

Created test file:

00108213
00208313
006202B3
00532023
00118193
00032383
00138393
00420863
00000033
00000033
00000033
00138393
00c000EF
00000033
00000033
01000437
00001497
05040567
00000033
00000033
00138393
00120213
00229293
00732223
006301B3
00432583
00000073
00000000
00000000
00000000
00000000
00000000

Assembly:

addi x4,x1,1	# x4=1
addi x6,x1,2	# x6=2
add x5,x4,x6	# WX + MX bypass
sw x5,0(x6)	# WM bypass
addi x3,x3,1	# x3=1
lw x7,0(x6)	# LD use
addi x7,x7,1	# stall + WX bypass
beq x4,x4,A	# flush 2 cycles
add x0,x0,x0	# --- skipped ---
add x0,x0,x0	# --- skipped ---
add x0,x0,x0	# --- skipped ---
A: addi x7,x7,1	# x7=5
jal B	# jump to B, x1=pc+4=0x01000034
add x0,x0,x0	# --- skipped ---
add x0,x0,x0	# --- skipped ---
B: lui, x8,0x01000	# x8=0x01000000
auipc x9,0x00001	# x9=pc+0x00001000=0x01001040
jalr x10,x8,0x4C	# jump to C, x10=pc+4=0x01000048
add x0,x0,x0	# --- skipped ---
add x0,x0,x0	# --- skipped ---
C: addi x7,x7,1	# x7=6
addi x4,x4,1	# x4=2
slli x5,x5,2	# x5=C
sw x7,4(x6)	# WD stall
add x3,x6,x6	# x3=4
lw x11,4(x6)	# x11=6
ecall	# exit

Final State:

x1 = 0x01000034
x2 = 0x01100000
x3 = 4
x4 = 2
x5 = C
x6 = 2
x7 = 6
x8 = 0x01000000
x9 = 0x01001040
x10 = 0x01000048
x11 = 6

Output:

[PD4] REGISTER FILE ON START:

[0] 00000000
[1] 00000000
[2] 01100000
[3] 00000000
[4] 00000000
[5] 00000000
[6] 00000000
[7] 00000000
[8] 00000000
[9] 00000000
[10] 00000000
[11] 00000000
[12] 00000000
[13] 00000000
[14] 00000000
[15] 00000000
[16] 00000000
[17] 00000000
[18] 00000000
[19] 00000000
[20] 00000000
[21] 00000000
[22] 00000000
[23] 00000000
[24] 00000000
[25] 00000000
[26] 00000000
[27] 00000000
[28] 00000000
[29] 00000000
[30] 00000000
[31] 00000000

[PD4] RUNNING TEST:

[PD4] LINE 1

[F] 01000000 00108213

[D] 01000000 00 00 00 00 0 00 00000000 00

[R] 00 00 00 00000000 00000000 0

[E] 01000000 00000000 00000000 0

[M] 01000000 00000000 0 3 00000000

[W] 01000000 0 00 00000000

[PD4] LINE 2

[F] 01000004 00208313

[D] 01000004 13 04 01 00 0 00 00000001 00
[R] 01 00 00 00000000 00000000 0
[E] 01000004 00000000 00000000 0
[M] 01000004 00000000 0 3 00000000
[W] 01000004 0 00 00000000

[PD4] LINE 3
[F] 01000008 006202b3
[D] 01000008 13 06 01 00 0 00 00000002 00
[R] 01 00 00 00000000 00000000 0
[E] 01000008 00000001 00000001 0
[M] 01000008 00000000 0 3 00000000
[W] 01000008 0 00 00000000

[PD4] LINE 4
[F] 0100000c 00532023
[D] 0100000c 33 05 04 06 0 00 00000000 00
[R] 04 06 00 00000000 00000000 0
[E] 0100000c 00000002 00000002 0
[M] 0100000c 00000001 0 3 00000000
[W] 0100000c 0 00 00000000

[PD4] LINE 5
[F] 01000010 00118193
[D] 01000010 23 00 06 05 2 00 00000000 00
[R] 06 05 04 00000000 00000000 1
[E] 01000010 00000003 00000003 0
[M] 01000010 00000002 0 3 00000000
[W] 01000010 1 04 00000001

[PD4] LINE 6
[F] 01000014 00032383
[D] 01000014 13 03 03 00 0 00 00000001 00
[R] 03 00 06 00000000 00000000 1
[E] 01000014 00000002 00000002 0
[M] 01000014 00000003 0 3 00000000
[W] 01000014 1 06 00000002

[PD4] LINE 7
[F] 01000018 00138393
[D] 01000018 03 07 06 00 2 00 00000000 00
[R] 06 00 05 00000002 00000000 1
[E] 01000018 00000001 00000001 0
[M] 01000018 00000002 1 2 00000003
[W] 01000018 1 05 00000003

[PD4] LINE 8
[F] 0100001c 00420863
[D] 0100001c 00 00 00 00 0 00 00000000 00

[R] 00 00 00 00000000 00000000 0
[E] 0100001c 00000002 00000002 0
[M] 0100001c 00000001 0 3 00000000
[W] 0100001c 0 00 00000000

[PD4] LINE 9
[F] 0100001c 00420863
[D] 0100001c 13 07 07 00 0 00 00000001 00
[R] 07 00 03 00000000 00000000 1
[E] 0100001c 00000000 00000000 0
[M] 0100001c 00000002 0 2 00000000
[W] 0100001c 1 03 00000001

[PD4] LINE 10
[F] 01000020 00000033
[D] 01000020 63 00 04 04 0 00 00000010 00
[R] 04 04 07 00000001 00000001 1
[E] 01000020 00000004 00000004 0
[M] 01000020 00000000 0 3 00000000
[W] 01000020 1 07 00000003

[PD4] LINE 11
[F] 01000024 00000033
[D] 01000024 33 00 00 00 0 00 00000000 00
[R] 00 00 00 00000000 00000000 0
[E] 01000024 0100002c 0100002c 1
[M] 01000024 00000004 0 3 00000000
[W] 01000024 0 00 00000000

[PD4] LINE 12
[F] 0100002c 00138393
[D] 0100002c 33 00 00 00 0 00 00000000 00
[R] 00 00 07 00000000 00000000 1
[E] 0100002c 00000000 00000000 0
[M] 0100002c 0100002c 0 3 00000001
[W] 0100002c 1 07 00000004

[PD4] LINE 13
[F] 01000030 00c000ef
[D] 01000030 13 07 07 00 0 00 00000001 00
[R] 07 00 00 00000004 00000000 0
[E] 01000030 00000000 00000000 0
[M] 01000030 00000000 0 3 00000000
[W] 01000030 0 00 00000000

[PD4] LINE 14
[F] 01000034 00000033
[D] 01000034 6f 01 00 00 0 00 0000000c 00
[R] 00 00 00 00000000 00000000 0

[E] 01000034 00000005 00000005 0
[M] 01000034 00000000 0 3 00000000
[W] 01000034 0 00 00000000

[PD4] LINE 15
[F] 01000038 00000033
[D] 01000038 33 00 00 00 0 00 00000000 00
[R] 00 00 00 00000000 00000000 0
[E] 01000038 0100003c 0100003c 1
[M] 01000038 00000005 0 3 00000000
[W] 01000038 0 00 00000000

[PD4] LINE 16
[F] 0100003c 01000437
[D] 0100003c 33 00 00 00 0 00 00000000 00
[R] 00 00 07 00000000 00000000 1
[E] 0100003c 00000000 00000000 0
[M] 0100003c 0100003c 0 3 00000000
[W] 0100003c 1 07 00000005

[PD4] LINE 17
[F] 01000040 00001497
[D] 01000040 37 08 00 00 0 00 01000000 00
[R] 00 00 01 00000000 00000000 1
[E] 01000040 00000000 00000000 0
[M] 01000040 00000000 0 3 00000000
[W] 01000040 1 01 01000034

[PD4] LINE 18
[F] 01000044 05040567
[D] 01000044 17 09 00 00 0 00 00001000 00
[R] 00 00 00 00000000 00000000 0
[E] 01000044 01000000 01000000 0
[M] 01000044 00000000 0 3 00000000
[W] 01000044 0 00 00000000

[PD4] LINE 19
[F] 01000048 00000033
[D] 01000048 67 0a 08 00 0 00 00000050 00
[R] 08 00 00 00000000 00000000 0
[E] 01000048 01001040 01001040 0
[M] 01000048 01000000 0 3 00000000
[W] 01000048 0 00 00000000

[PD4] LINE 20
[F] 0100004c 00000033
[D] 0100004c 33 00 00 00 0 00 00000000 00
[R] 00 00 08 00000000 00000000 1
[E] 0100004c 01000050 01000050 1

[M] 0100004c 01001040 0 3 00000000
[W] 0100004c 1 08 01000000

[PD4] LINE 21
[F] 01000050 00138393
[D] 01000050 33 00 00 00 0 00 00000000 00
[R] 00 00 09 00000000 00000000 1
[E] 01000050 00000000 00000000 0
[M] 01000050 01000050 0 3 00000000
[W] 01000050 1 09 01001040

[PD4] LINE 22
[F] 01000054 00120213
[D] 01000054 13 07 07 00 0 00 00000001 00
[R] 07 00 0a 00000005 00000000 1
[E] 01000054 00000000 00000000 0
[M] 01000054 00000000 0 3 00000000
[W] 01000054 1 0a 01000048

[PD4] LINE 23
[F] 01000058 00229293
[D] 01000058 13 04 04 00 0 00 00000001 00
[R] 04 00 00 00000001 00000000 0
[E] 01000058 00000006 00000006 0
[M] 01000058 00000000 0 3 00000000
[W] 01000058 0 00 00000000

[PD4] LINE 24
[F] 0100005c 00732223
[D] 0100005c 13 05 05 00 1 00 00000002 02
[R] 05 00 00 00000003 00000000 0
[E] 0100005c 00000002 00000002 0
[M] 0100005c 00000006 0 3 00000000
[W] 0100005c 0 00 00000000

[PD4] LINE 25
[F] 01000060 006301b3
[D] 01000060 00 00 00 00 0 00 00000000 00
[R] 00 00 07 00000000 00000000 1
[E] 01000060 0000000c 0000000c 0
[M] 01000060 00000002 0 3 00000000
[W] 01000060 1 07 00000006

[PD4] LINE 26
[F] 01000060 006301b3
[D] 01000060 23 00 06 07 2 00 00000004 00
[R] 06 07 04 00000002 00000006 1
[E] 01000060 00000000 00000000 0
[M] 01000060 0000000c 0 3 00000000

[W] 01000060 1 04 00000002

[PD4] LINE 27

[F] 01000064 00432583

[D] 01000064 33 03 06 06 0 00 00000000 00

[R] 06 06 05 00000002 00000002 1

[E] 01000064 00000006 00000006 0

[M] 01000064 00000000 0 3 00000000

[W] 01000064 1 05 0000000c

[PD4] LINE 28

[F] 01000068 00000073

[D] 01000068 03 0b 06 00 2 00 00000004 00

[R] 06 00 00 00000002 00000000 0

[E] 01000068 00000004 00000004 0

[M] 01000068 00000006 1 2 00000006

[W] 01000068 0 00 00000000

[PD4] LINE 29

[F] 0100006c 00000000

[D] 0100006c 73 00 00 00 0 00 00000000 00

[R] 00 00 00 00000000 00000000 0

[E] 0100006c 00000006 00000006 0

[M] 0100006c 00000004 0 3 00000002

[W] 0100006c 0 00 00000000

[PD4] LINE 30

[F] 01000070 00000000

[D] 01000070 00 00 00 00 0 00 00000000 00

[R] 00 00 03 00000000 00000000 1

[E] 01000070 00000000 00000000 0

[M] 01000070 00000006 0 2 00000000

[W] 01000070 1 03 00000004

[PD4] LINE 31

[F] 01000074 00000000

[D] 01000074 00 00 00 00 0 00 00000000 00

[R] 00 00 0b 00000000 00000000 1

[E] 01000074 00000000 00000000 0

[M] 01000074 00000000 0 3 00000000

[W] 01000074 1 0b 00000006

[PD4] LINE 32

[F] 01000078 00000000

[D] 01000078 00 00 00 00 0 00 00000000 00

[R] 00 00 00 00000000 00000000 0

[E] 01000078 00000000 00000000 0

[M] 01000078 00000000 0 3 00000000

[W] 01000078 0 00 00000000

[PD4] LINE 33
[F] 0100007c 00000000
[D] 0100007c 00 00 00 00 0 00 00000000 00
[R] 00 00 00 00000000 00000000 0
[E] 0100007c 00000000 00000000 0
[M] 0100007c 00000000 0 3 00000000
[W] 0100007c 0 00 00000000

[PD4] DONE EXECUTING - EXITED WITH ECALL

[PD4] REGISTER FILE:

[0] 00000000
[1] 01000034
[2] 01100000
[3] 00000004
[4] 00000002
[5] 0000000c
[6] 00000002
[7] 00000006
[8] 01000000
[9] 01001040
[10] 01000048
[11] 00000006
[12] 00000000
[13] 00000000
[14] 00000000
[15] 00000000
[16] 00000000
[17] 00000000
[18] 00000000
[19] 00000000
[20] 00000000
[21] 00000000
[22] 00000000
[23] 00000000
[24] 00000000
[25] 00000000
[26] 00000000
[27] 00000000
[28] 00000000
[29] 00000000
[30] 00000000
[31] 00000000

[PD4] DONE