19CSE205 Program Reasoning Weakest Precondition

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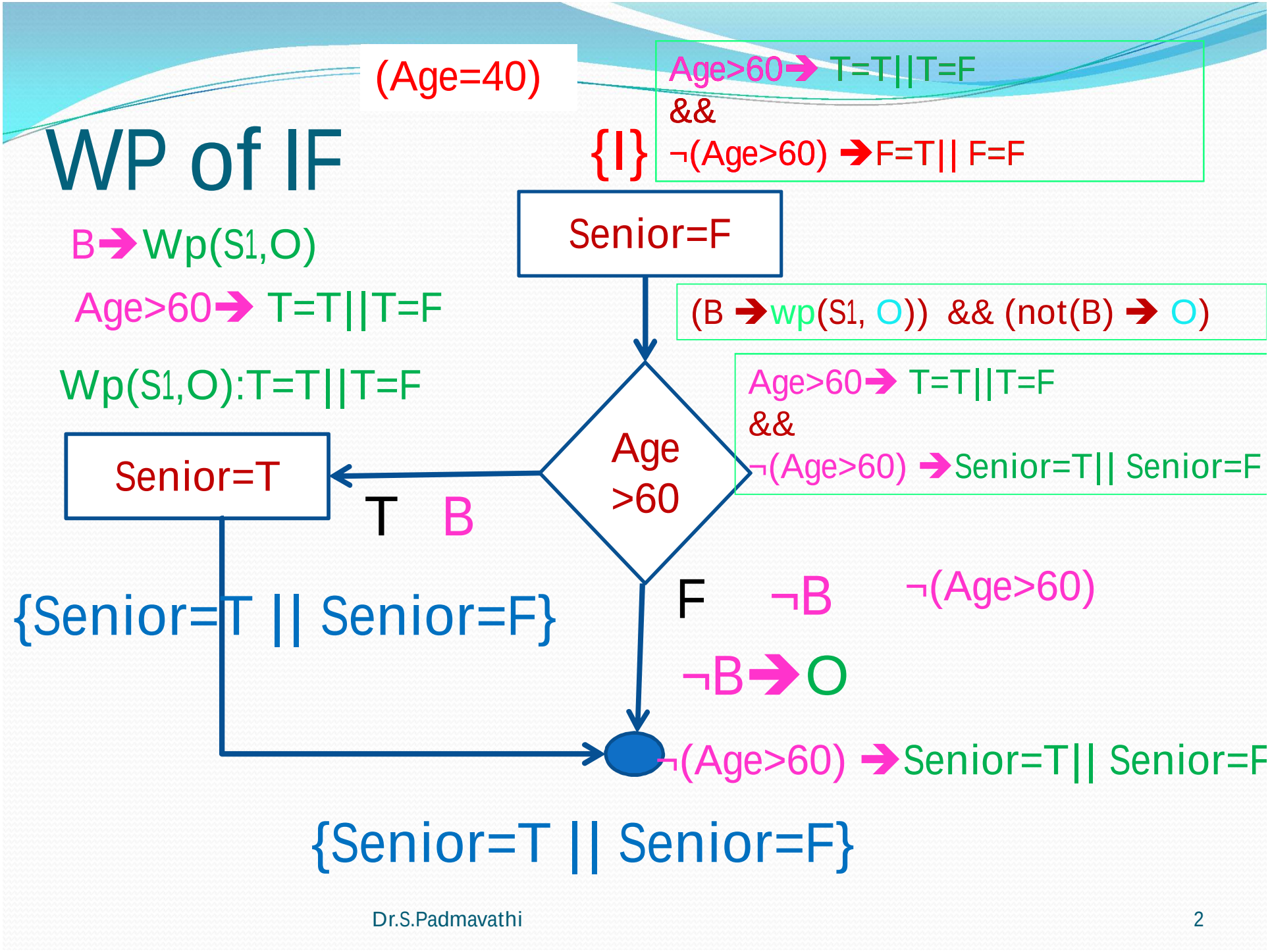
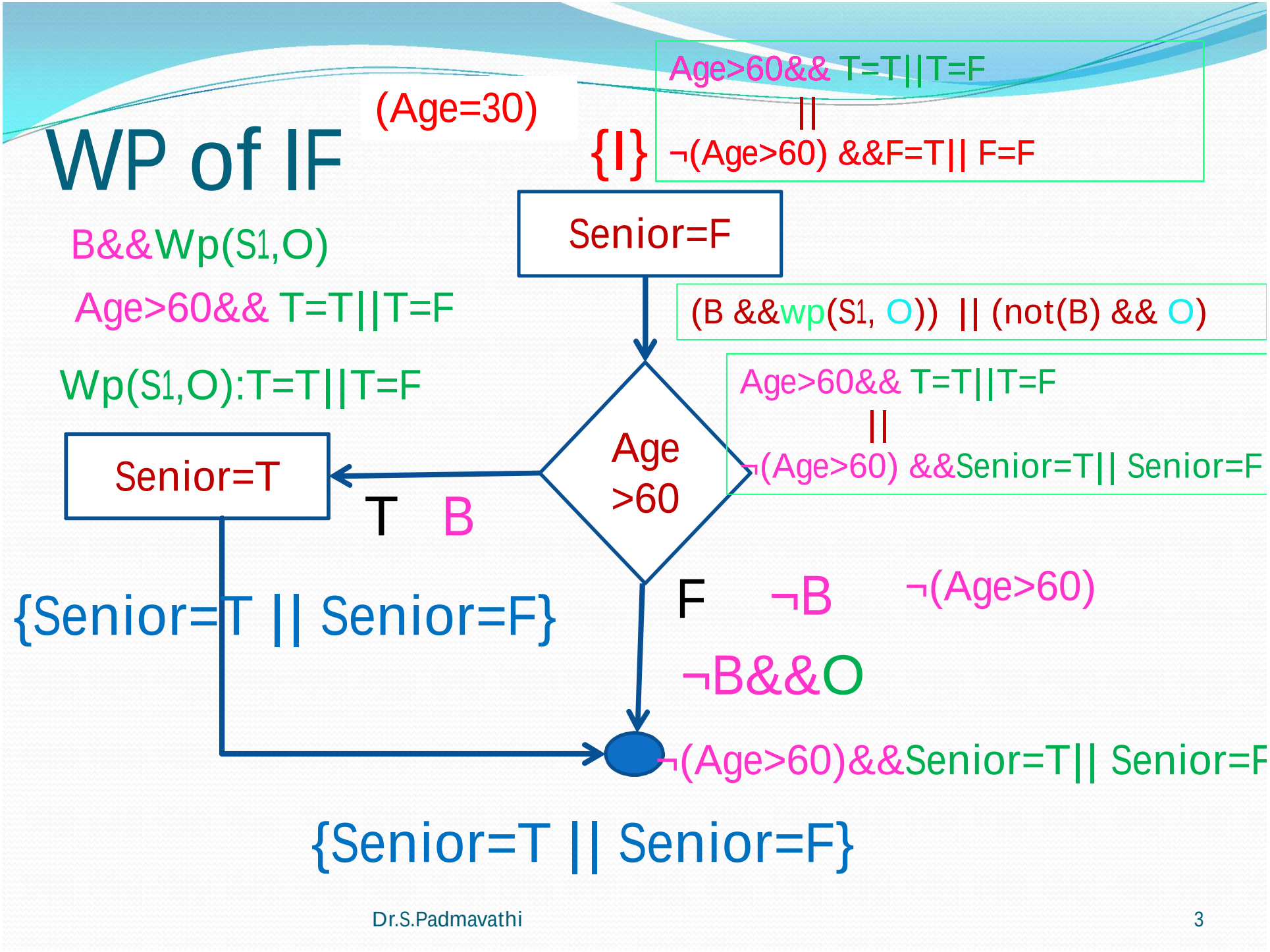
WP of IF


(Age=40)
Age>60➔ T=T||T=F
&&
¬(Age>60) ➔F=T|| F=F
{I}
Senior=F
B➔Wp(S1,O)
Age>60➔ T=T||T=F
(B ➔wp(S1, O)) && (not(B) ➔ O)
Wp(S1,O):T=T||T=F
Age>60➔ T=T||T=F
&&
¬(Age>60) ➔Senior=T|| Senior=F
Age >60
Senior=T
T B
F ¬B
¬(Age>60)
¬B➔O
{Senior=T || Senior=F}
¬(Age>60) ➔Senior=T|| Senior=F
{Senior=T || Senior=F}

WP of IF

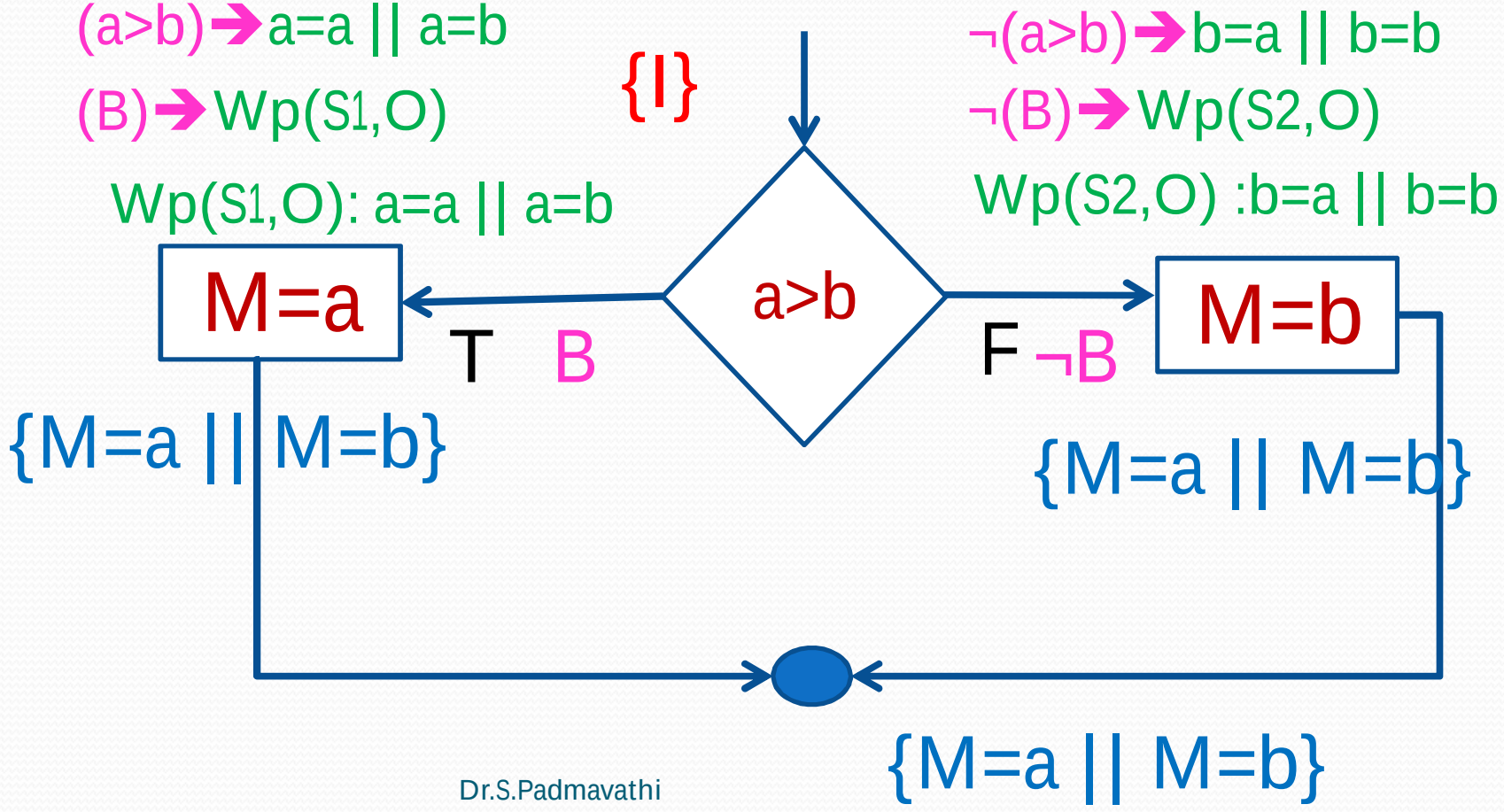

(Age=30)
{I}
Age>60&& T=T||T=F
||
¬(Age>60) &&F=T|| F=F
Senior=F
B&&Wp(S1,O)
Age>60&& T=T||T=F
(B &&wp(S1, O)) || (not(B) && O)
Wp(S1,O):T=T||T=F
Age>60&& T=T||T=F
||
¬(Age>60) &&Senior=T|| Senior=F
Age
>60
Senior=T
T B
F ¬B
¬(Age>60)
¬B&&O
{Senior=T || Senior=F}
¬(Age>60)&&Senior=T|| Senior=F
{Senior=T || Senior=F}

WP of If –else-max(a,b)

(B ➔wp(S1, O)) && (not(B) ➔ wp(S1, O))

(a>b)➔(a=a || a=b) && ¬(a>b)➔(b=a || b=b)

{a=7, b=2}

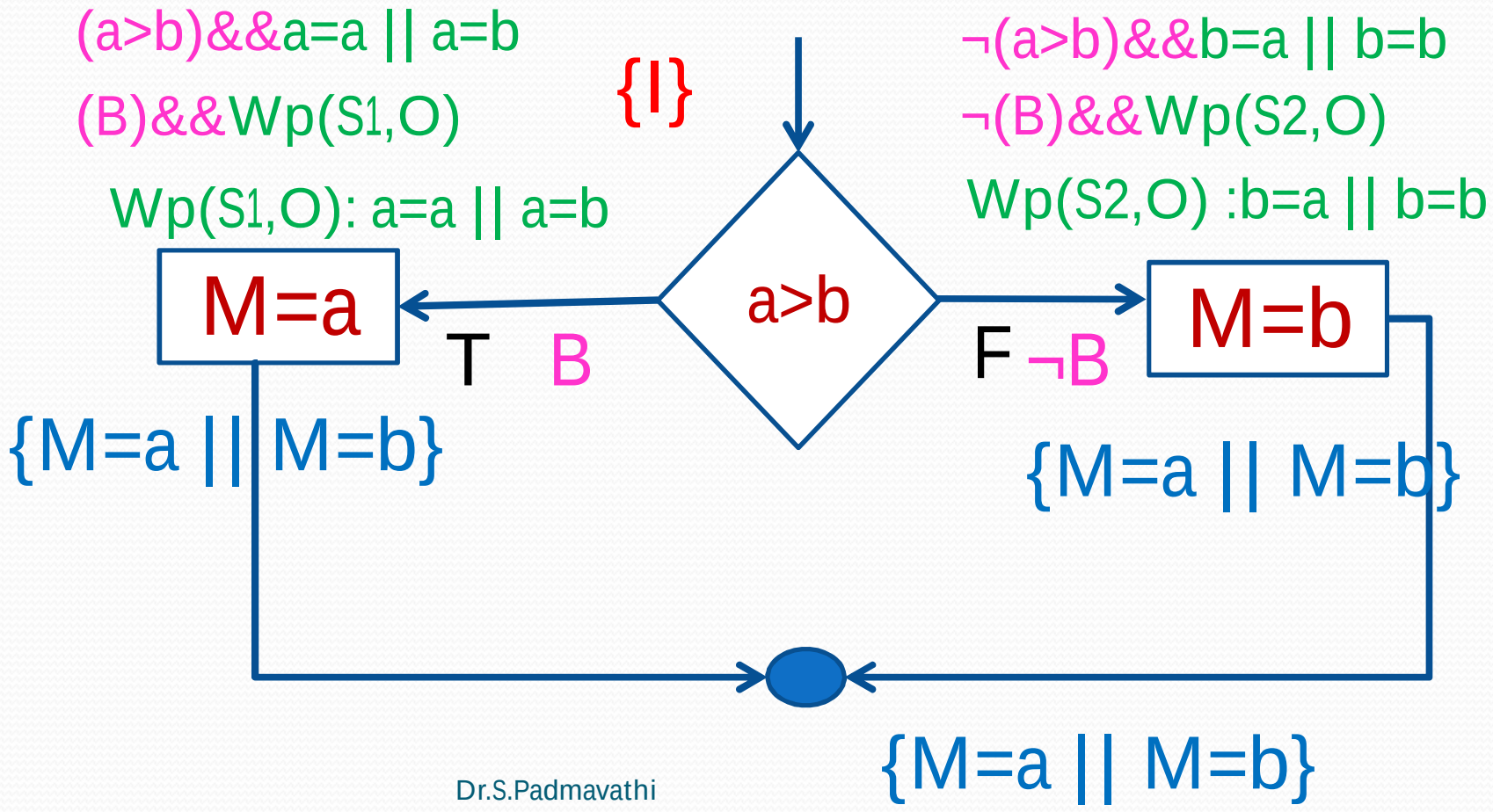


WP of If –else-max(a,b)

(B &&wp(S1, O)) || (not(B) && wp(S1, O))

(a>b)&&(a=a || a=b) || ¬(a>b)&&(b=a || b=b)

{a=7, b=2}

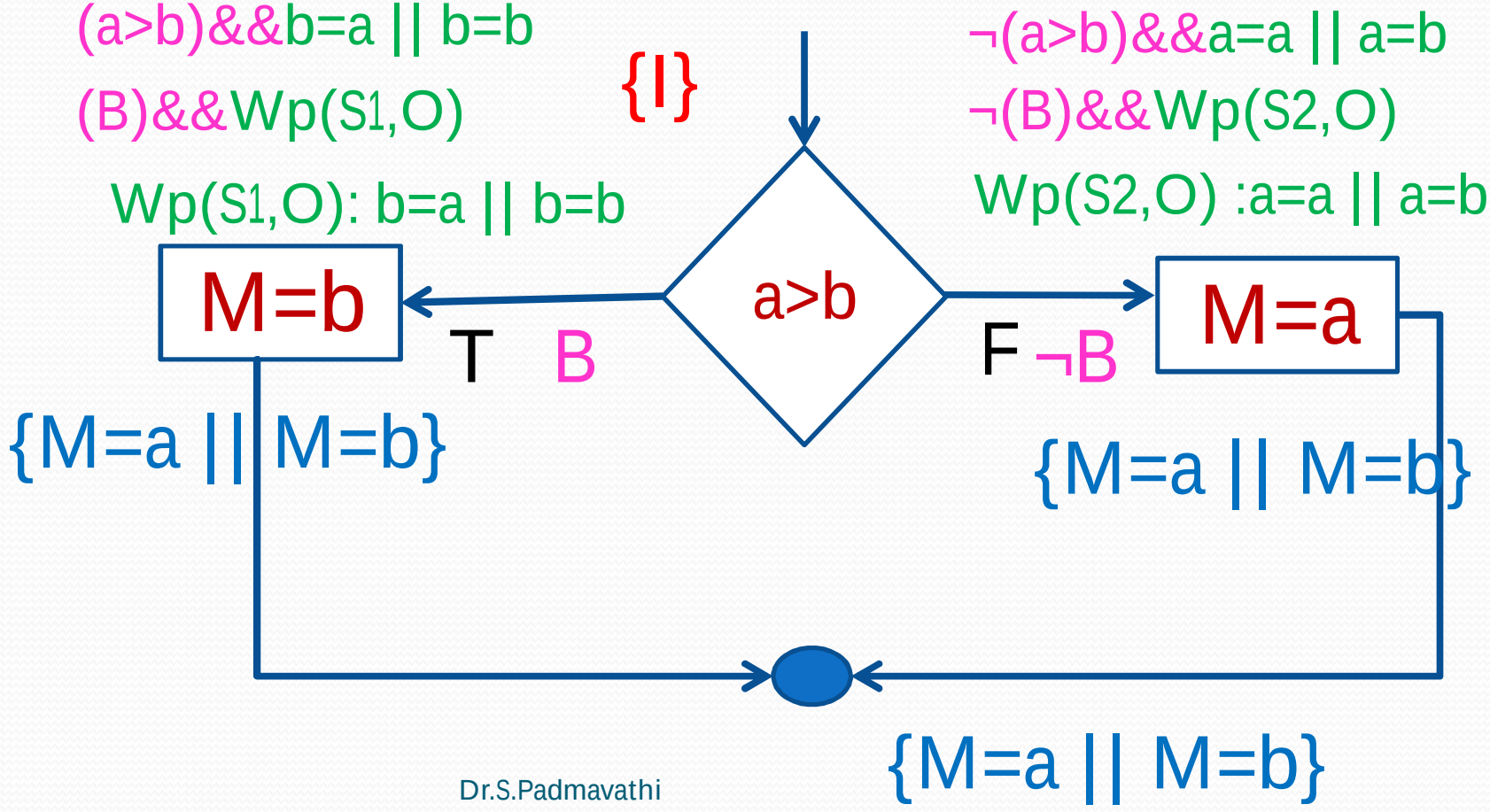


If –else-max(a,b)-Specification

(B &&wp(S1, O)) || (not(B) && wp(S1, O))

(a>b)&&(b=a || b=b) || ¬(a>b)&&(a=a || a=b)

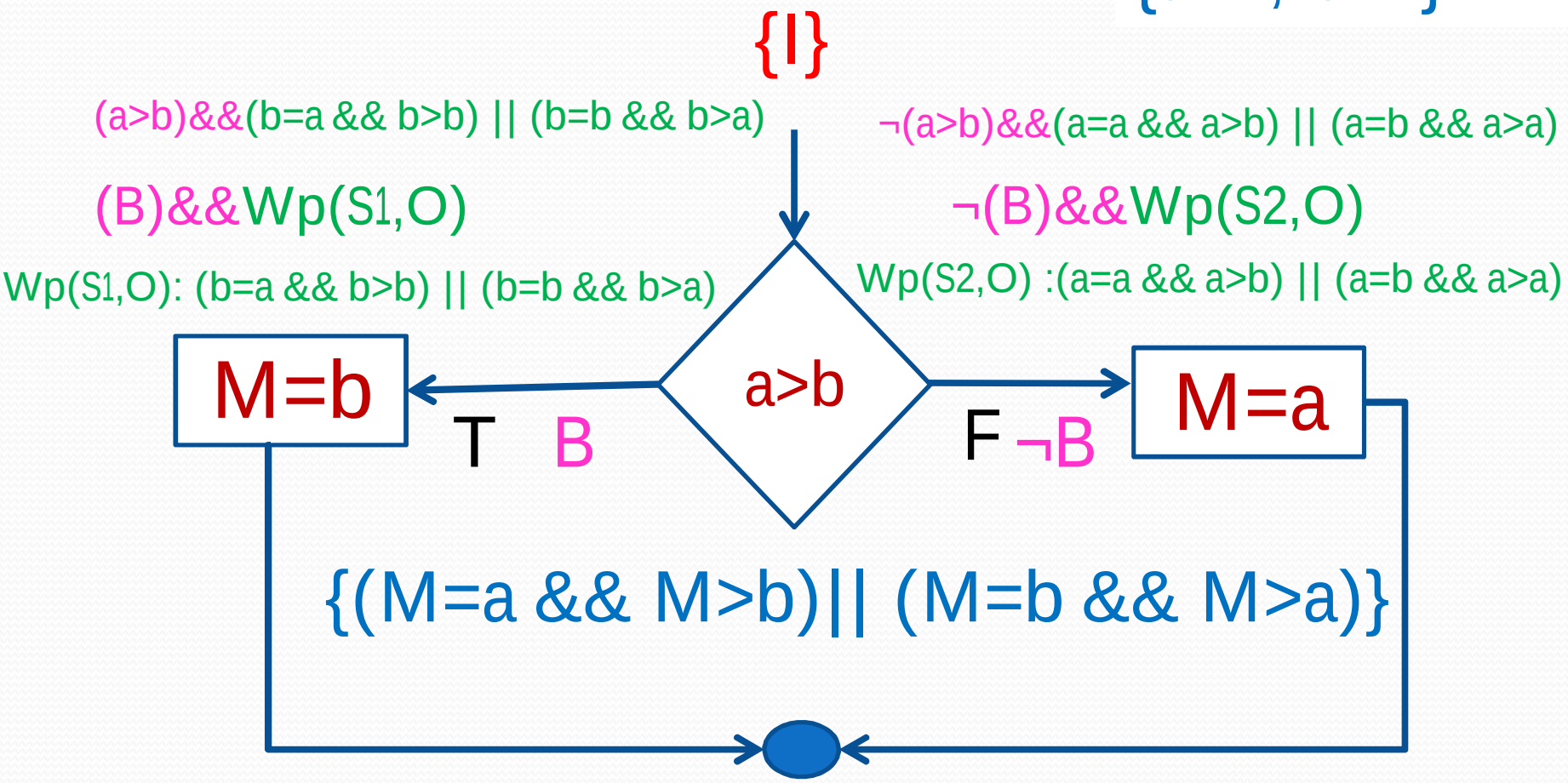
{a=7, b=2}



max(a,b)-Specification

(B &&wp(S1, O)) || (not(B) && wp(S1, O))

{a=7, b=2}



max(a,b)-Specification

{a=5, b=5}

(B &&wp(S1, O)) || (not(B) && wp(S1, O))

(a>b)&&((a=a && a>b) || (a=b && a>a)) || ¬(a>b)&&((b=a && b>b) || (b=b && b>a))

(a>b)&&((a=a && a>b) || (a=b && a>a))

{I}

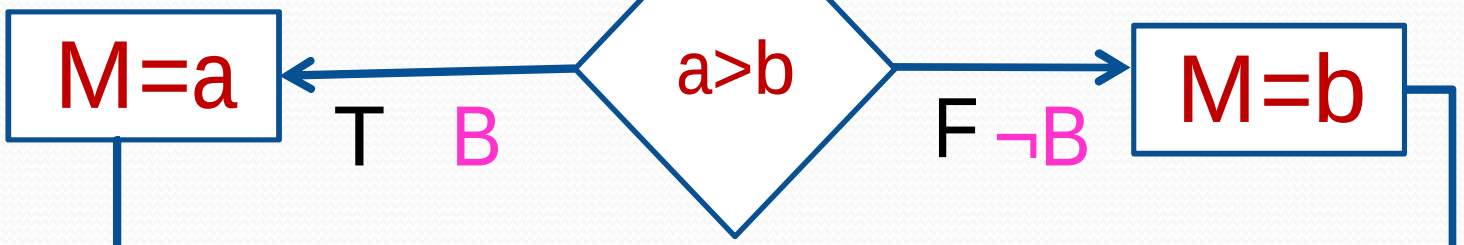
¬(a>b)&&((b=a && b>b) || (b=b && b>a))

(B)&&Wp(S1,O)

¬(B)&&Wp(S2,O)

Wp(S1,O): (a=a && a>b) || (a=b && a>a)

Wp(S2,O) :(b=a && b>b) || (b=b && b>a)



{(M=a && M>b)|| (M=b && M>a)}

{(M=a && M>b)|| (M=b && M>a) ||(M=a&&M=b)}

max(a,b)-Specification

(B &&wp(S1, O)) || (not(B) && wp(S1, O))

{a=5, b=5}

(a>b)&&((a=a && a>b) || (a=b && a>a)) ||(a=a && a=b)

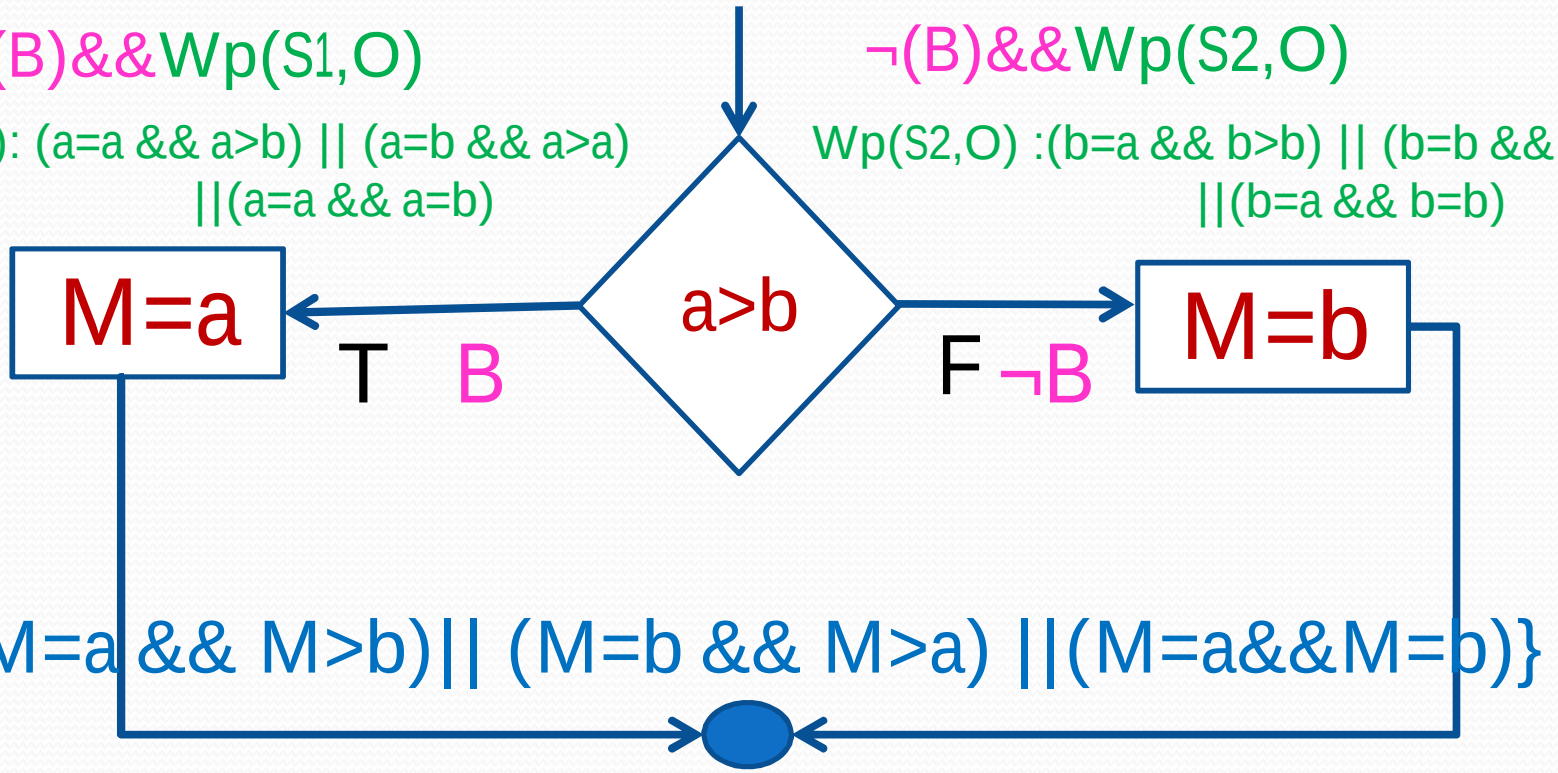
¬(a>b)&&((b=a && b>b) || (b=b && b>a)) ||(b=a && b=b)

(B)&&Wp(S1,O)

¬(B)&&Wp(S2,O)

Wp(S1,O): (a=a && a>b) || (a=b && a>a) ||(a=a && a=b)

Wp(S2,O) :(b=a && b>b) || (b=b && b>a) ||(b=a && b=b)



Exercise

- Derive the weakest precondition for finding the largest of 3 numbers.
- Write the appropriate output conditions
- Check both the forms in AltErgo

B && wp(S1, O) || not(B) && wp(S2, O)

(B ==>wp(S1, O)) && (not(B) ==> wp(S2, O))