EECS3342 Winter 2023
Notes on Discharging PO of Deadlock Freedom (DLF)
Bridge Controller: Initial Model

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1 Discharing the PO of Deadlock Freedom: First Attempt

$$\boxed{\begin{array}{l} d \in \mathbb{N} \\ n \in \mathbb{N} \\ n \leq d \\ \vdash \\ n < d \lor n > 0 \end{array}}$$

$\equiv$

$$\boxed{\begin{array}{l} d \in \mathbb{N} \\ n \in \mathbb{N} \\ n < d \lor n = d \\ \vdash \\ n < d \lor n > 0 \end{array}}$$

MON

$$\boxed{\begin{array}{l} n < d \lor n = d \\ \vdash \\ n < d \lor n > 0 \end{array}}\ \textbf{OR\_L}\ \begin{cases} \boxed{\begin{array}{l} n < d \\ \vdash \\ n < d \lor n > 0 \end{array}}\ \textbf{OR\_R1}\ \boxed{\begin{array}{l} n < d \\ \vdash \\ n < d \end{array}}\ \textbf{HYP} \\ \boxed{\begin{array}{l} n = d \\ \vdash \\ n < d \lor n > 0 \end{array}}\ \textbf{EQ\_LR}\ \boxed{\begin{array}{l} n = d \\ \vdash \\ d < d \lor d > 0 \end{array}}\ \textbf{MON}\ \boxed{\begin{array}{l} \vdash \\ d < d \lor d > 0 \end{array}}\ \textbf{OR\_R2}\ \boxed{\begin{array}{l} \vdash \\ d > 0 \end{array}}\ \textbf{?} \end{cases}$$

2 Discharing the PO of Deadlock Freedom: Second Attempt (after adding axm0_2)

$d \in \mathbb{N}$
$d > 0$
$n \in \mathbb{N}$
$n \leq d$
$\vdash$
$n < d \lor n > 0$

$\equiv$

$d \in \mathbb{N}$
$d > 0$
$n \in \mathbb{N}$
$n < d \lor n = d$
$\vdash$
$n < d \lor n > 0$

MON

$d > 0$
$n < d \lor n = d$
$\vdash$
$n < d \lor n > 0$

OR_L

- $d > 0$ $n < d$ $\vdash$ $n < d \lor n > 0$ **OR_R1** $d > 0$ $n < d$ $\vdash$ $n < d$ **HYP**
- $d > 0$ $n = d$ $\vdash$ $n < d \lor n > 0$ **EQ_LR** $d > 0$ $n = d$ $\vdash$ $d < d \lor d > 0$ **MON** $d > 0$ $\vdash$ $d < d \lor d > 0$ **OR_R2** $d > 0$ $\vdash$ $d > 0$ **HYP**