```
a[13] b[15] c[10] m_{13}[3] m_{23}[0] m_{33}[1] cnt_1[1] cnt_2[0] s_{11}[0] s_{21}[0]
cnt_3[0] random_1[82] cnt_4[0] vo_{13}[0] vo_{23}[0] vo_{33}[0] cnt_5[0] s_{31}[0]
 P_{1-1}: (m_{13} \neq 0) \land (cnt_1 = 1) \quad P_{2-1}: (m_{23} \neq 0) \land (cnt_1 = 1) \quad P_{3-1}: (m_{33} \neq 0) \land (cnt_1 = 1)
|\Pr_{1-1}: a \div m_{13} \to 1 | q_{13}|
                                         |\Pr_{2-1}: b \div m_{23} \to 1 | q_{23}
                                                                                  |\Pr_{3-1}: 0*cnt_1 + c \div m_{33} \to 1| q_{33}
 P_{4-1}: (m_{13} = 0) \land (cnt_1 = 1) \quad P_{5-1}: (m_{23} = 0) \land (cnt_1 = 1) \quad P_{6-1}: (m_{33} = 0) \land (cnt_1 = 1)
Pr_{4-1}:100 \to 1|q_{13}
                                                                                  \Pr_{6-1}: 0*cnt_1+100 \to 1 \mid q_{33}
                                          \Pr_{5-1}:100 \to 1 \mid q_{23}
 P_{7-1}: cnt_1 = 1
                                 P_{8-1} : cnt_2 = 1
                                                                                        P_{9-1}: cnt_2 = 1
|\Pr_{7-1}: 1 \to 1 | cnt_2
                                |\Pr_{8-1} : \min(q_{13}, q_{23}, q_{33}) + 1 \rightarrow 1 | rq_3 | | \Pr_{9-1} : 0 * cnt_2 + 1 \rightarrow 1 | cnt_3 |
 P_{10-1}: cnt_3 = 1
                                                 P_{11-1} : cnt_3 = 1
                                                                                             P_{12-1}: cnt_4 = 1
 \Pr_{10-1}: random_1 \% rq_3 \rightarrow 1 \mid pt_3 \quad \Pr_{11-1}: 0 * cnt_3 + 1 \rightarrow 1 \mid cnt_4 \quad \Pr_{12-1}: pt_3 * m_{13} \rightarrow 1 \mid vo_{13}
P_{13-1}: cnt_4 = 1
                                          P_{14-1}: cnt_4 = 1
                                                                                       P_{15-1}: cnt_4 = 1
                                                                                      \Pr_{15-1}: 0*cnt_4 + 1 \rightarrow 1 \mid cnt_5
|\Pr_{13-1}: pt_3 * m_{23} \to 1 | vo_{23}
                                         |\Pr_{14-1}: pt_3 * m_{33} \to 1| vo_{33}
P_{16-1} : cnt_5 = 1
                                          P_{17-1}: cnt_5 = 1
                                                                                     P_{18-1} : cnt_5 = 1
                                           |\Pr_{17-1}: b-vo_{23} \to 1|s_{21}
 |\Pr_{16-1}: a-vo_{13} \to 1|s_{11}
                                                                                     |\Pr_{18-1} : c - vo_{33} \to 1 | s_{31}
P_{19-1} : cnt_5 = 1
                                              q_{13}[0] q_{23}[0] q_{33}[0] rq_3[0] pt_3[0]
\Pr_{19-1}: 0*cnt_5 + 1 \rightarrow 1 \mid cnt_6
```

```
m_{11}[2] m_{21}[1] m_{31}[5] cnt_7[0] cnt_8[0] s_{12}[0] cnt_9[0] random_2[11]
cnt_{10}[0] vo_{11}[0] vo_{21}[0] vo_{31}[0] s_{22}[0] s_{32}[0] cnt_{11}[0]
[P_{1-2}:(m_{11}\neq 0) \land (cnt_6=1) \ [P_{2-2}:(m_{21}\neq 0) \land (cnt_6=1) \ [P_{3-2}:(m_{31}\neq 0) \land (cnt_6=1)]
 \left| \Pr_{1-2} : s_{11} \div m_{11} \to 1 \mid q_{11} \right| \left| \Pr_{2-2} : s_{21} \div m_{21} \to 1 \mid q_{21} \right| \left| \Pr_{3-2} : 0 * cnt_6 + s_{31} \div m_{31} \to 1 \mid q_{31} \right|
  P_{4-2}: (m_{11} = 0) \land (cnt_6 = 1) \quad P_{5-2}: (m_{21} = 0) \land (cnt_6 = 1) \quad P_{6-2}: (m_{31} = 0) \land (cnt_6 = 1)
                                                                                                           |\Pr_{5-2}:100 \to 1|q_{21}|
 |\Pr_{4-2}:100 \to 1|q_{11}
                                                                                                                                                                                                                        |\Pr_{6-2}: 0*cnt_6 + 100 \rightarrow 1| q_{31}
  P_{7-2} : cnt_6 = 1
                                                                                        P_{8-2} : cnt_7 = 1
                                                                                                                                                                                                                                         P_{9-2}: cnt_7 = 1
                                                                                     \Pr_{8-2} : \min(q_{11}, q_{21}, q_{31}) + 1 \to 1 \mid rq_1 \quad \Pr_{9-2} : 0 * cnt_7 + 1 \to 1 \mid cnt_8
 \Pr_{7-2}: 1 \rightarrow 1 \mid cnt_7
 P_{10-2}: cnt_8 = 1
                                                                                                                     P_{11-2}: cnt_8 = 1
                                                                                                                                                                                                                                 P_{12-2}: cnt_9 = 1
\left|\Pr_{10-2}: random_{2} \% rq_{1} \rightarrow 1 \mid pt_{1} \left|\Pr_{11-2}: 0*cnt_{7} + 1 \rightarrow 1 \mid cnt_{9} \left|\Pr_{12-2}: pt_{1}*m_{11} + vo_{13} \rightarrow 1 \mid vo_{11} \right|\right| \right|
                                                                                                                                                                                                                                              \int P_{15-2}:cnt_9=1
P_{13-2} : cnt_9 = 1
                                                                                                                        P_{14-2}: cnt_9 = 1
\left| \Pr_{13-2} : pt_1 * m_{21} + vo_{23} \rightarrow 1 \mid vo_{21} \right| \Pr_{14-2} : pt_1 * m_{31} + vo_{33} \rightarrow 1 \mid vo_3 \right| \Pr_{15-2} : 0 * cnt_8 + 1 \rightarrow 1 \mid cnt_{10} \mid vo_{31} \mid vo_{32} \mid vo_{33} \mid vo_{33} \mid vo_{33} \mid vo_{34} 
 P_{16-2}: cnt_{10} = 1
                                                                                                              P_{17-2}: cnt_{10} = 1
                                                                                                                                                                                                                           P_{18-2} : cnt_{10} = 1
 |\Pr_{16-2}: a-vo_{11} \to 1| s_{12}
                                                                                                              |\Pr_{17-2}: b - vo_{21} \to 1 | s_{22}|
                                                                                                                                                                                                                           |\Pr_{18-2} : c - vo_{31} \to 1 | s_{32}
 P_{19-2} : cnt_{10} = 1
                                                                                                                             q_{11}[0] q_{21}[0] q_{31}[0] rq_1[0] pt_1[0]
\Pr_{19-2}: 0*cnt_{10}+1 \to 1 \mid cnt_{11}
```

```
m_{14}[4] m_{24}[4] m_{34}[0] cnt_{12}[0] cnt_{13}[0] s_{13}[0] cnt_{14}[0] random_3[41]
cnt_{15}[0] vo_{14}[0] vo_{24}[0] vo_{34}[0] s_{23}[0] s_{33}[0] cnt_{16}[0]
 P_{1-3}: (m_{14} \neq 0) \land (cnt_{11} = 1) P_{2-3}: (m_{24} \neq 0) \land (cnt_{11} = 1) P_{3-3}: (m_{34} \neq 0) \land (cnt_{11} = 1)
 |\Pr_{1-3}: s_{12} \div m_{14} \to 1| q_{14} \qquad |\Pr_{2-3}: s_{22} \div m_{24} \to 1| q_{24} \qquad |\Pr_{3-3}: 0 * cnt_{10} + s_{32} \div m_{34} \to 1| q_{34}
 \left[P_{4-3}: (m_{14}=0) \land (cnt_{11}=1)\right] P_{5-3}: (m_{24}=0) \land (cnt_{11}=1) \left[P_{6-3}: (m_{34}=0) \land (cnt_{11}=1)\right]
\Pr_{4-3}:100 \to 1 \mid q_{14}
                                                                                               |\Pr_{5-3}:100 \to 1|q_{24}
                                                                                                                                                                                                \Pr_{6-3}: 0*cnt_{10}+100 \to 1 \mid q_{34}
                                                                                                                                                                                                               P_{9-3}: cnt_{12} = 1
  P_{7-3}: cnt_{11} = 1
                                                                             P_{8-3}: cnt_{12} = 1
\Pr_{7-3}: 1 \rightarrow 1 \mid cnt_{12}
                                                                             \Pr_{8-3} : \min(q_{14}, q_{24}, q_{34}) + 1 \to 1 \mid rq_4 \mid \Pr_{9-3} : 0 * cnt_{11} + 1 \to 1 \mid cnt_{13}
P_{10-3}: cnt_{13} = 1
                                                                                                            P_{11-3}: cnt_{13} = 1
                                                                                                                                                                                                                 P_{12-3}: cnt_{14} = 1
\left|\Pr_{10-3}: random_{2} \% \, rq_{4} \to 1 \,|\, pt_{4} \,\left|\Pr_{11-3}: 0 * cnt_{13} + 1 \to 1 \,|\, cnt_{14} \,\right| \Pr_{12-3}: pt_{4} * m_{14} + vo_{11} \to 1 \,|\, vo_{14} = 1 \,|\, vo_{14} + 1 \,|\, vo_{14} = 1 \,|\, vo_{14} + 1 \,|\, vo_{14} = 1 
P_{13-3}: cnt_{14} = 1
                                                                                                              P_{14-3}: cnt_{14} = 1
                                                                                                                                                                                                                            P_{15-3}: cnt_{14} = 1
|\Pr_{13-3}: pt_4 * m_{24} + vo_{21} \rightarrow 1| vo_{24} | \Pr_{14-3}: pt_4 * m_{34} + vo_{31} \rightarrow 1| vo_{34} | \Pr_{15-3}: 0 * cnt_{14} + 1 \rightarrow 1| cnt_{15}|
                                                                                                   P_{17-3}: cnt_{15} = 1
 P_{16-3}: cnt_{15} = 1
                                                                                                                                                                                                     P_{18-3}: cnt_{15} = 1
 |\Pr_{16-3}: a-vo_{14} \to 1|s_{13}
                                                                                                  |\Pr_{17-3}: b-vo_{24} \to 1|s_{23}
                                                                                                                                                                                                     |\Pr_{18-3}: c-vo_{34} \to 1|s_{33}
 P_{19-3}: cnt_{15} = 1
                                                                                                                 q_{14}[0] q_{24}[0] q_{34}[0] rq_4[0] pt_4[0]
 \Pr_{19-3}: 0*cnt_{15}+1 \rightarrow 1 \mid cnt_{16}
```

```
\begin{cases} a_{1}[0] & b_{1}[0] & c_{1}[0] \\ P_{1-8} : cnt_{29} = 1 \\ Pr_{1-8} : a - 2 * t_{1} + t_{2} - 3 * t_{3} - 4 * t_{4} \rightarrow 1 \mid a_{1} \end{cases} \begin{cases} P_{2-8} : cnt_{29} = 1 \\ Pr_{2-8} : b - t_{1} - t_{2} + 2 * t_{3} - 4 * t_{4} \rightarrow 1 \mid b_{1} \end{cases}
\begin{cases} P_{3-8} : cnt_{29} = 1 \\ Pr_{3-8} : c - 5 * t_{1} - 3 * t_{2} \rightarrow 1 \mid c_{1} \end{cases}
8
```

```
m_{12}[0] m_{22}[2] m_{32}[4] cnt_{17}[0] cnt_{18}[0] s_{13/2}[0] cnt_{19}[0] t_{2}[0]
cnt_{20}[0] vr_1[0] vr_2[0] vr_3[0] s_{23-2}[0] s_{33-2}[0] q_{12}[0]
\left[P_{1-4}: (m_{12} \neq 0) \land (cnt_{16} = 1) \right] \left[P_{2-4}: (m_{22} \neq 0) \land (cnt_{16} = 1) \right] P_{3-4}: (m_{32} \neq 0) \land (cnt_{16} = 1)
\left| \Pr_{1-4} : s_{13} \div m_{12} \to 1 \mid q_{12} \right| \left| \Pr_{2-4} : s_{23} \div m_{22} \to 1 \mid q_{22} \right| \left| \Pr_{3-4} : 0 * cnt_{16} + s_{33} \div m_{32} \to 1 \mid q_{32} \right|
P_{4-4}: (m_{12}=0) \land (cnt_{16}=1) P_{5-4}: (m_{22}=0) \land (cnt_{16}=1) P_{6-4}: (m_{32}=0) \land (cnt_{16}=1)
\Pr_{4-4}:100 \to 1|q_{12}
                                            |\Pr_{5-4}:100 \to 1|q_{22}
                                                                                          |\Pr_{6-4}: 0*cnt_{16}+100 \rightarrow 1| q_{32}
P_{7-4}: cnt_{16} = 1
                                        P_{8-4}: cnt_{17} = 1
                                                                                                 P_{9-4} : cnt_{17} = 1
                                                                                                \Pr_{9-4}: 0*cnt_{17}+1 \to 1 \mid cnt_{18}
|\Pr_{7-4}:1 \to 1| cnt_{17}
                                        \Pr_{8-4} : \min(q_{12}, q_{22}, q_{32}) \to 1 \mid t_2
                                            P_{11-4} : cnt_{18} = 1
P_{10-4}: cnt_{18} = 1
                                                                                                 P_{12-4}: cnt_{18} = 1
                                           |\Pr_{11-4}: t_2 * m_{22} \to 1 | vr_2
\Pr_{10-4}: t_2 * m_{12} \to 1 \mid vr_1
                                                                                                 |\Pr_{12-4}: t_2 * m_{32} \to 1| vr_3
                                                  P_{14-4} : cnt_{19} = 1
                                                                                                 P_{15-4}: cnt_{19} = 1
P_{13-4}: cnt_{18} = 1
\Pr_{13-4}: 0 * cnt_{18} + 1 \rightarrow 1 \mid cnt_{19}  \Pr_{14-4}: s_{12} - vr_1 \rightarrow 1 \mid s_{13-2}  \Pr_{15-4}: s_{22} - vr_2 \rightarrow 1 \mid s_{23-2} 
P_{16-4} : cnt_{19} = 1
                                                  P_{17-4}: cnt_{19} = 1
\Pr_{16-4}: s_{32} - vr_3 \to 1 \mid s_{33} \mid 2
                                                  \Pr_{17-4}: 0 * cnt_{19} + 1 \rightarrow 1 \mid cnt_{20}
```

```
q_{14\_2}[0] \quad q_{24\_2}[0] \quad q_{34\_2}[0] \quad cnt_{21}[0] \quad cnt_{22}[0] \quad s_{12\_2}[0] \quad cnt_{23}[0] \quad t_4[0]
   cnt_{24}[0] vo_{14\_2}[0] vo_{24\_2}[0] vo_{34\_2}[0] s_{22\_2}[0] s_{32\_2}[0]
 P_{1-5}: (m_{14} \neq 0) \land (cnt_{20} = 1) P_{2-5}: (m_{24} \neq 0) \land (cnt_{20} = 1) P_{3-5}: (m_{34} \neq 0) \land (cnt_{20} = 1)
  \left| \Pr_{1-5} : s_{13_{-2}} \div m_{14} \to 1 \mid q_{14_{-2}} \right| \Pr_{2-5} : s_{23_{-2}} \div m_{24} \to 1 \mid q_{24_{-2}} \right| \Pr_{3-5} : 0 * cnt_{20} + s_{33_{-2}} \div m_{34} \to 1 \mid q_{34_{-2}} \downarrow 1 + s_{34_{-2}} \downarrow
  P_{4-5}: (m_{14}=0) \land (cnt_{20}=1) \quad P_{5-5}: (m_{24}=0) \land (cnt_{20}=1) \quad P_{6-5}: (m_{34}=0) \land (cnt_{20}=1)
\Pr_{4-5}:100 \to 1 \mid q_{14}
                                                                                                                                                                                                         \Pr_{5-5}:100 \to 1|q_{24-2}
                                                                                                                                                                                                                                                                                                                                                                                                                     \Pr_{6-5}: 0*cnt_{20}+100 \rightarrow 1 \mid q_{34-2}
   P_{7-5}: cnt_{20} = 1
                                                                                                                                                         P_{8-5}: cnt_{21} = 1
                                                                                                                                                                                                                                                                                                                                                                                                                                   P_{9-5}: cnt_{21} = 1
  \Pr_{7-5}: 1 \to 1 \mid cnt_{21}
                                                                                                                                           \Pr_{8-5} : \min(q_{14_2}, q_{24_2}, q_{34_2}) \to 1 \mid t_4 \mid \Pr_{9-5} : 0 * cnt_{21} + 1 \to 1 \mid cnt_{22}
   P_{10-5}: cnt_{22} = 1
                                                                                                                                                                                                                 P_{11-5}: cnt_{22} = 1
                                                                                                                                                                                                                                                                                                                                                                                                                                           P_{12-5}: cnt_{22} = 1
\left| \Pr_{10-5} : t_4 * m_{14} + v r_1 \to 1 \mid vo_{14-2} \right| \Pr_{11-5} : t_4 * m_{24} + v r_2 \to 1 \mid vo_{24-2} \right| \Pr_{12-5} : t_4 * m_{34} + v r_3 \to 1 \mid vo_{34-2} \mid r_{12-5} : t_4 * m_{24} + v r_3 \to 1 \mid r_{24} \mid r_{24}
  P_{13-5}: cnt_{22} = 1
                                                                                                                                                                                                                    P_{14-5}: cnt_{23} = 1
                                                                                                                                                                                                                                                                                                                                                                                                                                       P_{15-5}: cnt_{23} = 1
 P_{17-5} : cnt_{23} = 1
 P_{16-5}: cnt_{23} = 1
\Pr_{16-5}: s_{31} - vo_{34-2} \to 1 \mid s_{32-2}  \Pr_{17-5}: 0 * cnt_{23} + 1 \to 1 \mid cnt_{24}
```

```
q_{11} _{2}[0] q_{21} _{2}[0] q_{31} _{2}[0] cnt_{25}[0] cnt_{26}[0] s_{11} _{2}[0] cnt_{27}[0] t_{1}[0]
cnt_{28}[0] vo_{11_{2}}[0] vo_{21_{2}}[0] vo_{31_{2}}[0] s_{21_{2}}[0] s_{31_{2}}[0]
P_{1-6}: (m_{11} \neq 0) \land (cnt_{24} = 1) P_{2-6}: (m_{21} \neq 0) \land (cnt_{24} = 1) P_{3-6}: (m_{31} \neq 0) \land (cnt_{24} = 1)
 \left| \Pr_{1-6} : s_{12\_2} \div m_{11} \to 1 \mid q_{11\_2} \right| \Pr_{2-6} : s_{22\_2} \div m_{21} \to 1 \mid q_{21\_2} \right| \Pr_{3-6} : 0 * cnt_{20} + s_{32\_2} \div m_{31} \to 1 \mid q_{31\_2} = 0
P_{4-6}: (m_{11}=0) \land (cnt_{24}=1) \quad P_{5-6}: (m_{21}=0) \land (cnt_{24}=1) \quad P_{6-6}: (m_{31}=0) \land (cnt_{24}=1)
                                                                                                                          \Pr_{5-6}:100 \to 1 \mid q_{21-2}
\Pr_{4-6}:100 \to 1|q_{11-2}
                                                                                                                                                                                                                                                       \Pr_{6-6}: 0*cnt_{24}+100 \rightarrow 1 \mid q_{31-2}
                                                                                              P_{8-6}: cnt_{25} = 1
 P_{7-6}: cnt_{24} = 1
                                                                                                                                                                                                                                                                P_{9-6}: cnt_{25} = 1
|\Pr_{7-6}: 1 \to 1 | cnt_{25}
                                                                                            |\Pr_{8-6} : \min(q_{11_2}, q_{21_2}, q_{31_2}) \to 1 | t_1 | | \Pr_{9-6} : 0 * cnt_{25} + 1 \to 1 | cnt_{26}
P_{10-6}: cnt_{26} = 1
                                                                                                                                          P_{11-6} : cnt_{26} = 1
                                                                                                                                                                                                                                                                                        P_{12-6}: cnt_{26} = 1
\left| \Pr_{10-6} : t_1 * m_{11} + vo_{14\_2} \to 1 \mid vo_{11\_2} \right| \Pr_{11-6} : t_1 * m_{21} + vo_{24\_2} \to 1 \mid vo_{21\_2} \right| \Pr_{12-6} : t_1 * m_{31} + vo_{34\_2} \to 1 \mid vo_{31\_2} \to 1 \mid v
 P_{13-6}: cnt_{26} = 1
                                                                                                                                   P_{14-6}: cnt_{27} = 1
                                                                                                                                                                                                                                                                      P_{15-6}: cnt_{27} = 1
|\Pr_{13-6}: 0*cnt_{26}+1 \rightarrow 1 | cnt_{27}| | \Pr_{14-6}: a-vo_{11_2} \rightarrow 1 | s_{11_2}|
                                                                                                                                                                                                                                                                   | Pr_{15-6} : b - vo_{21-2} \rightarrow 1 | s_{21-2} |
   P_{16-6}: cnt_{27} = 1
                                                                                                                                P_{17-6}: cnt_{27} = 1
|\Pr_{16-6}: c-vo_{31-2} \to 1| s_{31-2}| |\Pr_{17-6}: 0*cnt_{23}+1 \to 1| cnt_{28}
```