1 Rewrite_Rules Theory

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Parent Theories: rewrite_Rules_Lemmas

1.1 Definitions

[UNIONL_def]

$\vdash$ (UNIONL [] = $\{\}$) $\wedge$ $\forall s\ ss$. UNIONL (s::ss) = $s \cup$ UNIONL ss

1.2 Theorems

[example]

$\vdash \forall c\ d\ f$.
P_AND (D_AND c (D_OR c d)) (D_AND d f) =
P_AND c (D_AND d f)

[IN_REST]

$\vdash \forall x\ s$. $x \in$ REST $s \iff x \in s \wedge x \neq$ CHOICE s

[IN_UNIONL]

$\vdash \forall l\ v$. $v \in$ UNIONL $l \iff \exists s$. MEM $s\ l \wedge v \in s$

[rule_10]

$\vdash \forall X\ Y\ Z$. D_OR (D_AND X Y) (D_AND Y Z) = D_AND (D_OR X Z) Y

[rule_11]

$\vdash \forall L_1\ L_2$. n_OR (L_1 ++ [NEVER] ++ L_2) = n_OR (L_1 ++ L_2)

[rule_12]

$\vdash \forall L_1\ L_2$.
rv_gt0 (L_1 ++ L_2) $\Rightarrow$
(n_OR (L_1 ++ [ALWAYS] ++ L_2) = ALWAYS)

[rule_13_AND]

$\vdash \forall L_1\ L_2$.
rv_gt0 (L_1 ++ L_2) $\Rightarrow$ (n_AND (L_1 ++ [NEVER] ++ L_2) = NEVER)

[rule_13_PAND]

$\vdash \forall L$. rv_gt0 $L \Rightarrow$ (n_PAND (L ++ [NEVER]) = NEVER)

[rule_13_PAND_2]

$\vdash \forall L$. rv_gt0 $L \Rightarrow$ (n_PAND (NEVER::L) = NEVER)

[rule_13_PAND_3]

$\vdash \forall L_1\ L_2.$
$\quad$ rv_gt0 $(L_1$ ++ $L_2) \Rightarrow$
$\quad$ (n_PAND $(L_1$ ++ [NEVER] ++ $L_2)$ = NEVER)

[rule_14_AND]

$\vdash \forall L.$ rv_gt0 $L \Rightarrow$ (n_AND (ALWAYS::L) = n_AND L)

[rule_14_PAND]

$\vdash \forall L.$ rv_gt0 $L \Rightarrow$ (n_PAND (ALWAYS::L) = n_PAND L)

[rule_15_k_out_n]

$\vdash \forall L.$ ALL_DISTINCT $L \wedge$ rv_gt0 $L \Rightarrow$ (k_out_n_gate 1 L = n_OR L)

[rule_16_k_out_of_n_gate_AND]

$\vdash \forall L.$ ALL_DISTINCT $L \Rightarrow$ (k_out_n_gate (LENGTH L) L = n_AND L)

[rule_18]

$\vdash \forall X\ Y.$ D_AND $X\ Y$ = D_OR (P_AND $X\ Y$) (P_AND $Y\ X$)

[rule_19]

$\vdash \forall X\ Y.$
$\quad$ $(\forall s.$ ALL_DISTINCT [$X\ s$; $Y\ s$]) $\Rightarrow$
$\quad$ (D_AND (P_AND $X\ Y$) (P_AND $Y\ X$) = NEVER)

[rule_1_AND]

$\vdash \forall L_1\ L_2.$ PERM $L_1\ L_2 \Rightarrow$ (n_AND L_1 = n_AND L_2)

[rule_1_k_out_n]

$\vdash \forall L_1\ L_2\ k.$
$\quad$ PERM $L_1\ L_2 \Rightarrow$ (k_out_n_gate $k\ L_1$ = k_out_n_gate $k\ L_2$)

[rule_1_OR]

$\vdash \forall L_1\ L_2.$ PERM $L_1\ L_2 \Rightarrow$ (n_OR L_1 = n_OR L_2)

[rule_20]

$\vdash \forall B\ C_1\ C_2\ L.$
$\quad$ rv_gt0 $(L$ ++ [B; C_1; C_2]) $\Rightarrow$
$\quad$ (n_PAND ([B; P_AND $C_1\ C_2$] ++ L) =
$\quad$ D_AND (P_AND $C_1\ C_2$) (n_PAND ([B; C_2] ++ L)))

[rule_21]

$\vdash \forall X\ Y\ L.$
$\quad$ rv_gt0 [X; Y] $\Rightarrow$
$\quad$ (n_PAND (D_OR $X\ Y$::L) =
$\quad$ D_OR (n_PAND (X::L)) (n_PAND (Y::L)))

[rule_22]

$\vdash \forall B\ a\ b\ L.$
$\quad$ rv_gt0 $(B::a::b::L) \Rightarrow$
$\quad$ (n_PAND $(B::$D_OR (P_AND $a\ b)$ (P_AND $b\ a)::L)$ =
$\quad$ n_OR
$\quad\quad$ [n_PAND $(B::b::a::L)$; n_PAND $(b::B::a::L)$;
$\quad\quad$ n_PAND $(B::a::b::L)$; n_PAND $(a::B::b::L)$])

[rule_23]

$\vdash \forall L_1.$
$\quad L_1 \neq [] \wedge (\forall x.$ MEM $x\ L_1 \Rightarrow \forall s.\ 0 < x\ s) \Rightarrow$
$\quad \forall L_2.$ n_PAND $(L_1$ ++ [ALWAYS] ++ $L_2)$ = NEVER

[rule_2_AND]

$\vdash \forall L_1\ L_2.\ (L_1 = L_2) \Rightarrow$ (n_AND L_1 = n_AND L_2)

[rule_2_k_out_n]

$\vdash \forall L_1\ L_2\ k.\ (L_1 = L_2) \Rightarrow$ (k_out_n_gate $k\ L_1$ = k_out_n_gate $k\ L_2$)

[rule_2_OR]

$\vdash \forall L_1\ L_2.\ (L_1 = L_2) \Rightarrow$ (n_OR L_1 = n_OR L_2)

[rule_2_PAND]

$\vdash \forall L_1\ L_2.\ (L_1 = L_2) \Rightarrow$ (n_PAND L_1 = n_PAND L_2)

[rule_3_AND]

$\vdash \forall x.$ rv_gt0 $[x] \Rightarrow$ (n_AND $[x] = x$)

[rule_3_k_out_n]

$\vdash \forall x\ k.$ rv_gt0 $[x] \Rightarrow$ (k_out_n_gate 1 $[x] = x$)

[rule_3_OR]

$\vdash \forall x.$ n_OR $[x] = x$

[rule_3_PAND]

$\vdash \forall x.$ rv_gt0 $[x] \Rightarrow$ (n_PAND $[x] = x$)

[rule_4_AND]

$\vdash \forall L_1\ L_2\ x.$
$\quad$ n_AND $(L_1$ ++ $[x]$ ++ $L_2)$ = n_AND $(L_1$ ++ [n_OR $[x]]$ ++ $L_2)$

[rule_4_general]

$\vdash \forall L_1\ L_2\ x.\ L_1$ ++ $[x]$ ++ L_2 = L_1 ++ [n_OR $[x]]$ ++ L_2

[rule_4_k_out_gate]

$\vdash \forall L_1\ L_2\ x\ k.$
$\quad$ k_out_n_gate k (L_1 ++ [x] ++ L_2) =
$\quad$ k_out_n_gate k (L_1 ++ [n_OR [x]] ++ L_2)

[rule_4_OR]

$\vdash \forall L_1\ L_2\ x.$
$\quad$ n_OR (L_1 ++ [x] ++ L_2) = n_OR (L_1 ++ [n_OR [x]] ++ L_2)

[rule_5_AND]

$\vdash \forall L_1\ L_2.$
$\quad$ rv_gt0 (L_1 ++ L_2) $\Rightarrow$
$\quad$ (n_AND (n_AND L_2::L_1) = n_AND (L_2 ++ L_1))

[rule_5_OR]

$\vdash \forall L_1\ L_2.$ n_OR (n_OR L_2::L_1) = n_OR (L_2 ++ L_1)

[rule_5_PAND]

$\vdash \forall L_1\ L_2.$
$\quad$ rv_gt0 (L_1 ++ L_2) $\Rightarrow$
$\quad$ (n_PAND (n_PAND L_2::L_1) = n_PAND (L_2 ++ L_1))

[rule_7_AND]

$\vdash \forall x\ L.$ n_AND (x::x::L) = n_AND (x::L)

[rule_7_OR]

$\vdash \forall x\ L.$ n_OR (x::x::L) = n_OR (x::L)

[rule_7_PAND]

$\vdash \forall x\ L.$ rv_gt0 [x] $\Rightarrow$ (n_PAND (x::x::L) = n_PAND (x::L))

[rule_8]

$\vdash \forall X\ Y.$ D_AND X (D_OR X Y) = X

[rule_9]

$\vdash \forall X\ Y.$ D_OR X (D_AND X Y) = X