

# PPLS ex1

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- Thread #0 keeps decrementing  $x$  until  $x == y$ , while Thread #1 awaits  $x == y$ .
- When  $x == y == 0$ , thread #1 stops waiting.
- From this point, operations of 2 threads can be interleaved.
- Thread #0 will execute  $y = y + 1;$ , and thread #1 will execute  $x = 8; y = 2;.$ 
  - $y = y + 1;$  can be viewed as 3 atomic operations, i.e. read  $y$ ; add 1 to  $y$ ; write to  $y$ ;
  - $x = 8;$  and  $y = 2;$  are viewed as 2 atomic operations.
- This gives us 10 possible interleaving presented in tables below.
- Results can be one of following cases:
  - $x = 8; y = 3;$
  - $x = 8; y = 1;$
  - $x = 8; y = 2;$

thread #0	thread #1	state x	state y
	$x = 8;$	8	0
	$y = 2;$	8	2
read $y = 2$		8	2
$y + 1 \rightarrow 3$		8	2
write $y = 3$		8	3

thread #0	thread #1	state x	state y
	$x = 8;$	8	0
read $y = 2$		8	0
	$y = 2;$	8	2
$y + 1 \rightarrow 3$		8	2
write $y = 3$		8	1

thread #0	thread #1	state x	state y
	$x = 8;$	8	0
read $y = 2$		8	0
$y + 1 \rightarrow 3$		8	0
	$y = 2;$	8	2
write $y = 3$		8	1

thread #0	thread #1	state x	state y
	$x = 8;$	8	0
read $y = 2$		8	0
$y + 1 \rightarrow 3$		8	0
write $y = 3$		8	1
	$y = 2;$	8	2

thread #0	thread #1	state x	state y
read y = 2		0	0
	x = 8;	8	0
	y = 2;	8	2
y + 1 → 3		8	2
write y = 3		8	1

thread #0	thread #1	state x	state y
read y = 2		0	0
	x = 8;	8	0
y + 1 → 3		8	0
	y = 2;	8	2
write y = 3		8	1

thread #0	thread #1	state x	state y
read y = 2		0	0
	x = 8;	8	0
y + 1 → 3		8	0
write y = 3		8	1
	y = 2;	8	2

thread #0	thread #1	state x	state y
read y = 2		0	0
y + 1 → 3		0	0
	x = 8;	8	0
	y = 2;	8	2
write y = 3		8	1

thread #0	thread #1	state x	state y
read y = 2		0	0
y + 1 → 3		0	0
	x = 8;	8	0
write y = 3		8	1
	y = 2;	8	2

thread #0	thread #1	state x	state y
read y = 2		0	0
y + 1 → 3		0	0
write y = 3		0	1
	x = 8;	8	1
	y = 2;	8	2