EECS3342 Winter 2022
Notes on Discharging POs of Refinement
(Guard Strengthening & Invariant Preservation)
Bridge Controller: Initial Model vs. 1st Refinement

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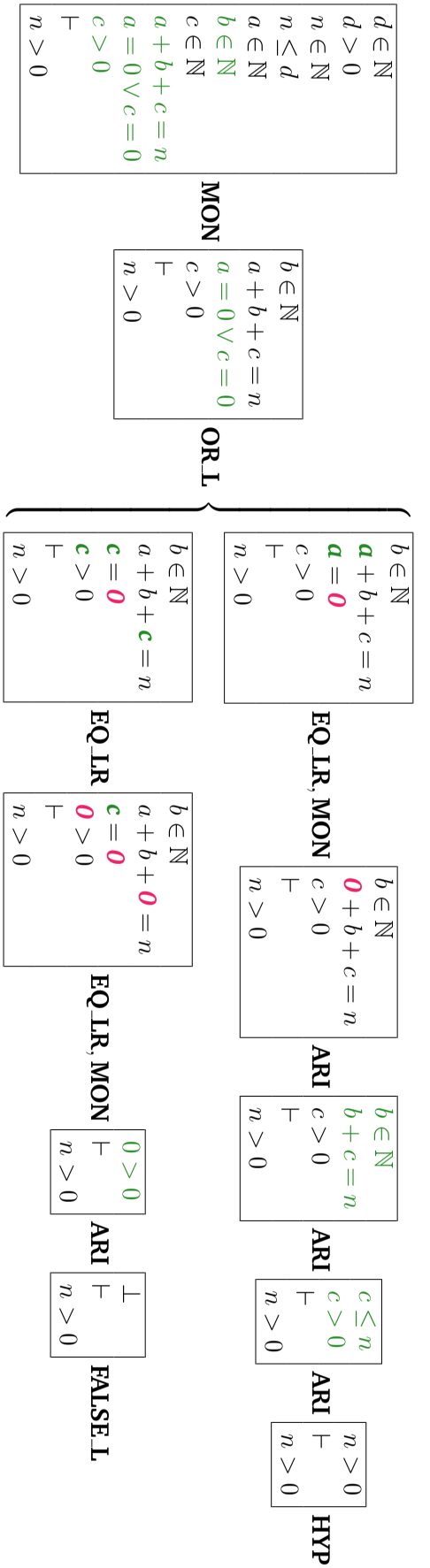
Contents

1 Discharing the PO of Guard Strengthening: ML_out/GRD

$$
\boxed{\begin{array}{l} d \in \mathbb{N} \\ d > 0 \\ n \in \mathbb{N} \\ n \leq d \\ a \in \mathbb{N} \\ b \in \mathbb{N} \\ c \in \mathbb{N} \\ a + b + c = n \\ a = 0 \lor c = 0 \\ a + b < d \\ c = 0 \\ \vdash \\ n < d \end{array}}
\ \textbf{MON}\
\boxed{\begin{array}{l} a + b + \boldsymbol{c} = n \\ a + b < d \\ \boldsymbol{c = 0} \\ \vdash \\ n < d \end{array}}
\ \textbf{EQ\_LR}, \textbf{MON}\
\boxed{\begin{array}{l} a + b + \boldsymbol{0} = n \\ a + b < d \\ \vdash \\ n < d \end{array}}
\ \textbf{ARI}\
\boxed{\begin{array}{l} \boldsymbol{a + b = n} \\ \boldsymbol{a + b} < d \\ \vdash \\ n < d \end{array}}
\ \textbf{EQ\_LR}, \textbf{MON}\
\boxed{\begin{array}{l} \boldsymbol{n} < d \\ \vdash \\ n < d \end{array}}
\ \textbf{HYP}
$$

2 Discharing the PO of Guard Strengthening: ML_in/GRD



3 Discharing the PO of Invariant Preservation: ML_out/inv1_4/INV

$d \in \mathbb{N}$
$d > 0$
$n \in \mathbb{N}$
$n \leq d$
$a \in \mathbb{N}$
$b \in \mathbb{N}$
$c \in \mathbb{N}$
a + b + c = n
$a = 0 \vee c = 0$
$a + b < d$
$c = 0$
$\vdash$
$(a + 1) + b + c = (n + 1)$

MON

$a + b + c = n$
$\vdash$
(a + 1) + b + c = (n + 1)

ARI

a + b + c = n
$\vdash$
$a + b + c + 1 = n + 1$

EQ_LR, MON

$\vdash$
$n + 1 = n + 1$

EQ

4 Discharing the PO of Invariant Preservation: ML_in/inv1_5/INV