26/03/20

Compilers tutorial-6

B_1

1.) i = m-1
2.) j = n
3.) $t_1 = 4*n$
4.) v = a[t_1]

B_2

5.) i = i+1
6.) $t_2 = 4*i$
7.) $t_3 = a[t_2]$
8.) if t_3 < v goto 5 (B_2)

B_3

9.) j = j-1
10.) $t_4 = 4*j$
11.) $t_5 = a[t_4]$
12.) if t_5 > v goto 9 (B_3)

B_4

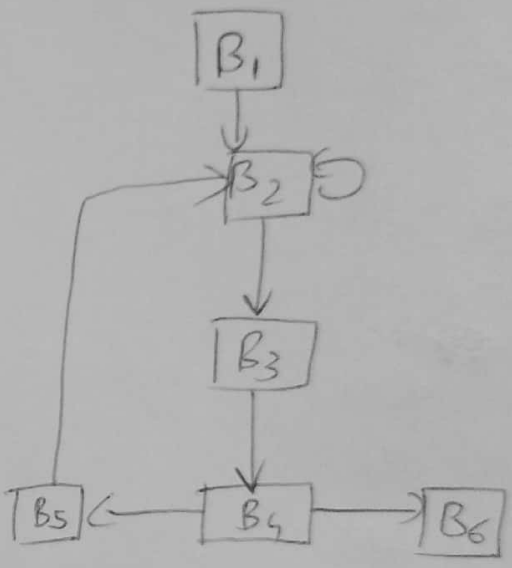
13.) if i >= j goto 23 (B_6)

B_5

14.) $t_6 = 4*i$
15.) x = a[t_6]
16.) $t_7 = 4*i$
17.) $t_8 = 4*j$
18.) $t_9 = a[t_8]$
19.) $a[t_7] = t_9$
20.) $t_{10} = 4*j$
21.) $a[t_{10}] = x$
22.) goto 5 (B_2)

B_6

23.) $t_{11} = 4*i$
24.) x = a[t_{11}]
25.) $t_{12} = 4*i$
26.) $t_{13} = 4*n$
27.) $t_{14} = a[t_{13}]$
28.) $a[t_{12}] = t_{14}$
29.) $t_{15} = 4*n$
30.) $a[t_{15}] = x$



M. Rabbath

local common subexpression elimination

B_5

$t_6 = 4 \times i$

$t = a[t_6]$

$t_7 = t_6$

$t_8 = 4 \times j$

$t_9 = a[t_8]$

$a[t_7] = t_9$

$t_{10} = t_8$

$a[t_{10}] = t$

goto B_2

B_6

$t_{12} = 4 * i$

$t = a[t_{11}]$

$t_{12} = t_{11}$

$t_{13} = 4 * n$

$t_{14} = a[t_{13}]$

$a[t_{12}] = t_{14}$

$t_{15} = t_{13}$

$a[t_{15}] = t$

Copy Propagation for $t_7, t_{10}, t_{12}, t_{15}$

$t_6 = 4 * i$

$t = a[t_6]$

$t_7 = t_6$

$t_8 = 4 * j$

$t_9 = a[t_8]$

$a[t_6] = t_9$

$t_{10} = t_8$

$a[t_8] = t$

goto B_2

$t_{11} = 4 * i$

$t = a[t_{11}]$

$t_{12} = t_{11}$

$t_{13} = 4 * n$

$t_{14} = a[t_{13}]$

$a[t_{11}] = t_{14}$

$t_{15} = t_{13}$

$a[t_{13}] = t$

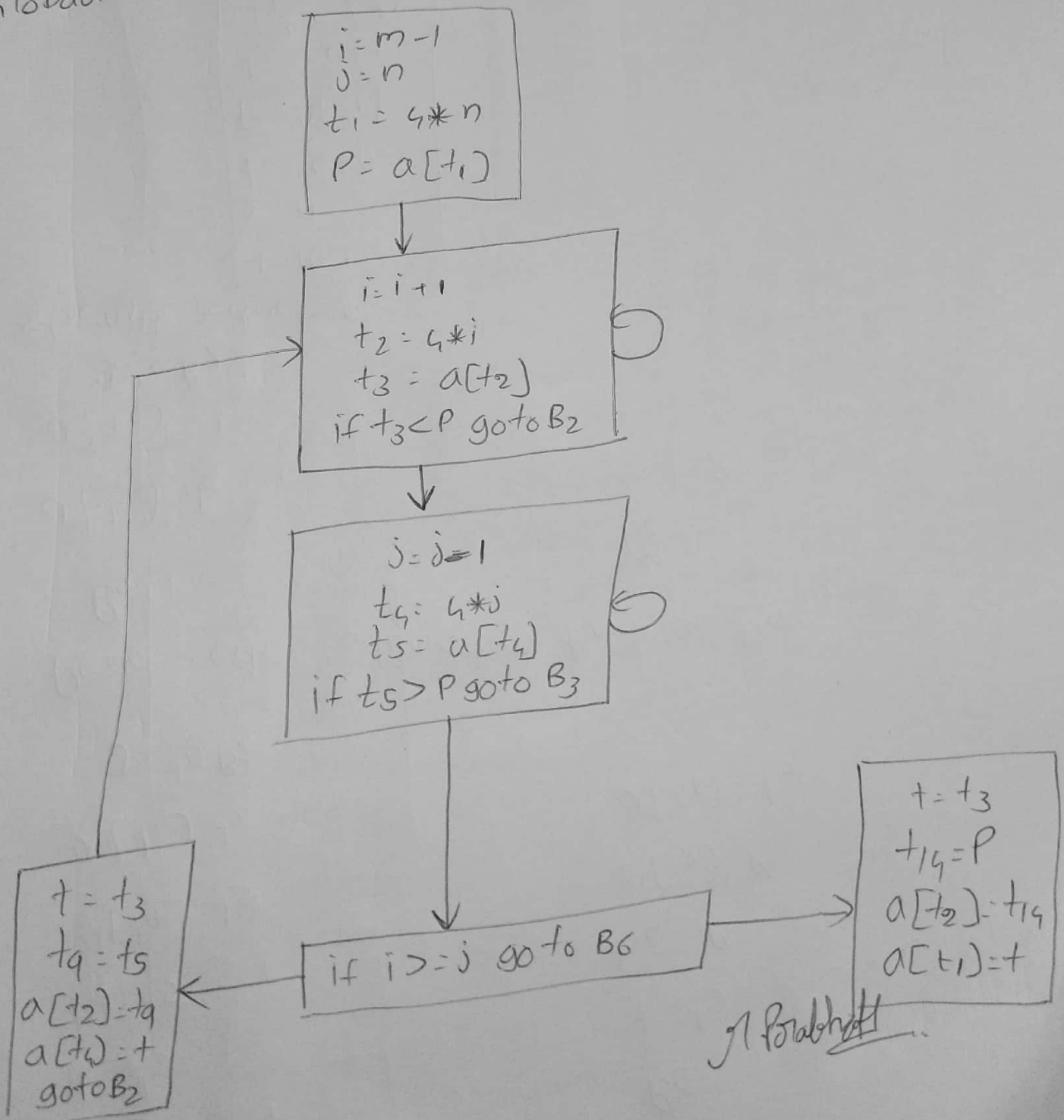
M. Prabhat

Dead code elimination for $t_7, t_{10}, t_{12}, t_{15}$

$t_6 = 4 \times i$
$t = a[t_6]$
$t_8 = 4 * j$
$t_9 = a[t_8]$
$a[t_6] = t_9$
$a[t_8] = t$
goto B_2

$t_{11} = 4 * i$
$t = a[t_{11}]$
$t_{13} = 4 \times n$
$t_{14} = a[t_{13}]$
$a[t_{12}] = t_{10}$
$a[t_{13}] = t$

Global common subexpression elimination :-



Scanned with CamScanner

Copy Propagation on t_2, t_4, t_{14}

B_5

$t = t_3$

$t_4 = t_5$

$a[t_2] = t_5$

$a[t_4] = t$

go to B_2

B_6

$t = t_3$

$t_{14} = P$

$a[t_2] = P$

$a[t_1] = t_3$

Dead code elimination t, t_{10}, t_{14}

B_5

$a[t_2] = t_5$

$a[t_4] = t_3$

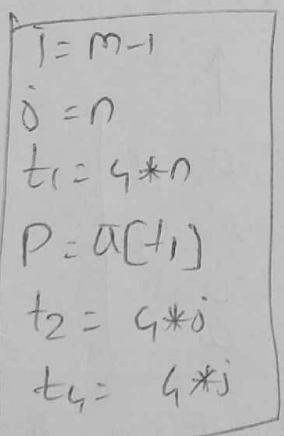
go to B_2

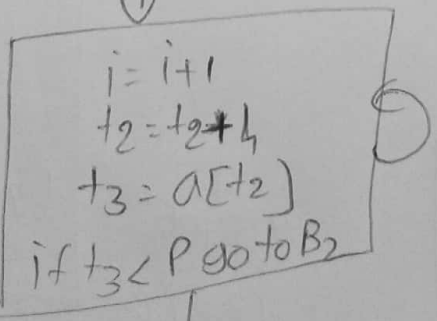
B_6

$a[t_2] = P$

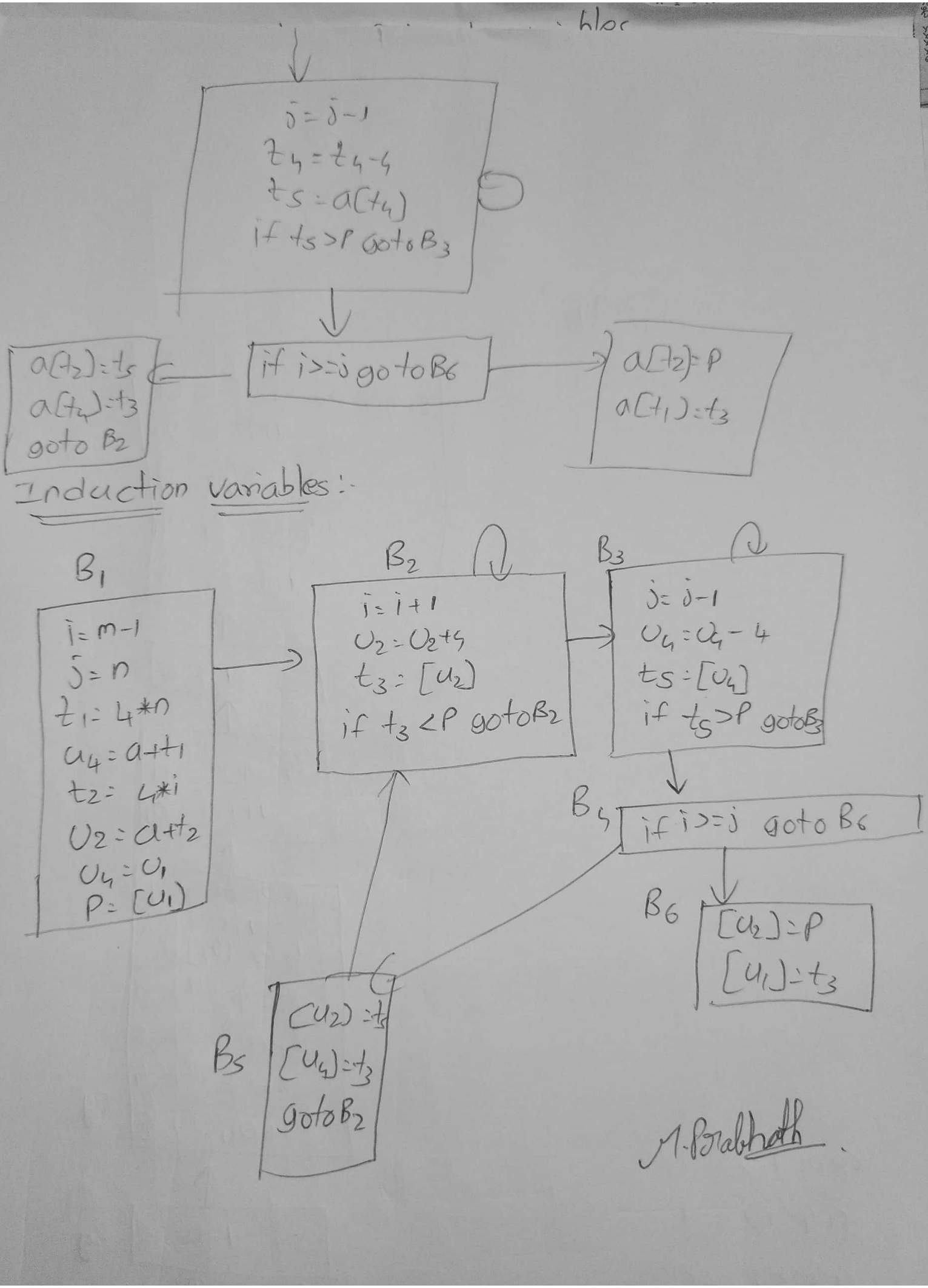
$a[t_1] = t_3$

Strength reduction

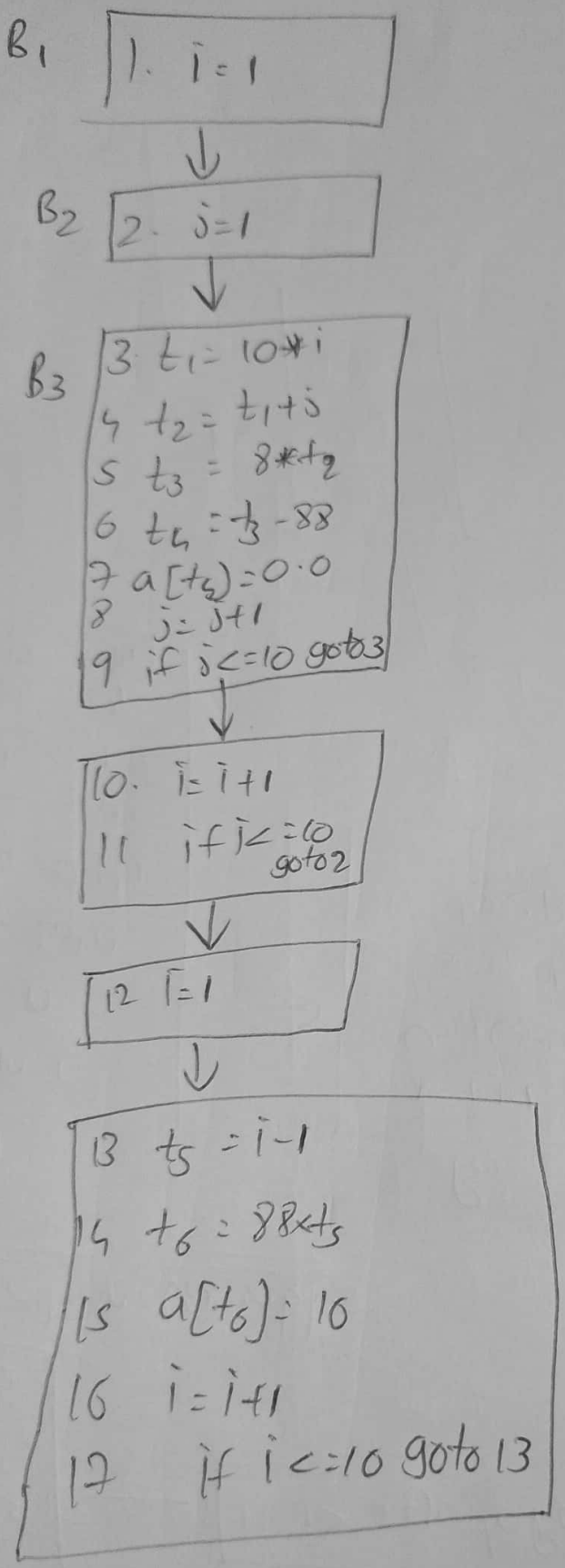




J. Brabhath



2-)



Induction variables

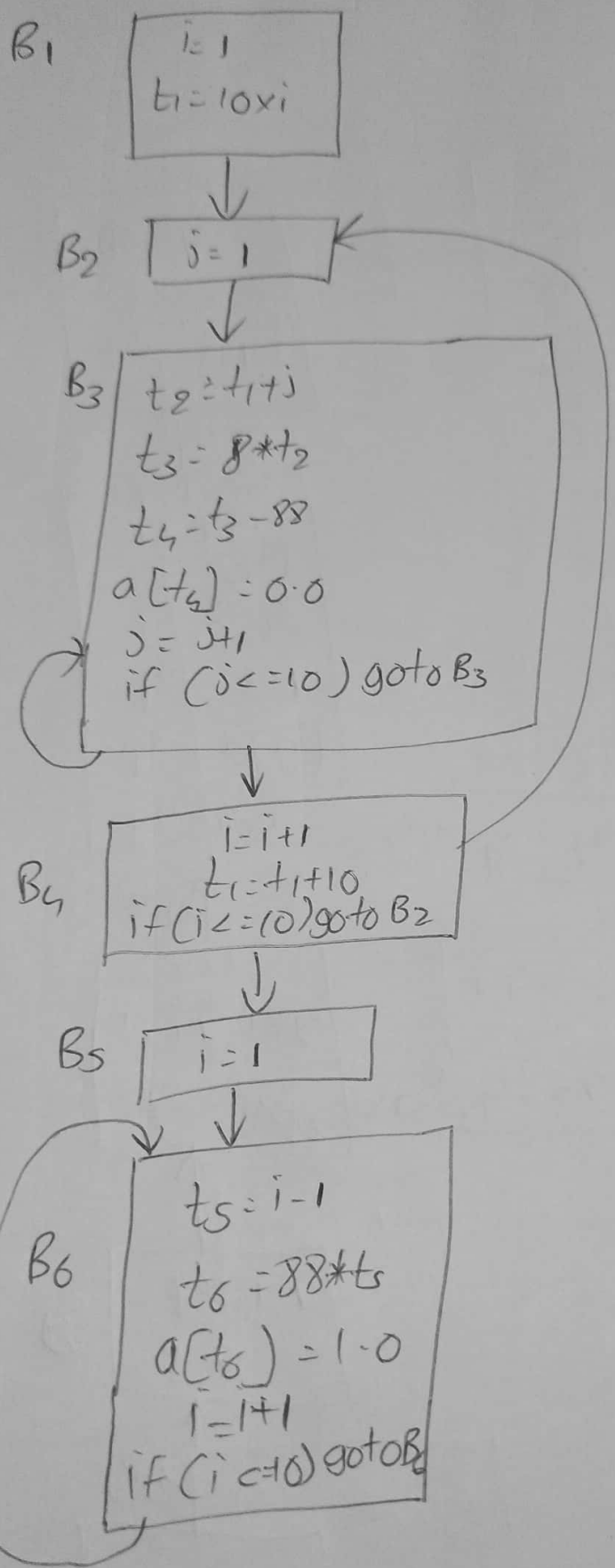
$j \rightarrow (j, 1, 1)$

$i \rightarrow (i, 1, 1)$

$t_1 \rightarrow (i, 10, 0)$

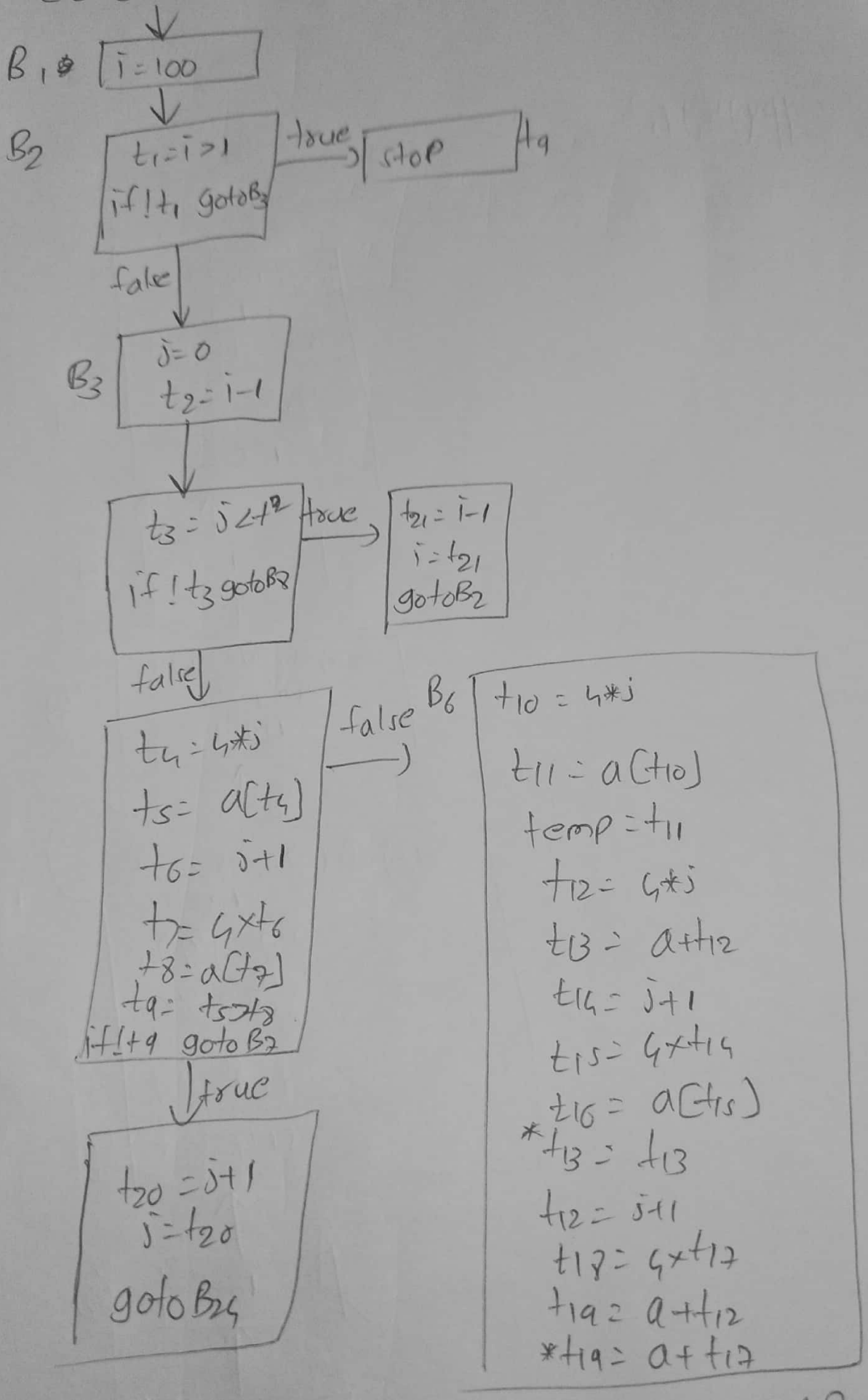
M. Prabhat.

After eliminating Induced variables



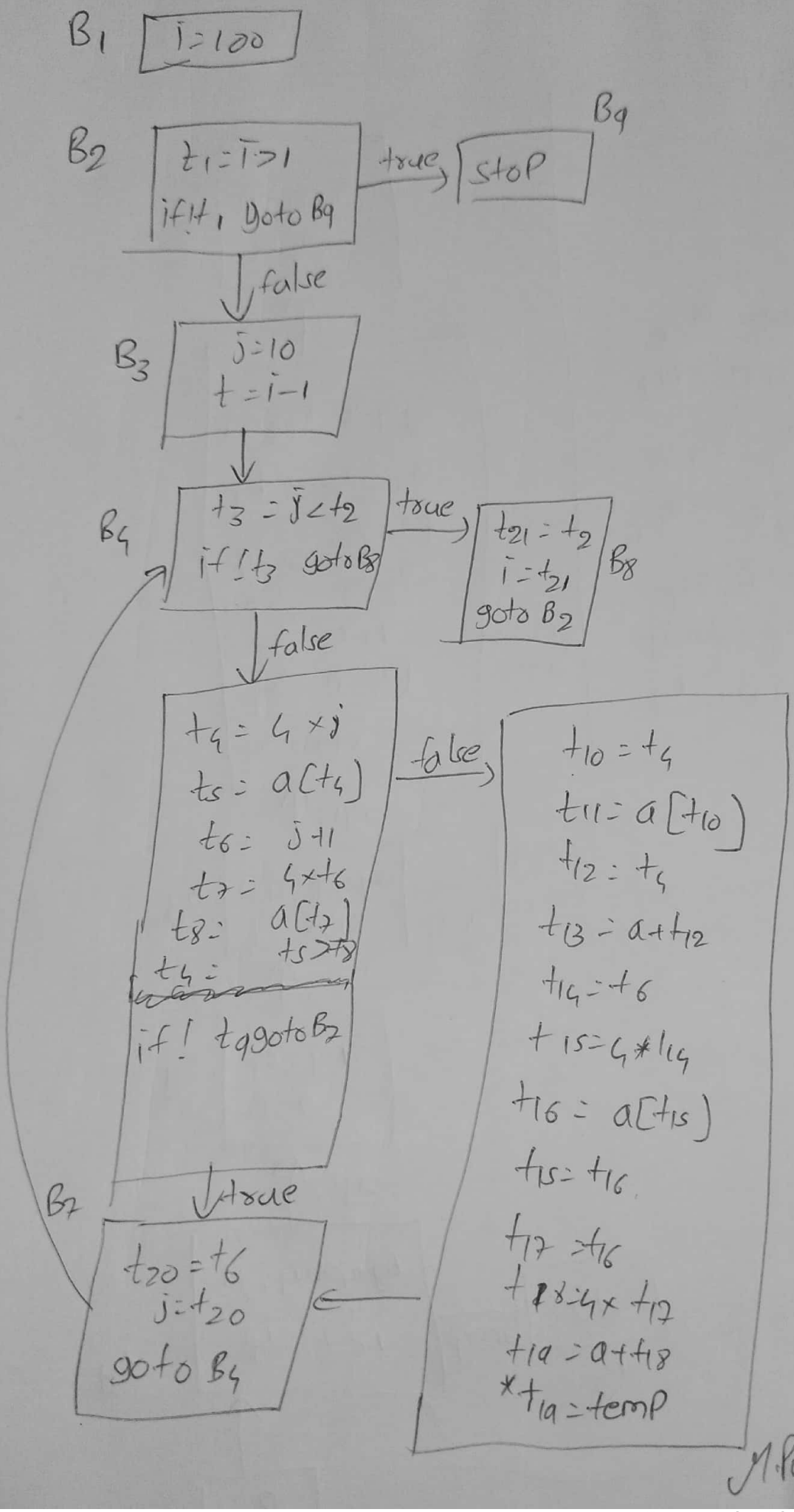
M. Poralchath

3-) Code-3



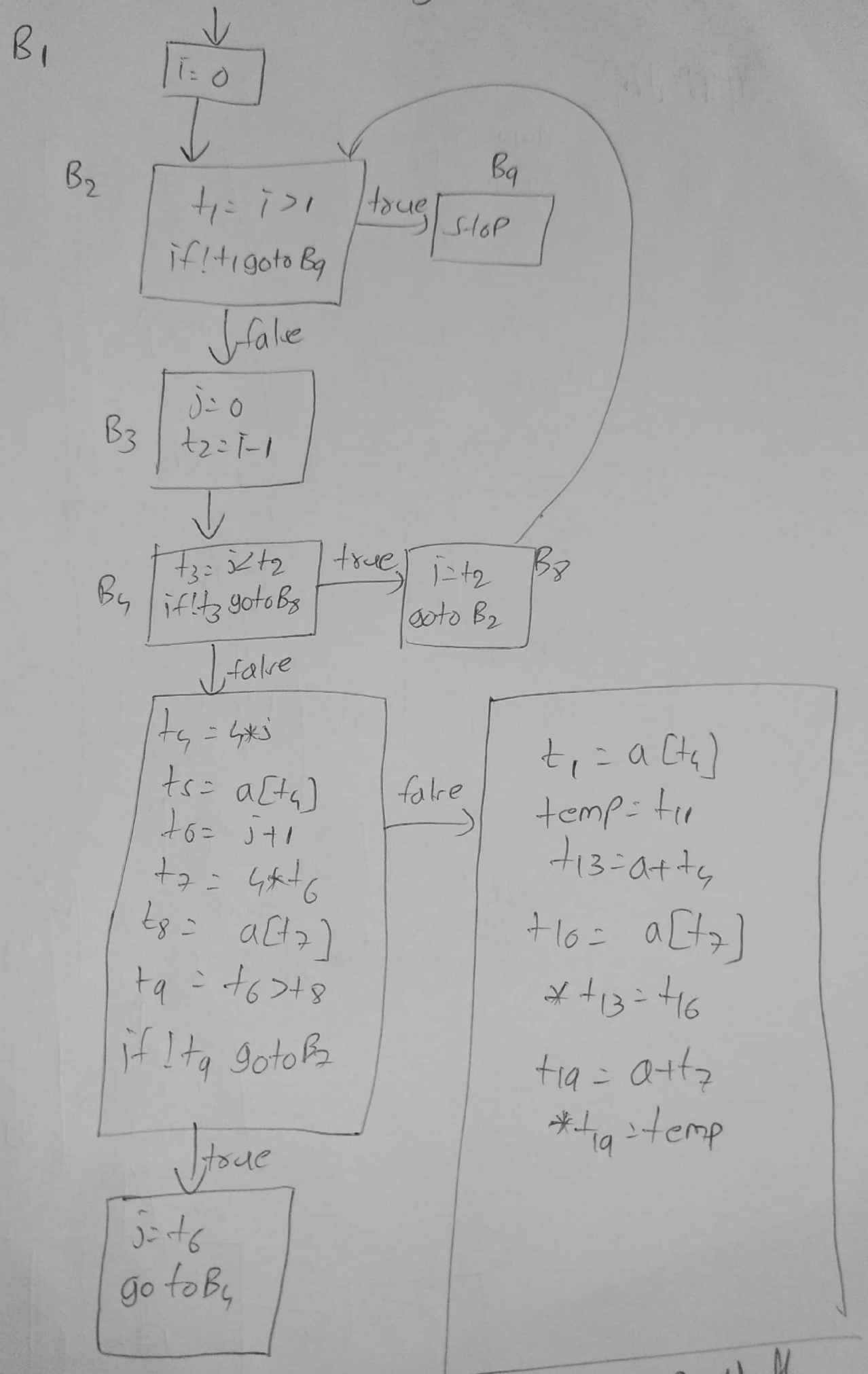
M. Poralchatt.

Global common sub-exp elimination



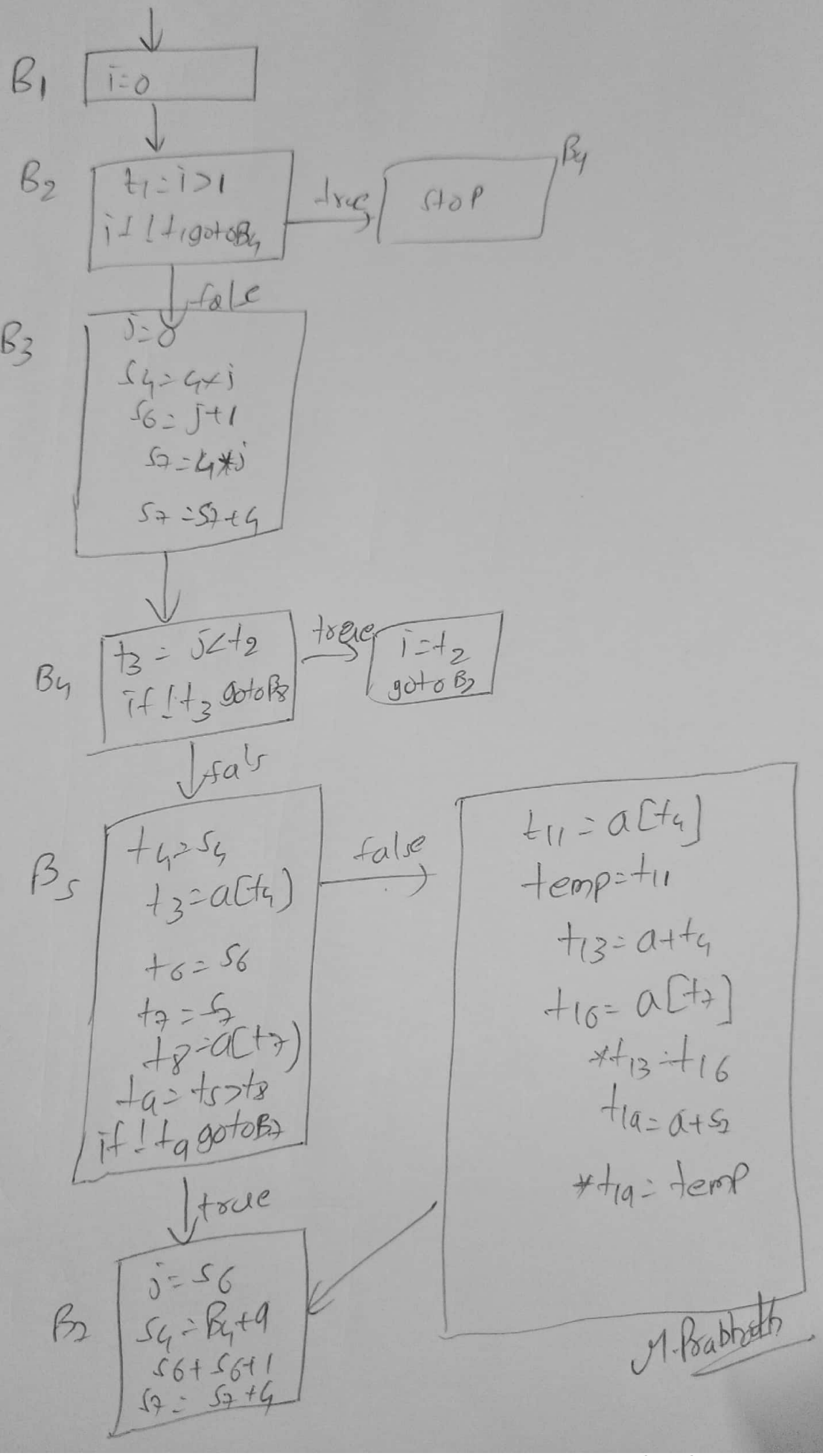
M. Pavalavath

GCSE and copy Propagation



M Prabhath.

I-V detection and C.S.E triplets for I.V. (Induction variables)



M. Prabhath