Turning on/off 9 lamps using 6 switches

Problem Statement: Draw a ladder logic diagram to control the output as per the given logic. Make use of start and stop push buttons, 6 switches to turn on and off the 9 lamps.

START PUSH BUTTON		
SWITCH 1	-	L1, L2, L3 ON
SWITCH 2		L4, L5, L6 ON
SWITCH 3		L7, L8, L9 <mark>ON</mark>
SWITCH 4		L1, L5, L9 OFF
SWITCH 5	-	L3, L4, L8 OFF
SWITCH 6	-	L2, L6, L7 OFF
STOP BUTTON	-	ALL STOP

Figure 1. Assignments of buttons and switches

	Class	Label Name	Data Type
1	VAR	push_1	Bit
2	VAR	push_2	Bit
3	VAR	isON	Bit
4	VAR	stop_1	Bit
5	VAR	start_1	Bit
6	VAR	switch_1	Bit
7	VAR	lamp_1	Bit
8	VAR	lamp_2	Bit
9	VAR	lamp_3	Bit
10	VAR	lamp_4	Bit
11	VAR	lamp_5	Bit
12	VAR	lamp_6	Bit
13	VAR	lamp_7	Bit
14	VAR	lamp_8	Bit
15	VAR	lamp_9	Bit
16	VAR	switch_2	Bit
17	VAR	switch_3	Bit
18	VAR	switch_4	Bit
19	VAR	switch_5	Bit
20	VAR	switch_6	Bit

Figure 2. Local labels

```
start_1
                    stop_1
                                                                                                                                 (isON
( 0)
          isON
          11
                   switch_1
                                                    switch_4
         start_1
                                          stop_1
(8)
                                            11
                                                       11
                                                                                                                                 _(lamp_1
        lamp_1
         start_1
                   switch_1
                                          stop_1
                                                    switch_6
( 20)
                                            11
                                                                                                                                 -(lamp_2
                                                       11
        lamp_2
         start_1
                   switch_1
                                          stop_1
                                                     switch_5
                                                       11
( 32)
                                            11
                                                                                                                                 -(lamp_3
        lamp_3
                   switch_2
                                                    switch_5
         start_1
                                          stop_1
( 44)
                                                                                                                                 _(lamp_4
                                                       #
        lamp_4
          +
                   switch_2
                                                    switch_4
         start_1
                                          stop_1
( 56)
                                                                                                                                 -(lamp_5
                                                       1
        lamp_5
         \dashv \vdash
                   switch_2
                                                    switch_6
         start_1
                                          stop_1
(68)
         \dashv\vdash
                                                       1
                                                                                                                                 -(lamp_6
        lamp_6
         start_1
                   switch_3
                                          stop_1
                                                     switch_6
(80)
                                                                                                                                 _(lamp_7
         \dashv \vdash
        lamp_7
                                                     switch_5
                   switch_3
                                          stop_1
( 92)
                                                                                                                                 -(lamp_8
          - | |-
                                            H
                                                       1
        lamp_8
          \dashv \vdash
                                                    switch_4
                   switch_3
                                          stop_1
( 104)
          +
                                            ℋ
                                                       ₩
                                                                                                                                 _(lamp_9
        lamp_9
          +
(116)
                                                                                                                                 END
```

Figure 3. Ladder logic diagram