma: p0 \vdash p0}{\Gamma: p0, p0 \multimap p67 \otimes p63 \otimes p65 \otimes p56 \otimes p32 \otimes p30 \otimes p28 \otimes p4 \otimes p2 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67} \multimap \\
\frac{\Gamma: p0 \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67}{\Gamma: \Delta \vdash p2 \otimes p28 \otimes p30 \otimes p32 \otimes p4 \otimes p56 \otimes p63 \otimes p65 \otimes p67} \star
\end{array}$$

file: MCC/CloudDeployment\_deploy\_2\_a\_1\_1.p (73937 ms)



$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p552 \vdash p552}{\Gamma : p1, p552 \vdash p1 \otimes p552} \otimes \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p552}{\Gamma : p0, p0 \multimap p552 \otimes p1 \vdash p1 \otimes p552} \star \\
\frac{\Gamma : p0 \vdash p1 \otimes p552}{\Gamma : \Delta \vdash p1 \otimes p552} \multimap D_C
\end{array}$$

file: MCC/CloudDeployment\_deploy\_2.b.5.1.p (14653 ms)

$$\begin{array}{c}
\frac{\Gamma : p266 \vdash p266 \quad \Gamma : p3 \vdash p3}{\Gamma : p266, p3 \vdash p266 \otimes p3} \otimes \frac{\Gamma : p547 \vdash p547}{\Gamma : p266, p3, p547 \vdash p266 \otimes p3 \otimes p547} \otimes \frac{\Gamma : p554 \vdash p554}{\Gamma : p266, p3, p547, p554 \vdash p266 \otimes p3 \otimes p547 \otimes p554} \otimes \\
\frac{\Gamma : p552 \vdash p552}{\Gamma : p266, p3, p547, p552 \multimap p554 \vdash p266 \otimes p3 \otimes p547 \otimes p554} \multimap D_C \\
\frac{\Gamma : p529 \vdash p529}{\Gamma : p266, p3, p529, p552, p529 \multimap p547 \vdash p266 \otimes p3 \otimes p547 \otimes p554} \multimap D_C \\
\frac{\Gamma : p266, p3, p529, p552 \vdash p266 \otimes p3 \otimes p547 \otimes p554}{\Gamma : \Delta \vdash p266 \otimes p3 \otimes p547 \otimes p554} \star \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p2, p529, p552, p2 \multimap p266 \otimes p3 \vdash p266 \otimes p3 \otimes p547 \otimes p554} \multimap D_C \\
\frac{\Gamma : p2, p529, p552 \vdash p266 \otimes p3 \otimes p547 \otimes p554}{\Gamma : \Delta \vdash p266 \otimes p3 \otimes p547 \otimes p554} \star \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p552, p1 \multimap p529 \otimes p2 \vdash p266 \otimes p3 \otimes p547 \otimes p554} \multimap D_C \\
\frac{\Gamma : p1, p552 \vdash p266 \otimes p3 \otimes p547 \otimes p554}{\Gamma : \Delta \vdash p266 \otimes p3 \otimes p547 \otimes p554} \star \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p552 \otimes p1 \vdash p266 \otimes p3 \otimes p547 \otimes p554} \multimap D_C \\
\frac{\Gamma : p0 \vdash p266 \otimes p3 \otimes p547 \otimes p554}{\Gamma : \Delta \vdash p266 \otimes p3 \otimes p547 \otimes p554} \star
\end{array}$$

file: MCC/CloudDeployment\_deploy\_3.b.1.1.p (14630 ms)

$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p855 \vdash p855}{\Gamma : p1, p855 \vdash p1 \otimes p855} \otimes \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p855}{\Gamma : p0, p0 \multimap p855 \otimes p1 \vdash p1 \otimes p855} \star \\
\frac{\Gamma : p0 \vdash p1 \otimes p855}{\Gamma : \Delta \vdash p1 \otimes p855} \multimap D_C
\end{array}$$

file: MCC/CloudDeployment\_deploy\_3.b.5.1.p (47945 ms)



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file: MCC/DES_des_01_b_5_1.p (4583 ms)
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$$\begin{array}{c}
\frac{\Gamma: p11 \vdash p11 \quad \Gamma: p132 \vdash p132}{\Gamma: p11, p132 \vdash p11 \otimes p132} \otimes \frac{\Gamma: p14 \vdash p14}{\Gamma: p11, p132, p14 \vdash p11 \otimes p132 \otimes p14} \otimes \frac{\Gamma: p276 \vdash p276}{\Gamma: p11, p132, p14, p276 \vdash p11 \otimes p132 \otimes p14 \otimes p276} \otimes \frac{\Gamma: p4 \vdash p4}{\Gamma: p11, p132, p14, p276, p4 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4} \otimes \frac{\Gamma: p9 \vdash p9}{\Gamma: p11, p132, p14, p276, p4, p9 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \otimes \\
\frac{\Gamma: p3 \vdash p3}{\Gamma: p11, p132, p14, p276, p3, p3 \multimap p9 \otimes p4 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \multimap \frac{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9}{\Gamma: p11, p132, p14, p276, p3 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} D_C \\
\frac{\Gamma: p131 \vdash p131}{\Gamma: p11, p131, p14, p3, p131 \multimap p276 \otimes p132 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \multimap \frac{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9}{\Gamma: p11, p131, p14, p3 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} D_C \\
\frac{\Gamma: p13 \vdash p13}{\Gamma: p11, p13, p3, p13 \multimap p131 \otimes p14 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \multimap \frac{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9}{\Gamma: p11, p13, p3 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} D_C \\
\frac{\Gamma: p1 \vdash p1}{\Gamma: p1, p13, p1 \multimap p11 \otimes p3 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \multimap \frac{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9}{\Gamma: p1, p13 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} D_C \\
\frac{\Gamma: p0 \vdash p0}{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \multimap \frac{\Gamma: p0, p0 \multimap p13 \otimes p1 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9}{\Gamma: p0 \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} D_C \\
\frac{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9}{\Gamma: \Delta \vdash p11 \otimes p132 \otimes p14 \otimes p276 \otimes p4 \otimes p9} \star
\end{array}$$

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file: MCC/DES_des_02_b_1_1.p (800 ms)
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$$\frac{\frac{\frac{\Gamma : p1 \vdash p1}{\Gamma : p17 \vdash p17} \otimes \frac{\Gamma : p1, p17 \vdash p1 \otimes p17}{\Gamma : \Delta \vdash p1 \otimes p17} \star}{\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p17 \otimes p1 \vdash p1 \otimes p17} \multimap} \star \quad D_C$$

```
file: MCC/DES_des_02_b_5_1.p (4673 ms)
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$$\begin{array}{c}
\frac{\Gamma : p11 \vdash p11 \quad \Gamma : p136 \vdash p136}{\Gamma : p11, p136 \vdash p11 \otimes p136} \otimes \frac{\Gamma : p14 \vdash p14}{\Gamma : p11, p136, p14 \vdash p11 \otimes p136 \otimes p14} \otimes \frac{\Gamma : p18 \vdash p18}{\Gamma : p11, p136, p14, p18 \vdash p11 \otimes p136 \otimes p14 \otimes p18} \otimes \frac{\Gamma : p280 \vdash p280}{\Gamma : p11, p136, p14, p18, p280 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280} \otimes \frac{\Gamma : p4 \vdash p4}{\Gamma : p11, p136, p14, p18, p280, p4 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} \otimes \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : p136, p14, p18, p280, p3, p3 \multimap p11 \otimes p4 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4}{\Gamma : p136, p14, p18, p280, p3 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} D_C \star \\
\frac{\Gamma : p135 \vdash p135}{\Gamma : p135, p14, p18, p3, p135 \multimap p280 \otimes p136 \otimes p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4}{\Gamma : p135, p14, p18, p3 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} D_C \star \\
\frac{\Gamma : p17 \vdash p17}{\Gamma : p14, p17, p3, p17 \multimap p135 \otimes p18 \otimes p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4}{\Gamma : p14, p17, p3 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} D_C \star \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p17, p1 \multimap p14 \otimes p3 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4}{\Gamma : p1, p17 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} D_C \star \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p17 \otimes p1 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} \multimap \frac{\Gamma : \Delta \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4}{\Gamma : p0 \vdash p11 \otimes p136 \otimes p14 \otimes p18 \otimes p280 \otimes p4} D_C \star
\end{array}$$

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file:  MCC/DES_des_05_b_1_1.p (877 ms)
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$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p29 \vdash p29}{\Gamma : p1, p29 \vdash p1 \otimes p29} \otimes \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p29}{\Gamma : p0, p0 \multimap p29 \otimes p1 \vdash p1 \otimes p29} \star \\
\frac{\Gamma : p0 \vdash p1 \otimes p29}{\Gamma : \Delta \vdash p1 \otimes p29} D_C
\end{array}$$

file: MCC/DES\_des.05\_b.5\_1.p (5271 ms)

$$\begin{array}{c}
\frac{\Gamma : p148 \vdash p148 \quad \Gamma : p17 \vdash p17}{\Gamma : p148, p17 \vdash p148 \otimes p17} \otimes \quad \frac{\Gamma : p23 \vdash p23}{\Gamma : p148, p17, p23 \vdash p148 \otimes p17 \otimes p23} \otimes \quad \frac{\Gamma : p292 \vdash p292}{\Gamma : p148, p17, p23, p292 \vdash p148 \otimes p17 \otimes p23 \otimes p292} \otimes \quad \frac{\Gamma : p30 \vdash p30}{\Gamma : p148, p17, p23, p292, p30 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30} \otimes \quad \frac{\Gamma : p4 \vdash p4}{\Gamma : p148, p17, p23, p292, p30, p4 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \otimes \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : p148, p23, p292, p3, p30, p3 \multimap p17 \otimes p4 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \multimap \quad \frac{\Gamma : p148, p23, p292, p3, p30 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4}{\Gamma : \Delta \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \star \\
\frac{\Gamma : p147 \vdash p147}{\Gamma : p147, p23, p3, p30, p147 \multimap p292 \otimes p148 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \multimap \quad \frac{\Gamma : p147, p23, p3, p30 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4}{\Gamma : \Delta \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \star \\
\frac{\Gamma : p29 \vdash p29}{\Gamma : p23, p29, p3, p29 \multimap p147 \otimes p30 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \multimap \quad \frac{\Gamma : p23, p29, p3 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4}{\Gamma : \Delta \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \star \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p29, p1 \multimap p23 \otimes p3 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \multimap \quad \frac{\Gamma : p1, p29 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4}{\Gamma : \Delta \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \star \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p29 \otimes p1 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \multimap \quad \frac{\Gamma : p0 \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4}{\Gamma : \Delta \vdash p148 \otimes p17 \otimes p23 \otimes p292 \otimes p30 \otimes p4} \star
\end{array}$$

file: MCC/DES\_des.10\_b.1\_1.p (1171 ms)

$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p49 \vdash p49}{\Gamma : p1, p49 \vdash p1 \otimes p49} \otimes \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p49}{\Gamma : p0, p0 \multimap p49 \otimes p1 \vdash p1 \otimes p49} \star \\
\frac{\Gamma : p0 \vdash p1 \otimes p49}{\Gamma : \Delta \vdash p1 \otimes p49} D_C
\end{array}$$

file: MCC/DES\_des.10\_b.5\_1.p (6703 ms)

$$\begin{array}{c}
\frac{\Gamma : p168 \vdash p168 \quad \Gamma : p27 \vdash p27}{\Gamma : p168, p27 \vdash p168 \otimes p27} \otimes \quad \frac{\Gamma : p312 \vdash p312}{\Gamma : p168, p27, p312 \vdash p168 \otimes p27 \otimes p312} \otimes \quad \frac{\Gamma : p38 \vdash p38}{\Gamma : p168, p27, p312, p38 \vdash p168 \otimes p27 \otimes p312 \otimes p38} \otimes \quad \frac{\Gamma : p4 \vdash p4}{\Gamma : p168, p27, p312, p38, p4 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4} \otimes \quad \frac{\Gamma : p50 \vdash p50}{\Gamma : p168, p27, p312, p38, p4, p50 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \otimes \\
\frac{\Gamma : p167 \vdash p167}{\Gamma : p167, p27, p38, p4, p50, p167 \multimap p312 \otimes p168 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \multimap \quad \frac{\Gamma : p167, p27, p38, p4, p50 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50}{\Gamma : \Delta \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \star \\
\frac{\Gamma : p49 \vdash p49}{\Gamma : p27, p38, p4, p49 \multimap p167 \otimes p50 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \multimap \quad \frac{\Gamma : p27, p38, p4, p49 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50}{\Gamma : \Delta \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \star \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : p3, p38, p49, p3 \multimap p27 \otimes p4 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \multimap \quad \frac{\Gamma : p3, p38, p49 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50}{\Gamma : \Delta \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \star \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p49, p1 \multimap p38 \otimes p3 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \multimap \quad \frac{\Gamma : p1, p49 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50}{\Gamma : \Delta \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \star \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p49 \otimes p1 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \multimap \quad \frac{\Gamma : p0 \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50}{\Gamma : \Delta \vdash p168 \otimes p27 \otimes p312 \otimes p38 \otimes p4 \otimes p50} \star
\end{array}$$

file: MCC/DES\_des\_20\_b.1.1.p (1653 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p89 \vdash p89}{\Gamma : p1, p89 \vdash p1 \otimes p89} \otimes}{\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p89}{\Gamma : p0, p0 \multimap p89 \otimes p1 \vdash p1 \otimes p89} \star} \multimap \\
\frac{\Gamma : p0 \vdash p1 \otimes p89}{\Gamma : \Delta \vdash p1 \otimes p89} \star \quad D_C
\end{array}$$

file: MCC/DES\_des\_20\_b.5.1.p (8575 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\frac{\Gamma : p208 \vdash p208 \quad \Gamma : p352 \vdash p352}{\Gamma : p208, p352 \vdash p208 \otimes p352} \otimes \quad \frac{\Gamma : p4 \vdash p4}{\Gamma : p208, p352, p4 \vdash p208 \otimes p352 \otimes p4} \otimes \quad \frac{\Gamma : p47 \vdash p47}{\Gamma : p208, p352, p4, p47 \vdash p208 \otimes p352 \otimes p4 \otimes p47} \otimes \quad \frac{\Gamma : p68 \vdash p68}{\Gamma : p208, p352, p4, p47, p68 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68} \otimes \quad \frac{\Gamma : p90 \vdash p90}{\Gamma : p208, p352, p4, p47, p68, p90 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \otimes}{\frac{\Gamma : p207 \vdash p207}{\Gamma : p207, p4, p47, p68, p90, p207 \multimap p352 \otimes p208 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \multimap} \star \\
\frac{\Gamma : p89 \vdash p89}{\Gamma : p4, p47, p68, p89, p89 \multimap p207 \otimes p90 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \multimap \quad D_C \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : p3, p68, p89, p3 \multimap p47 \otimes p4 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \multimap \quad D_C \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p89, p1 \multimap p68 \otimes p3 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \multimap \quad D_C \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p89 \otimes p1 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \multimap \quad D_C \\
\frac{\Gamma : p0 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90}{\Gamma : \Delta \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \star \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : \Delta \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \star \\
\frac{\Gamma : p1, p89, p1 \multimap p68 \otimes p3 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90}{\Gamma : p1, p89 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \star \\
\frac{\Gamma : p0 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90}{\Gamma : \Delta \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \star \\
\frac{\Gamma : p0 \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90}{\Gamma : \Delta \vdash p208 \otimes p352 \otimes p4 \otimes p47 \otimes p68 \otimes p90} \star
\end{array}$$

file: MCC/DES\_des\_30\_b.1.1.p (2247 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p128 \vdash p128}{\Gamma : p1, p128 \vdash p1 \otimes p128} \otimes}{\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p128}{\Gamma : p0, p0 \multimap p128 \otimes p1 \vdash p1 \otimes p128} \star} \multimap \\
\frac{\Gamma : p0 \vdash p1 \otimes p128}{\Gamma : \Delta \vdash p1 \otimes p128} \star \quad D_C
\end{array}$$

file: MCC/DES\_des\_30\_b.5.1.p (10376 ms)





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file: MCC/DES_des_50_b_5_1.p (14970 ms)
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[illegible]

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file: MCC/DES_des_60_b_1_1.p (3800 ms)
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$$\frac{\frac{\frac{\overline{\Gamma : p1 \vdash p1} \quad \overline{\Gamma : p248 \vdash p248}}{\overline{\Gamma : p1, p248 \vdash p1 \otimes p248}} \otimes \quad \frac{\overline{\Gamma : p0 \vdash p0}}{\overline{\Gamma : \Delta \vdash p1 \otimes p248}} \star}{\overline{\Gamma : p0, p0 \multimap p248 \otimes p1 \vdash p1 \otimes p248}} \multimap \quad \frac{\overline{\Gamma : p0 \vdash p1 \otimes p248}}{\overline{\Gamma : \Delta \vdash p1 \otimes p248}} \star}{D_C} \star$$

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file: MCC/DES_des_60_b_5_1.p (17502 ms)
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$$\begin{array}{c}
\frac{\Gamma: p126 \vdash p126 \quad \Gamma: p187 \vdash p187}{\Gamma: p126, p187 \vdash p126 \otimes p187} \otimes \quad \frac{\Gamma: p249 \vdash p249}{\Gamma: p126, p187, p249 \vdash p126 \otimes p187 \otimes p249} \otimes \quad \frac{\Gamma: p366 \vdash p366}{\Gamma: p126, p187, p249, p366 \vdash p126 \otimes p187 \otimes p249 \otimes p366} \otimes \quad \frac{\Gamma: p5 \vdash p5}{\Gamma: p126, p187, p249, p366, p5 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5} \otimes \quad \frac{\Gamma: p65 \vdash p65}{\Gamma: p126, p187, p249, p366, p5, p65 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} \otimes \\
\frac{\Gamma: p4 \vdash p4}{\Gamma: p126, p187, p249, p366, p4, p4 \multimap p65 \otimes p5 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} \multimap \quad \frac{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65}{\Gamma: p126, p187, p249, p366, p4 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} D_C \quad * \\
\frac{\Gamma: p3 \vdash p3}{\Gamma: p187, p249, p3, p366, p3 \multimap p126 \otimes p4 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} \multimap \quad \frac{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65}{\Gamma: p187, p249, p3, p366 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} D_C \quad * \\
\frac{\Gamma: p248 \vdash p248}{\Gamma: p187, p248, p3, p248 \multimap p366 \otimes p249 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} \multimap \quad \frac{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65}{\Gamma: p187, p248, p3 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} D_C \quad * \\
\frac{\Gamma: p1 \vdash p1}{\Gamma: p1, p248, p1 \multimap p187 \otimes p3 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} \multimap \quad \frac{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65}{\Gamma: p1, p248 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} D_C \quad * \\
\frac{\Gamma: p0 \vdash p0}{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} \multimap \quad \frac{\Gamma: p0, p0 \multimap p248 \otimes p1 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65}{\Gamma: p0 \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} D_C \quad * \\
\frac{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65}{\Gamma: \Delta \vdash p126 \otimes p187 \otimes p249 \otimes p366 \otimes p5 \otimes p65} *
\end{array}$$

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file: MCC/DatabaseWithMutex_database2UNFOLD_100_1.p (732 ms)
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[illegible]

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file: MCC/DatabaseWithMutex_database2UNFOLD_10_1.p (248 ms)
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$$\begin{array}{c}
\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p203 \vdash p203}{\Gamma : p1, p203 \vdash p1 \otimes p203} \otimes}{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p203} \star \\
\frac{\Gamma : p0, p0 \multimap p203 \otimes p1 \vdash p1 \otimes p203}{\Gamma : p0 \vdash p1 \otimes p203} \multimap \\
\frac{\Gamma : p0 \vdash p1 \otimes p203}{\Gamma : \Delta \vdash p1 \otimes p203} D_C \star
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_04\_b.5.1.p (2722 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p255 \vdash p255}{\Gamma : p1, p255 \vdash p1 \otimes p255} \otimes \quad \frac{\Gamma : p266 \vdash p266}{\Gamma : p1, p255, p266 \vdash p1 \otimes p255 \otimes p266} \otimes}{\frac{\Gamma : p267 \vdash p267 \quad \Gamma : p1, p255, p267 \multimap p266 \vdash p1 \otimes p255 \otimes p266}{\Gamma : p1, p255, p267 \vdash p1 \otimes p255 \otimes p266} \multimap} \otimes \\
\frac{\Gamma : p256 \vdash p256 \quad \Gamma : p1, p255, p256 \multimap p267 \vdash p1 \otimes p255 \otimes p266}{\Gamma : p1, p255, p256 \vdash p1 \otimes p255 \otimes p266} \multimap \\
\frac{\Gamma : p204 \vdash p204 \quad \Gamma : p1, p255, p256 \vdash p1 \otimes p255 \otimes p266}{\Gamma : p1, p204, p256 \vdash p1 \otimes p255 \otimes p266} D_C \multimap \\
\frac{\Gamma : p1, p204, p256, p204 \multimap p255 \vdash p1 \otimes p255 \otimes p266}{\Gamma : p1, p204, p256 \vdash p1 \otimes p255 \otimes p266} D_C \multimap \\
\frac{\Gamma : p203 \vdash p203 \quad \Gamma : \Delta \vdash p1 \otimes p255 \otimes p266}{\Gamma : p1, p203, p203 \multimap p256 \otimes p204 \vdash p1 \otimes p255 \otimes p266} \star \\
\frac{\Gamma : p1, p203 \vdash p1 \otimes p255 \otimes p266}{\Gamma : \Delta \vdash p1 \otimes p255 \otimes p266} D_C \multimap \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p255 \otimes p266}{\Gamma : p0, p0 \multimap p203 \otimes p1 \vdash p1 \otimes p255 \otimes p266} \star \\
\frac{\Gamma : p0 \vdash p1 \otimes p255 \otimes p266}{\Gamma : \Delta \vdash p1 \otimes p255 \otimes p266} D_C \star
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_06\_a.1.1.p (14357 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p12 \vdash p12 \quad \Gamma : p24 \vdash p24}{\Gamma : p12, p24 \vdash p12 \otimes p24} \otimes \quad \frac{\Gamma : p36 \vdash p36}{\Gamma : p12, p24, p36 \vdash p12 \otimes p24 \otimes p36} \otimes \quad \frac{\Gamma : p48 \vdash p48}{\Gamma : p12, p24, p36, p48 \vdash p12 \otimes p24 \otimes p36 \otimes p48} \otimes \quad \frac{\Gamma : p60 \vdash p60}{\Gamma : p12, p24, p36, p48, p60 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60} \otimes \\
\frac{\Gamma : p12, p24, p36, p48, p60 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60}{\Gamma : p12, p24, p36, p48, p60, p72 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72} \otimes \quad \frac{\Gamma : p72 \vdash p72}{\Gamma : p12, p24, p36, p48, p60, p72 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72} \otimes \\
\frac{\Gamma : p12, p24, p36, p48, p60, p72 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72}{\Gamma : p12, p24, p36, p48, p60, p72, p73 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73} \otimes \quad \frac{\Gamma : p73 \vdash p73}{\Gamma : p12, p24, p36, p48, p60, p72, p73 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73} \otimes \\
\frac{\Gamma : p12, p24, p36, p48, p60, p72, p73 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73}{\Gamma : p12, p24, p36, p48, p60, p72, p73, p74 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73 \otimes p74} \otimes \quad \frac{\Gamma : p74 \vdash p74}{\Gamma : p12, p24, p36, p48, p60, p72, p73, p74 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73 \otimes p74} \otimes \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73 \otimes p74}{\Gamma : p0, p0 \multimap p74 \otimes p73 \otimes p72 \otimes p60 \otimes p48 \otimes p36 \otimes p24 \otimes p12 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73 \otimes p74} \star \\
\frac{\Gamma : p0 \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73 \otimes p74}{\Gamma : \Delta \vdash p12 \otimes p24 \otimes p36 \otimes p48 \otimes p60 \otimes p72 \otimes p73 \otimes p74} D_C \star
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_06\_a.5.1.p (33351 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\Gamma : p10 \vdash p10 \quad \Gamma : p24 \vdash p24}{\Gamma : p10, p24 \vdash p10 \otimes p24} \otimes \quad \frac{\Gamma : p36 \vdash p36}{\Gamma : p10, p24, p36 \vdash p10 \otimes p24 \otimes p36} \otimes \quad \frac{\Gamma : p48 \vdash p48}{\Gamma : p10, p24, p36, p48 \vdash p10 \otimes p24 \otimes p36 \otimes p48} \otimes \quad \frac{\Gamma : p59 \vdash p59}{\Gamma : p10, p24, p36, p48, p59 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59} \otimes \quad \frac{\Gamma : p72 \vdash p72}{\Gamma : p10, p24, p36, p48, p59, p72 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72} \otimes \quad \frac{\Gamma : p73 \vdash p73}{\Gamma : p10, p24, p36, p48, p59, p72, p73 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73} \otimes \quad \frac{\Gamma : p74 \vdash p74}{\Gamma : p10, p24, p36, p48, p59, p72, p73, p74 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74} \otimes \\
\frac{\Gamma : p60 \vdash p60 \quad \Gamma : p10, p24, p36, p48, p60, p72, p73, p74, p60 \multimap p59 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74}{\Gamma : p10, p24, p36, p48, p60, p72, p73, p74 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74} \multimap \\
\frac{\Gamma : p11 \vdash p11 \quad \Gamma : p10, p24, p36, p48, p60, p72, p73, p74 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74}{\Gamma : p11, p24, p36, p48, p60, p72, p73, p74 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74} D_C \multimap \\
\frac{\Gamma : p12 \vdash p12 \quad \Gamma : p11, p24, p36, p48, p60, p72, p73, p74 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74}{\Gamma : p12, p24, p36, p48, p60, p72, p73, p74 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74} D_C \multimap \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74}{\Gamma : p0, p0 \multimap p74 \otimes p73 \otimes p72 \otimes p60 \otimes p48 \otimes p36 \otimes p24 \otimes p10 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74} \star \\
\frac{\Gamma : p0 \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74}{\Gamma : \Delta \vdash p10 \otimes p24 \otimes p36 \otimes p48 \otimes p59 \otimes p72 \otimes p73 \otimes p74} D_C \star
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_06\_b.1.1.p (4345 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p397 \vdash p397}{\Gamma : p1, p397 \vdash p1 \otimes p397} \otimes}{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p397} \star \\
\frac{\Gamma : p0, p0 \multimap p397 \otimes p1 \vdash p1 \otimes p397}{\Gamma : p0 \vdash p1 \otimes p397} \multimap \\
\frac{\Gamma : p0 \vdash p1 \otimes p397}{\Gamma : \Delta \vdash p1 \otimes p397} \star \\
D_C
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_06\_b.5.1.p (14439 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\Gamma : p278 \vdash p278 \quad \Gamma : p3 \vdash p3}{\Gamma : p278, p3 \vdash p278 \otimes p3} \otimes \frac{\Gamma : p395 \vdash p395}{\Gamma : p278, p3, p395 \vdash p278 \otimes p3 \otimes p395} \otimes \frac{\Gamma : p397 \vdash p397}{\Gamma : p278, p3, p395, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \otimes}{\frac{\Gamma : p396 \vdash p396}{\Gamma : p278, p3, p396, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \multimap} \multimap \\
\frac{\Gamma : p346 \vdash p346}{\Gamma : p278, p3, p346, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \multimap \\
\frac{\Gamma : p278, p3, p346, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397}{\Gamma : p278, p3, p346, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \star \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p2, p346, p397, p2 \multimap p278 \otimes p3 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \multimap \\
\frac{\Gamma : p2, p346, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397}{\Gamma : \Delta \vdash p278 \otimes p3 \otimes p395 \otimes p397} \star \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p397, p1 \multimap p346 \otimes p2 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \multimap \\
\frac{\Gamma : p1, p397 \vdash p278 \otimes p3 \otimes p395 \otimes p397}{\Gamma : \Delta \vdash p278 \otimes p3 \otimes p395 \otimes p397} \star \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p397 \otimes p1 \vdash p278 \otimes p3 \otimes p395 \otimes p397} \multimap \\
\frac{\Gamma : p0 \vdash p278 \otimes p3 \otimes p395 \otimes p397}{\Gamma : \Delta \vdash p278 \otimes p3 \otimes p395 \otimes p397} \star \\
D_C
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_08\_b.1.1.p (13618 ms)

$$\begin{array}{c}
\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p655 \vdash p655}{\Gamma : p1, p655 \vdash p1 \otimes p655} \otimes}{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p655} \star \\
\frac{\Gamma : p0, p0 \multimap p655 \otimes p1 \vdash p1 \otimes p655}{\Gamma : p0 \vdash p1 \otimes p655} \multimap \\
\frac{\Gamma : p0 \vdash p1 \otimes p655}{\Gamma : \Delta \vdash p1 \otimes p655} \star \\
D_C
\end{array}$$

file: MCC/FlexibleBarrier\_flexbar\_08\_b.5.1.p (38236 ms)

$$\begin{array}{c}
\frac{\frac{\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p656 \vdash p656}{\Gamma : p1, p656 \vdash p1 \otimes p656} \otimes \frac{\Gamma : p917 \vdash p917}{\Gamma : p1, p656, p917 \vdash p1 \otimes p656 \otimes p917} \otimes}{\frac{\Gamma : p918 \vdash p918}{\Gamma : p1, p656, p918, p917 \multimap p917 \vdash p1 \otimes p656 \otimes p917} \multimap} \multimap \\
\frac{\Gamma : p919 \vdash p919}{\Gamma : p1, p656, p919, p917 \multimap p918 \vdash p1 \otimes p656 \otimes p917} \multimap \\
\frac{\Gamma : p908 \vdash p908}{\Gamma : p1, p656, p908, p908 \multimap p919 \vdash p1 \otimes p656 \otimes p917} \multimap \\
\frac{\Gamma : p1, p656, p908 \vdash p1 \otimes p656 \otimes p917}{\Gamma : \Delta \vdash p1 \otimes p656 \otimes p917} \star \\
\frac{\Gamma : p655 \vdash p655}{\Gamma : p1, p655, p655 \multimap p908 \otimes p656 \vdash p1 \otimes p656 \otimes p917} \multimap \\
\frac{\Gamma : p1, p655 \vdash p1 \otimes p656 \otimes p917}{\Gamma : \Delta \vdash p1 \otimes p656 \otimes p917} \star \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p655 \otimes p1 \vdash p1 \otimes p656 \otimes p917} \multimap \\
\frac{\Gamma : p0 \vdash p1 \otimes p656 \otimes p917}{\Gamma : \Delta \vdash p1 \otimes p656 \otimes p917} \star \\
D_C
\end{array}$$



file: MCC/FlexibleBarrier\_flexbar\_10\_b.1.1.p (34087 ms)

$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p977 \vdash p977}{\Gamma : p1, p977 \vdash p1 \otimes p977} \otimes \\
\frac{\Gamma : p0 \vdash p0 \quad \Gamma : \Delta \vdash p1 \otimes p977}{\Gamma : p0, p0 \multimap p977 \otimes p1 \vdash p1 \otimes p977} \multimap \star \\
\frac{\Gamma : p0 \vdash p1 \otimes p977}{\Gamma : \Delta \vdash p1 \otimes p977} D_C
\end{array}$$

file: MCC/HouseConstruction-002.10.1.p (10044 ms)

$$\begin{array}{c}
\frac{\Gamma : p12 \vdash p12 \quad \Gamma : p25 \vdash p25}{\Gamma : p12, p25 \vdash p12 \otimes p25} \otimes \frac{\Gamma : p3 \vdash p3}{\Gamma : p5 \vdash p5} \otimes \frac{\Gamma : p8 \vdash p8}{\Gamma : p5 \vdash p5} \otimes \\
\frac{\Gamma : p12, p25, p3 \vdash p12 \otimes p25 \otimes p3}{\Gamma : p12, p25, p3, p5 \vdash p12 \otimes p25 \otimes p3 \otimes p5} \otimes \frac{\Gamma : p16 \vdash p16}{\Gamma : p12, p16, p3, p5, p8 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \otimes \\
\frac{\Gamma : p12, p16, p3, p5, p8 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8}{\Gamma : p12, p16, p3, p5, p8 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} D_C \\
\frac{\Gamma : p11 \vdash p11}{\Gamma : p12, p15, p3, p4, p5, p8, p4 \vdash p15 \multimap p16 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \multimap D_C \\
\frac{\Gamma : p7 \vdash p7}{\Gamma : p11, p12, p3, p4, p5, p8, p11 \multimap p15 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \multimap D_C \\
\frac{\Gamma : p12, p3, p4, p5, p7, p8 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8}{\Gamma : p12, p3, p4, p5, p7, p8 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \star D_C \\
\frac{\Gamma : p6 \vdash p6}{\Gamma : \Delta \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \star D_C \\
\frac{\Gamma : p3, p4, p5, p6, p6 \multimap p7 \otimes p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8}{\Gamma : p3, p4, p5, p6 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \multimap D_C \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : \Delta \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \star D_C \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p3, p3 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \star D_C \\
\frac{\Gamma : p2, p2 \multimap p3 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8}{\Gamma : p2, p3 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \multimap D_C \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p2, p2, p2 \multimap p3 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \multimap D_C \\
\frac{\Gamma : p1, p1, p1 \multimap p2 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8}{\Gamma : p1, p1, p1 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \multimap D_C \\
\frac{\Gamma : p1, p1 \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8}{\Gamma : \Delta \vdash p12 \otimes p25 \otimes p3 \otimes p5 \otimes p8} \star D_C
\end{array}$$

file: MCC/HouseConstruction-002.1.1.p (58 ms)

$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p1 \vdash p2}{\Gamma : p1, p1 \vdash p1 \otimes p2} \otimes \\
\frac{\Gamma : p1, p1, p1 \multimap p2 \vdash p1 \otimes p2}{\Gamma : p1, p1 \vdash p1 \otimes p2} \multimap D_C \\
\frac{\Gamma : p1, p1 \vdash p1 \otimes p2}{\Gamma : \Delta \vdash p1 \otimes p2} \star
\end{array}$$

file: MCC/HouseConstruction-002.5.1.p (210 ms)

$$\begin{array}{c}
\frac{\Gamma : p3 \vdash p3 \quad \Gamma : p4 \vdash p4}{\Gamma : p3, p4 \vdash p3 \otimes p4} \otimes \frac{\Gamma : p5 \vdash p5}{\Gamma : p3, p4, p5 \vdash p3 \otimes p4 \otimes p5} \otimes \frac{\Gamma : p6 \vdash p6}{\Gamma : p3, p4, p5, p6 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \otimes \\
\frac{\Gamma : p3 \vdash p3}{\Gamma : p3, p3, p3 \multimap p6 \vdash p4 \otimes p5 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \multimap D_C \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p2, p3, p2 \multimap p3 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \multimap D_C \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p2, p3 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \multimap D_C \\
\frac{\Gamma : p2, p2, p2 \multimap p3 \vdash p3 \otimes p4 \otimes p5 \otimes p6}{\Gamma : p2, p2 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \multimap D_C \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p2, p1 \multimap p2 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \multimap D_C \\
\frac{\Gamma : p1, p1, p1 \multimap p2 \vdash p3 \otimes p4 \otimes p5 \otimes p6}{\Gamma : p1, p1 \vdash p3 \otimes p4 \otimes p5 \otimes p6} \multimap D_C \\
\frac{\Gamma : p1, p1 \vdash p3 \otimes p4 \otimes p5 \otimes p6}{\Gamma : \Delta \vdash p3 \otimes p4 \otimes p5 \otimes p6} \star
\end{array}$$

$$\frac{\frac{\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1 \vdash p1 \otimes p1} \otimes \frac{\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1 \vdash p1 \otimes p1} \otimes \frac{\Gamma : p2 \vdash p2}{\Gamma : p1, p1, p1, p1 \vdash p1 \otimes p1 \otimes p1 \otimes p1 \otimes p2} \otimes \frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1, p1, p1, p2 \vdash p1 \otimes p1 \otimes p1 \otimes p1 \otimes p2} \circ}{\frac{\Gamma : p1, p1, p1, p1, p1, p1 \multimap p2 \vdash p1 \otimes p1 \otimes p1 \otimes p1 \otimes p2}{\Gamma : p1, p1, p1, p1, p1 \vdash p1 \otimes p1 \otimes p1 \otimes p1 \otimes p2} D_C} \multimap \frac{\Gamma : \Delta \vdash p1 \otimes p1 \otimes p1 \otimes p1 \otimes p2}{\Gamma : \Delta \vdash p1 \otimes p1 \otimes p1 \otimes p1 \otimes p2} \star$$
$$\begin{array}{c}
\frac{\Gamma : p1 \vdash p1 \quad \Gamma : p1 \vdash p1}{\Gamma : p1, p1 \vdash p1 \otimes p1} \otimes \frac{\Gamma : p2 \vdash p2}{\Gamma : p1, p1, p2 \vdash p1 \otimes p1 \otimes p2} \otimes \frac{\Gamma : p3 \vdash p3}{\Gamma : p1, p1, p2, p3 \vdash p1 \otimes p1 \otimes p2 \otimes p3} \otimes \frac{\Gamma : p3 \vdash p3}{\Gamma : p1, p1, p2, p3, p3 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \\
\frac{\Gamma : p2 \vdash p2}{\Gamma : p1, p1, p2, p2, p3, p2 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \frac{\Gamma : p1, p1, p2, p2, p3, p2 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3}{\Gamma : p1, p1, p2, p2, p2 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1, p1, p2, p2 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1, p1, p1, p2, p1 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \frac{\Gamma : p1, p1, p1, p1, p2, p1 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3}{\Gamma : p1, p1, p1, p1, p2 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1, p1, p1, p1 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \\
\frac{\Gamma : p1 \vdash p1}{\Gamma : p1, p1, p1, p1, p1 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \otimes \frac{\Gamma : p1, p1, p1, p1, p1 \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3}{\Gamma : \Delta \vdash p1 \otimes p1 \otimes p2 \otimes p3 \otimes p3} \star
\end{array}$$
[illegible]

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file: MCC/IBM703\_50.1.p (18122 ms)

file: MCC/IBM703\_5.1.p (1230 ms)

file: MCC/LamportFastMutEx\_lamport\_fmea-2.10.1.p (10449 ms)

file: MCC/LamportFastMutEx\_lamport\_fmea-2.1.1.p (1103 ms)

file: MCC/LamportFastMutEx\_lamport\_fmea-2.5.1.p (1940 ms)

file: MCC/LamportFastMutEx\_lamport\_fmea-3.1.1.p (19866 ms)

file: MCC/LamportFastMutEx\_lamport\_fmea-3.5.1.p (24078 ms)

file: MCC/NeighborGrid\_z\_2d\_3n.1m.c.1.2.1.1.p (21762 ms)

```
file: MCC/NeighborGrid.z.2d.3n.1m.t.1.2.1.1.p (28427 ms)
```

```
file:  MCC/Peterson-2_1_1.p (14394 ms)
```

```
file:  MCC/Peterson-2_5_1.p (17659 ms)
```

```
file: MCC/Philosophers-5_100_1.p (30876 ms)
```

```
file: MCC/Philosophers-5_10_1.p (29996 ms)
```

```
file:  MCC/Philosophers-5_1_1.p (29759 ms)
```

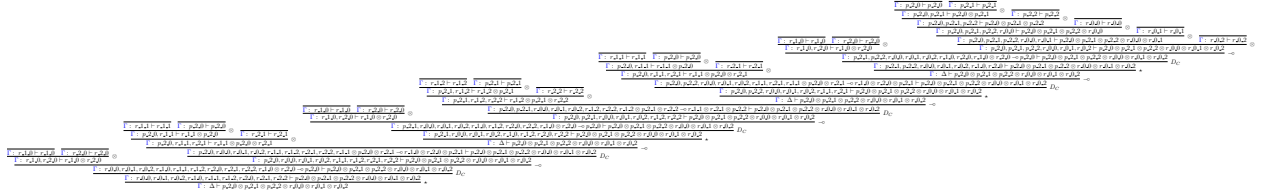


[illegible]
$$\begin{array}{c}
\frac{\frac{\Gamma : p15 \vdash p15 \quad \Gamma : p20 \vdash p20}{\Gamma : p15, p20 \vdash p15 \otimes p20} \otimes \frac{\Gamma : p21 \vdash p21}{\Gamma : p15, p20, p21 \vdash p15 \otimes p20 \otimes p21} \otimes \frac{\Gamma : p27 \vdash p27}{\Gamma : p15, p20, p21, p27 \vdash p15 \otimes p20 \otimes p21 \otimes p27} \otimes \frac{\Gamma : p3 \vdash p3}{\Gamma : p15, p20, p21, p27, p3 \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3} \otimes \frac{\Gamma : p9 \vdash p9}{\Gamma : p15, p20, p21, p27, p3, p9 \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9} \otimes \\
\frac{\frac{\Gamma : p20 \vdash p20 \quad \Gamma : p10 \vdash p10}{\Gamma : p10, p20 \vdash p20 \otimes p10} \otimes \frac{\Gamma : p10, p15, p20, p21, p27, p3, p20 \otimes p10 \multimap p9 \otimes p20 \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9}{\Gamma : \Delta \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9} \multimap \\
\frac{\frac{\Gamma : p15 \vdash p15 \quad \Gamma : p5 \vdash p5}{\Gamma : p15, p5 \vdash p15 \otimes p5} \otimes \frac{\Gamma : p10, p15, p20, p21, p27, p5, p15 \otimes p5 \multimap p3 \otimes p15 \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9}{\Gamma : p10, p15, p20, p21, p27, p5 \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9} \multimap \\
\frac{\Gamma : p0 \vdash p0}{\Gamma : p0, p0 \multimap p21 \otimes p27 \otimes p20 \otimes p15 \otimes p10 \otimes p5 \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9} \multimap \frac{\Gamma : \Delta \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9}{\Gamma : \Delta \vdash p15 \otimes p20 \otimes p21 \otimes p27 \otimes p3 \otimes p9} \star D_C
\end{array}$$
$$\frac{\frac{\frac{\Gamma : p10 \vdash p10}{\Gamma : p10, p15 \vdash p10 \otimes p15} \otimes \frac{\Gamma : p15 \vdash p15}{\Gamma : p20 \vdash p20}}{\Gamma : p10, p15, p20 \vdash p10 \otimes p15 \otimes p20} \otimes \frac{\Gamma : p21 \vdash p21}{\Gamma : p10, p15, p20, p21 \vdash p10 \otimes p15 \otimes p20 \otimes p21} \otimes \frac{\Gamma : p27 \vdash p27}{\Gamma : p10, p15, p20, p21, p27 \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27} \otimes \frac{\Gamma : p5 \vdash p5}{\Gamma : p10, p15, p20, p21, p27, p5 \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27 \otimes p5} \otimes \frac{\Gamma : p0 \vdash p0}{\Gamma : \Delta \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27 \otimes p5} \star \frac{\Gamma : p0, p0 \multimap p21 \otimes p27 \otimes p20 \otimes p15 \otimes p10 \otimes p5 \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27 \otimes p5}{\Gamma : p0 \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27 \otimes p5} \multimap \frac{\Gamma : \Delta \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27 \otimes p5}{\Gamma : \Delta \vdash p10 \otimes p15 \otimes p20 \otimes p21 \otimes p27 \otimes p5} \star D_C$$

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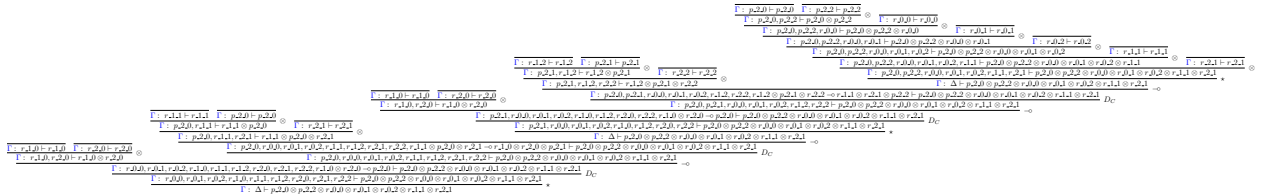




file: MCC/ResAllocation\_RAS-C-3\_1.1.p (5894 ms)

$$\begin{aligned}
 & \frac{\frac{\Gamma: p.2.0 \vdash p.2.0}{\Gamma: p.2.0, r.0.0 \vdash p.2.0} \otimes \frac{\Gamma: r.0.0 \vdash r.0.0}{\Gamma: p.2.0, r.0.0 \vdash r.0.0} \otimes \frac{\Gamma: r.0.1 \vdash r.0.1}{\Gamma: p.2.0, r.0.0, r.0.1 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1} \otimes \frac{\Gamma: r.0.2 \vdash r.0.2}{\Gamma: p.2.0, r.0.0, r.0.1, r.0.2 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2} \otimes \frac{\Gamma: r.1.1 \vdash r.1.1}{\Gamma: p.2.0, r.0.0, r.0.1, r.0.2, r.1.1 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.1} \otimes \frac{\Gamma: r.1.2 \vdash r.1.2}{\Gamma: p.2.0, r.0.0, r.0.1, r.0.2, r.1.1, r.1.2 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.1 \otimes r.1.2} \otimes \frac{\Gamma: r.2.1 \vdash r.2.1}{\Gamma: p.2.0, r.0.0, r.0.1, r.0.2, r.1.1, r.1.2, r.2.1 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.1 \otimes r.1.2 \otimes r.2.1} \otimes \frac{\Gamma: r.2.2 \vdash r.2.2}{\Gamma: p.2.0, r.0.0, r.0.1, r.0.2, r.1.1, r.1.2, r.2.1, r.2.2 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.1 \otimes r.1.2 \otimes r.2.1 \otimes r.2.2} \otimes \\
 & \frac{\Gamma: r.1.0 \vdash r.1.0}{\Gamma: r.1.0, r.2.0 \vdash r.1.0} \otimes \frac{\Gamma: r.2.0 \vdash r.2.0}{\Gamma: r.1.0, r.2.0 \vdash r.1.0 \otimes r.2.0} \otimes \frac{\Gamma: r.0.0, r.0.1, r.0.2, r.1.0, r.1.1, r.1.2, r.2.0, r.2.1, r.2.2 \vdash r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.0 \otimes r.1.1 \otimes r.1.2 \otimes r.2.0 \otimes r.2.1 \otimes r.2.2}{\Gamma: r.0.0, r.0.1, r.0.2, r.1.0, r.1.1, r.1.2, r.2.0, r.2.1, r.2.2 \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.0 \otimes r.1.1 \otimes r.1.2 \otimes r.2.0 \otimes r.2.1 \otimes r.2.2} \multimap \\
 & \frac{\Gamma: \Delta \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.0 \otimes r.1.1 \otimes r.1.2 \otimes r.2.0 \otimes r.2.1 \otimes r.2.2}{\Gamma: \Delta \vdash p.2.0 \otimes r.0.0 \otimes r.0.1 \otimes r.0.2 \otimes r.1.1 \otimes r.1.2 \otimes r.2.1 \otimes r.2.2} \star D_C
 \end{aligned}$$

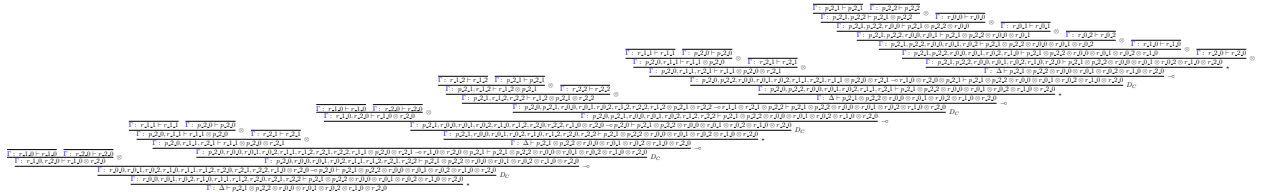
file: MCC/ResAllocation\_RAS-C-3\_20.1.p (1758 ms)



file: MCC/ResAllocation\_RAS-C-3\_50.1.p (1653 ms)



file: MCC/ResAllocation\_RAS-C-3\_5.1.p (2088 ms)



file: MCC/ResAllocation\_RAS-R-2\_100.1.p (92 ms)

$$\begin{aligned}
 & \frac{\frac{\Gamma: r.0.1 \vdash r.0.1}{\Gamma: r.0.1, r.1.1 \vdash r.0.1} \otimes \frac{\Gamma: r.1.1 \vdash r.1.1}{\Gamma: r.0.1, r.1.1 \vdash r.0.1 \otimes r.1.1} \otimes \frac{\frac{\Gamma: p.1.1 \vdash p.1.1}{\Gamma: p.1.1, r.0.0 \vdash p.1.1} \otimes \frac{\Gamma: r.0.0 \vdash r.0.0}{\Gamma: p.1.1, r.0.0 \vdash p.1.1 \otimes r.0.0} \otimes \frac{\Gamma: r.1.0 \vdash r.1.0}{\Gamma: p.1.1, r.0.0, r.1.0 \vdash p.1.1 \otimes r.0.0 \otimes r.1.0} \otimes \\
 & \frac{\Gamma: r.0.0, r.0.1, r.1.0, r.1.1, r.0.1 \otimes r.1.1 \multimap p.1.1 \vdash p.1.1 \otimes r.0.0 \otimes r.1.0}{\Gamma: r.0.0, r.0.1, r.1.0, r.1.1 \vdash p.1.1 \otimes r.0.0 \otimes r.1.0} \multimap D_C \\
 & \frac{\Gamma: \Delta \vdash p.1.1 \otimes r.0.0 \otimes r.1.0}{\Gamma: \Delta \vdash p.1.1 \otimes r.0.0 \otimes r.1.0} \star
 \end{aligned}$$

file: MCC/ResAllocation\_RAS-R-2\_10.1.p (88 ms)





file: MCC/ResAllocation\_RAS-R-5\_100.1.p (7489 ms)

file: MCC/ResAllocation\_RAS-R-5\_10.1.p (7495 ms)

file: MCC/ResAllocation\_RAS-R-5\_1.1.p (25745 ms)

$$\begin{aligned} & \Gamma: p_{1.4} \vdash p_{1.4} \quad \Gamma: r_{0.0} \vdash r_{0.0} \\ & \Gamma: p_{1.4}, r_{0.0} \vdash p_{1.4} \otimes r_{0.0} \quad \Gamma: r_{0.1} \vdash r_{0.1} \\ & \Gamma: p_{1.4}, r_{0.0}, r_{0.1} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \quad \Gamma: r_{0.2} \vdash r_{0.2} \\ & \Gamma: p_{1.4}, r_{0.0}, r_{0.1}, r_{0.2} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \quad \Gamma: r_{0.3} \vdash r_{0.3} \\ & \Gamma: p_{1.4}, r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \quad \Gamma: r_{1.0} \vdash r_{1.0} \\ & \Gamma: p_{1.4}, r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3}, r_{1.0} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \quad \Gamma: r_{1.1} \vdash r_{1.1} \\ & \Gamma: p_{1.4}, r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3}, r_{1.0}, r_{1.1} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \otimes r_{1.1} \quad \Gamma: r_{1.2} \vdash r_{1.2} \\ & \Gamma: r_{0.4} \vdash r_{0.4} \quad \Gamma: r_{1.4} \vdash r_{1.4} \quad \Gamma: p_{1.4}, r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3}, r_{1.0}, r_{1.1}, r_{1.2} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \otimes r_{1.1} \otimes r_{1.2} \quad \Gamma: r_{1.3} \vdash r_{1.3} \\ & \Gamma: r_{0.4}, r_{1.4} \vdash r_{0.4} \otimes r_{1.4} \quad \Gamma: p_{1.4}, r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3}, r_{1.0}, r_{1.1}, r_{1.2}, r_{1.3} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \otimes r_{1.1} \otimes r_{1.2} \otimes r_{1.3} \\ & \Gamma: r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3}, r_{0.4}, r_{1.0}, r_{1.1}, r_{1.2}, r_{1.3}, r_{1.4} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \otimes r_{1.1} \otimes r_{1.2} \otimes r_{1.3} \quad D_C \\ & \Gamma: r_{0.0}, r_{0.1}, r_{0.2}, r_{0.3}, r_{0.4}, r_{1.0}, r_{1.1}, r_{1.2}, r_{1.3}, r_{1.4} \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \otimes r_{1.1} \otimes r_{1.2} \otimes r_{1.3} \quad \star \\ & \Gamma: \Delta \vdash p_{1.4} \otimes r_{0.0} \otimes r_{0.1} \otimes r_{0.2} \otimes r_{0.3} \otimes r_{1.0} \otimes r_{1.1} \otimes r_{1.2} \otimes r_{1.3} \end{aligned}$$

file: MCC/ResAllocation\_RAS-R-5\_20.1.p (4288 ms)

file: MCC/ResAllocation\_RAS-R-5\_50.1.p (4306 ms)

file: MCC/ResAllocation\_RAS-R-5\_5.1.p (6631 ms)

file: MCC/RobotManipulation\_robot-manipulation-1\_100.1.p (432 ms)

[illegible]

```
file: MCC/RobotManipulation_robot-manipulation-1_10_1.p (426 ms)
```

[illegible]

```
file: MCC/RobotManipulation_robot-manipulation-1_1_1.p (2206 ms)
```

$$\begin{array}{c}
\frac{\Gamma; \text{access} \vdash \text{access} \quad \Gamma; \text{access} \vdash \text{access}}{\Gamma; \text{access}, \text{access} \vdash \text{access} \otimes \text{access}} \otimes \quad \frac{}{\Gamma; \text{initialize} \vdash \text{initialize}} \otimes \quad \frac{}{\Gamma; p'_{i1} \vdash p'_{i1}} \otimes \\
\frac{\Gamma; \text{access}, \text{access}, \text{initialize} \vdash \text{access} \otimes \text{access} \otimes \text{initialize}}{\Gamma; \text{access}, \text{access}, \text{initialize}, p'_{i1} \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1}} \otimes \quad \frac{}{\Gamma; p'_{i1} \vdash p'_{i1}} \otimes \quad \frac{}{\Gamma; p'_{i2} \vdash p'_{i2}} \otimes \\
\frac{\Gamma; \text{access}, \text{access}, \text{initialize}, p'_{i1}, p'_{i1} \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1}}{\Gamma; \text{access}, \text{access}, \text{initialize}, p'_{i1}, p'_{i1}, p'_{i2} \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1} \otimes p'_{i2}} \otimes \quad \frac{}{\Gamma; r'_{i1} \vdash r'_{i1}} \otimes \quad \frac{}{\Gamma; r'_{i2} \vdash r'_{i2}} \otimes \\
\frac{\Gamma; \text{access}, \text{access}, \text{initialize}, p'_{i1}, p'_{i1}, p'_{i2}, r'_{i1} \vdash \text{stopped} \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1} \otimes p'_{i2} \otimes r'_{i1} \vdash \text{stopped}}{\Gamma; \text{access}, \text{access}, \text{initialize}, p'_{i1}, p'_{i1}, p'_{i2}, r'_{i1} \vdash \text{stopped}, r'_{i1} \vdash \text{stopped} \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1} \otimes p'_{i2} \otimes r'_{i1} \vdash \text{stopped}} \otimes \quad \frac{}{\Gamma; r'_{i1} \vdash r'_{i1}} \otimes \quad \frac{}{\Gamma; r'_{i2} \vdash r'_{i2}} \otimes \\
\frac{\Gamma; p'_{i1} \vdash p'_{i1}}{\Gamma; \text{access}, \text{access}, p'_{i1}, p'_{i1}, p'_{i1}, r'_{i1} \vdash \text{stopped}, r'_{i1} \vdash \text{stopped}, p'_{i1} \rightarrow \text{initialize} \otimes p'_{i2} \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1} \otimes p'_{i2} \otimes r'_{i1} \vdash \text{stopped} \otimes r'_{i1} \vdash \text{stopped}} \rightarrow \quad \frac{}{\Gamma; \Delta \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1} \otimes p'_{i2} \otimes r'_{i1} \vdash \text{stopped} \otimes r'_{i1} \vdash \text{stopped}} \star \\
\frac{}{\Gamma; \Delta \vdash \text{access} \otimes \text{access} \otimes \text{initialize} \otimes p'_{i1} \otimes p'_{i1} \otimes p'_{i2} \otimes r'_{i1} \vdash \text{stopped} \otimes r'_{i1} \vdash \text{stopped}} \star \quad D_C
\end{array}$$

```
file: MCC/RobotManipulation_robot-manipulation-1_20_1.p (1543 ms)
```

[illegible]

```
file: MCC/RobotManipulation_robot-manipulation-1.50.1.p (1560 ms)
```

```
file: MCC/RobotManipulation_robot-manipulation-1_5_1.p (1217 ms)
```

file: MCC/RobotManipulation\_robot-manipulation-2\_100.1.p (95949 ms)



file: MCC/RobotManipulation\_robot-manipulation-2\_10.1.p (94414 ms)



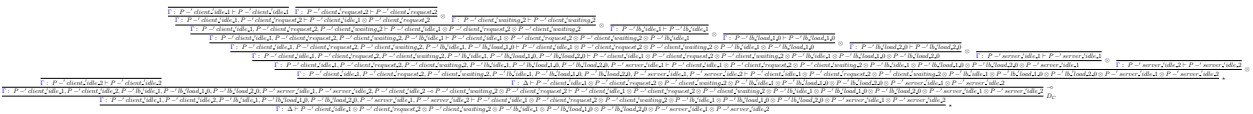
file: MCC/SimpleLoadBal\_simple\_lbs-2\_100.1.p (70864 ms)



file: MCC/SimpleLoadBal\_simple\_lbs-2\_10.1.p (70801 ms)



file: MCC/SimpleLoadBal\_simple\_lbs-2\_1.1.p (9358 ms)



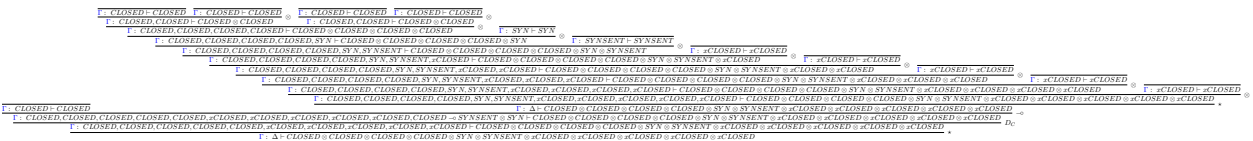
file: MCC/SimpleLoadBal\_simple\_lbs-2\_50.1.p (2881 ms)



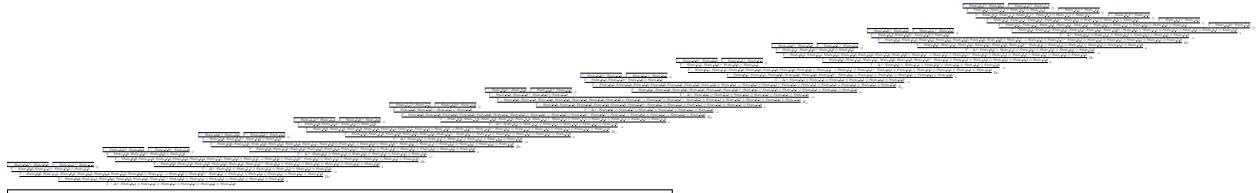
file: MCC/SimpleLoadBal\_simple\_lbs-2\_5.1.p (2937 ms)



file: MCC/TCPcondis\_tcp5\_1.1.p (21504 ms)



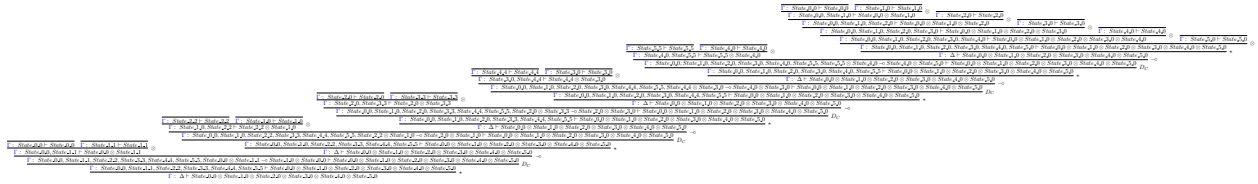
file: MCC/TokenRing-5-unfolded\_10.1.p (64817 ms)



file: MCC/TokenRing-5-unfolded\_1.1.p (1749 ms)

$$\begin{array}{c}
 \frac{\Gamma: \text{State}_{0,0} \vdash \text{State}_{0,0} \quad \Gamma: \text{State}_{1,0} \vdash \text{State}_{1,0}}{\Gamma: \text{State}_{0,0}, \text{State}_{1,0} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0}} \otimes \quad \frac{\Gamma: \text{State}_{2,2} \vdash \text{State}_{2,2}}{\Gamma: \text{State}_{2,2} \vdash \text{State}_{2,2}} \\
 \frac{\Gamma: \text{State}_{0,0}, \text{State}_{1,0}, \text{State}_{2,2} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2}}{\Gamma: \text{State}_{0,0}, \text{State}_{1,0}, \text{State}_{2,2}, \text{State}_{3,3} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3}} \otimes \quad \frac{\Gamma: \text{State}_{3,3} \vdash \text{State}_{3,3}}{\Gamma: \text{State}_{3,3} \vdash \text{State}_{3,3}} \\
 \frac{\Gamma: \text{State}_{0,0}, \text{State}_{1,0}, \text{State}_{2,2}, \text{State}_{3,3}, \text{State}_{4,4} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3} \otimes \text{State}_{4,4}}{\Gamma: \text{State}_{0,0}, \text{State}_{1,0}, \text{State}_{2,2}, \text{State}_{3,3}, \text{State}_{4,4}, \text{State}_{5,5} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3} \otimes \text{State}_{4,4} \otimes \text{State}_{5,5}} \otimes \quad \frac{\Gamma: \text{State}_{4,4} \vdash \text{State}_{4,4}}{\Gamma: \text{State}_{4,4} \vdash \text{State}_{4,4}} \\
 \frac{\Gamma: \text{State}_{0,0} \vdash \text{State}_{0,0} \quad \Gamma: \text{State}_{1,1} \vdash \text{State}_{1,1}}{\Gamma: \text{State}_{0,0}, \text{State}_{1,1} \vdash \text{State}_{0,0} \otimes \text{State}_{1,1}} \otimes \quad \frac{\Gamma: \text{State}_{0,0}, \text{State}_{1,0}, \text{State}_{2,2}, \text{State}_{3,3}, \text{State}_{4,4}, \text{State}_{5,5} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3} \otimes \text{State}_{4,4} \otimes \text{State}_{5,5}}{\Gamma: \text{State}_{0,0}, \text{State}_{1,1}, \text{State}_{2,2}, \text{State}_{3,3}, \text{State}_{4,4}, \text{State}_{5,5} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3} \otimes \text{State}_{4,4} \otimes \text{State}_{5,5}} \otimes \\
 \frac{\Gamma: \text{State}_{0,0}, \text{State}_{1,1}, \text{State}_{2,2}, \text{State}_{3,3}, \text{State}_{4,4}, \text{State}_{5,5} \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3} \otimes \text{State}_{4,4} \otimes \text{State}_{5,5}}{\Gamma: \Delta \vdash \text{State}_{0,0} \otimes \text{State}_{1,0} \otimes \text{State}_{2,2} \otimes \text{State}_{3,3} \otimes \text{State}_{4,4} \otimes \text{State}_{5,5}} \text{Dc} \quad \star
 \end{array}$$

file: MCC/TokenRing-5-unfolded\_5.1.p (6735 ms)



file: MCC/UtahNoC\_1.1.p (75438 ms)

$$\begin{array}{c}
 \frac{\Gamma: p_{133} \vdash p_{133} \quad \Gamma: p_{162} \vdash p_{162}}{\Gamma: p_{133}, p_{162} \vdash p_{133} \otimes p_{162}} \otimes \quad \frac{\Gamma: p_{191} \vdash p_{191}}{\Gamma: p_{133}, p_{162}, p_{191} \vdash p_{133} \otimes p_{162} \otimes p_{191}} \otimes \quad \frac{\Gamma: p_{215} \vdash p_{215}}{\Gamma: p_{133}, p_{162}, p_{191}, p_{215} \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215}} \otimes \quad \frac{\Gamma: p_3 \vdash p_3}{\Gamma: p_{133}, p_{162}, p_{191}, p_{215}, p_3 \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3} \otimes \quad \frac{\Gamma: p_4 \vdash p_4}{\Gamma: p_{133}, p_{162}, p_{191}, p_{215}, p_3, p_4 \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4} \otimes \quad \frac{\Gamma: p_{47} \vdash p_{47}}{\Gamma: p_{133}, p_{162}, p_{191}, p_{215}, p_3, p_4, p_{47} \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4 \otimes p_{47}} \otimes \quad \frac{\Gamma: p_{90} \vdash p_{90}}{\Gamma: p_{133}, p_{162}, p_{191}, p_{215}, p_3, p_4, p_{47}, p_{90} \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4 \otimes p_{47} \otimes p_{90}} \otimes \\
 \frac{\Gamma: p_0 \vdash p_0}{\Gamma: p_0, p_0 \vdash p_0} \quad \frac{\Gamma: \Delta \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4 \otimes p_{47} \otimes p_{90}}{\Gamma: p_0, p_0 \vdash p_3 \otimes p_4 \otimes p_{47} \otimes p_{90} \otimes p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4 \otimes p_{47} \otimes p_{90}} \text{Dc} \quad \star \\
 \frac{\Gamma: p_0 \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4 \otimes p_{47} \otimes p_{90}}{\Gamma: \Delta \vdash p_{133} \otimes p_{162} \otimes p_{191} \otimes p_{215} \otimes p_3 \otimes p_4 \otimes p_{47} \otimes p_{90}} \star
 \end{array}$$