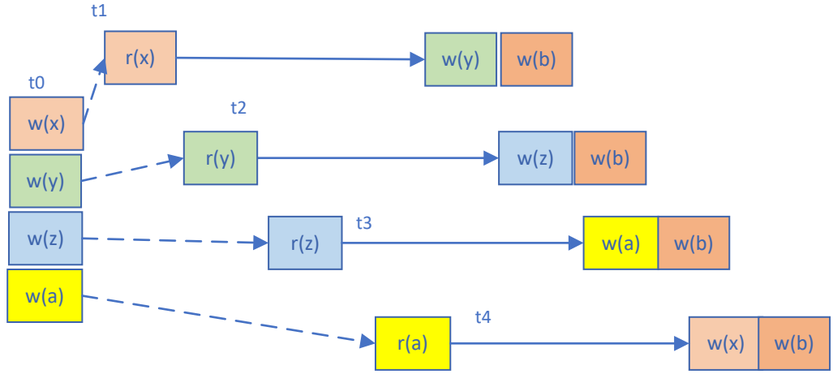
c→commit a→abort+理由になったtx　bd→boundary
r→read flag対象のtx　w→write flag対象のtx

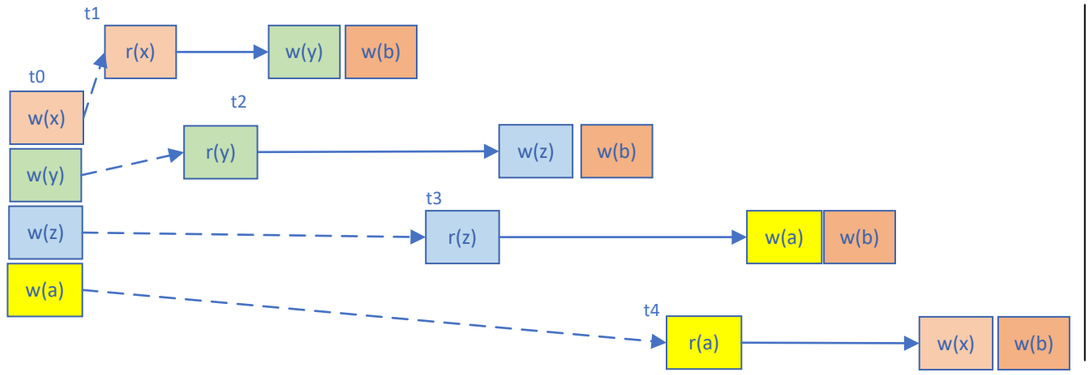


r(b)

write_crown																
cascading_4tx_cycled																
	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	a:t4	OCC	c	OCC	c	LTX	c bd1	OCC	a:t4	OCC	a:t4	LTX	c bd1
t2	OCC	a:t1	OCC	c	OCC	a:t1	LTX	c bd2	OCC	a:t1	OCC	c	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	a:t3	LTX	c bd4	OCC	a:t3	OCC	c	OCC	a:t3	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t3		t3		t1		t4		t3		t2		t4		t3	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	a:t4	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	a bd1 r:t2 w:t1
read b	t1		t3		t4		t2		t3		t4		t1		t1	

ex write_crown.cascading_4tx_cycled.occ2ltx1occ1



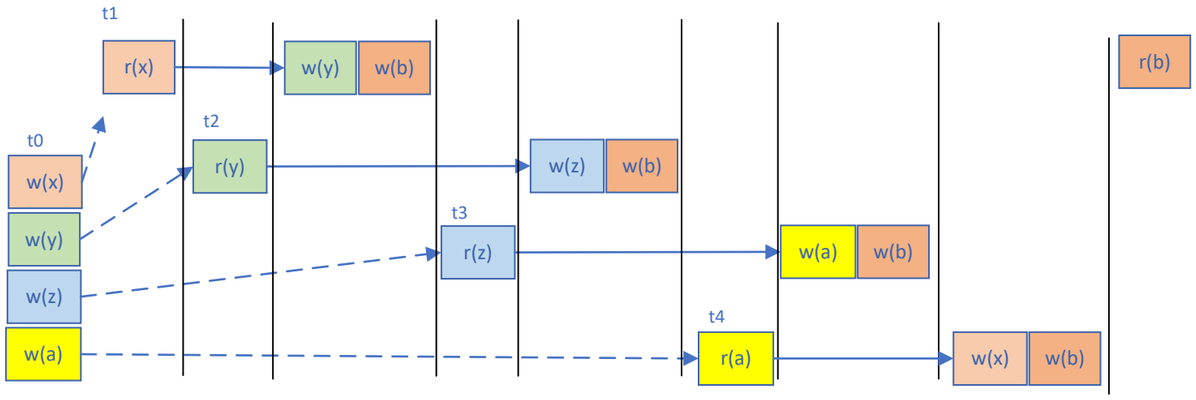
r(b)

write_crown

cascading_3tx_cycled

	occ4		occ3ltx1		occ2ltx1 occc1		occ1ltx1 occc2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	a:t4	OCC	c	OCC	c	LTX	c bd1	OCC	a:t4	OCC	a:t4	LTX	c bd1
t2	OCC	a:t1	OCC	c	OCC	a:t1	LTX	c bd2	OCC	a:t1	OCC	c	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	a:t2	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	a:t3	LTX	c bd4	OCC	a:t3	OCC	c	OCC	a:t3	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t3		t2		t1		t4		t3		t2		t4		t3	

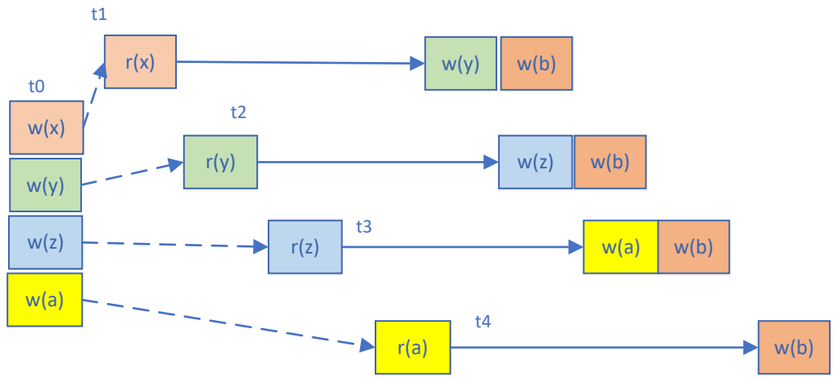
	occ1ltx2 occc1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	a:t4	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	a bd1 r:t2 w:t1
read b	t1		t3		t4		t2		t3		t4		t1		t1	



write_crown																
cascading_3tx_1epoch_per_1ope_cycled																
	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	c	OCC	c	OCC	c	LTX	c bd1	OCC	c	OCC	c	LTX	c bd1
t2	OCC	a:t1	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	a:t3	LTX	c bd:4	OCC	a:t3	OCC	c	OCC	a:t3	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t3		t3		t3		t4		t3		t3		t4		t3	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	c	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	a bd2 r:t3 w:t1	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	a bd1 r:t2 w:t1
read b	t1		t3		t4		t1		t3		t4		t1		t1	

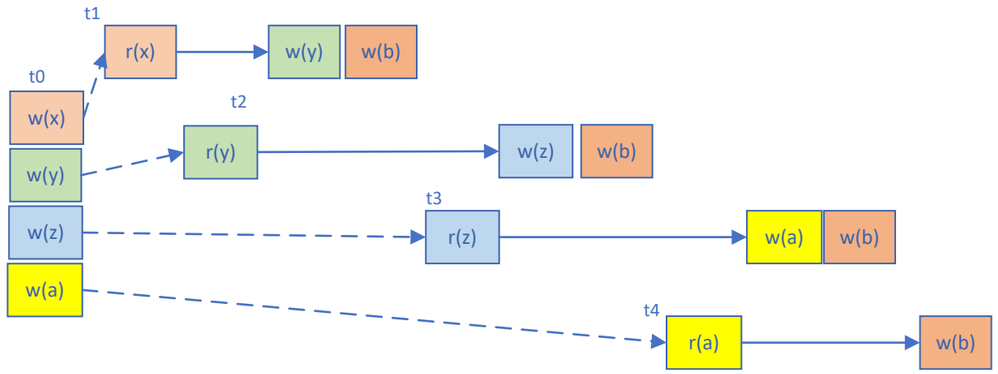
ex write_crown.cascading_3tx_1epoch_per_1ope.occ2ltx1occ1



write_crown																
cascading_4tx_uncylced																
	occ4		occ3ltx1		occ2ltx1 occc1		occ1ltx1 occc2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	c	OCC	c	OCC	c	LTX	c bd1	OCC	c	OCC	c	LTX	c bd1
t2	OCC	a:t1	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	a:t3	LTX	c bd4	OCC	a:t3	OCC	c	OCC	a:t3	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t4		t3		t1		t4		t3		t1		t1		t3	

	occ1ltx2 occc1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	c	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	c bd1 r:t3
read b	t1		t3		t4		t1		t3		t4		t1		t1	

ex write_crown.cascading_4tx_uncycled.occ2ltx1occ1

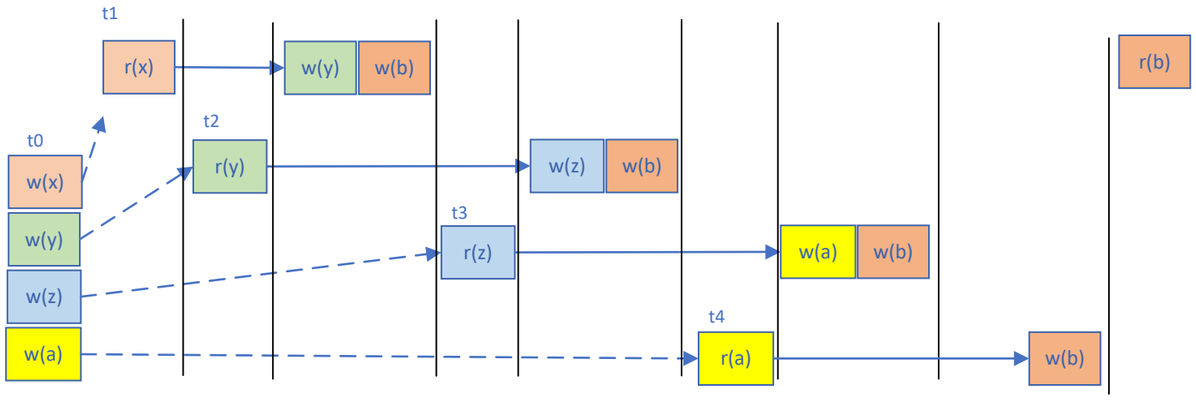


write_crown

cascading_3tx_uncycled

	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	c	OCC	c	OCC	c	LTX	c bd1	OCC	c	OCC	c	LTX	c bd1
t2	OCC	a:t1	OCC	c	OCC	a:t1	LTX	c bd2	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	a:t2	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	a:t3	LTX	c bd4	OCC	a:t3	OCC	c	OCC	a:t3	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t4		t2		t1		t4		t3		t1		t1		t3	

	occ1ltx2 occc1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	c	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	c bd1 r:t3
read b	t1		t3		t4		t1		t3		t4		t1		t1	



write_crown

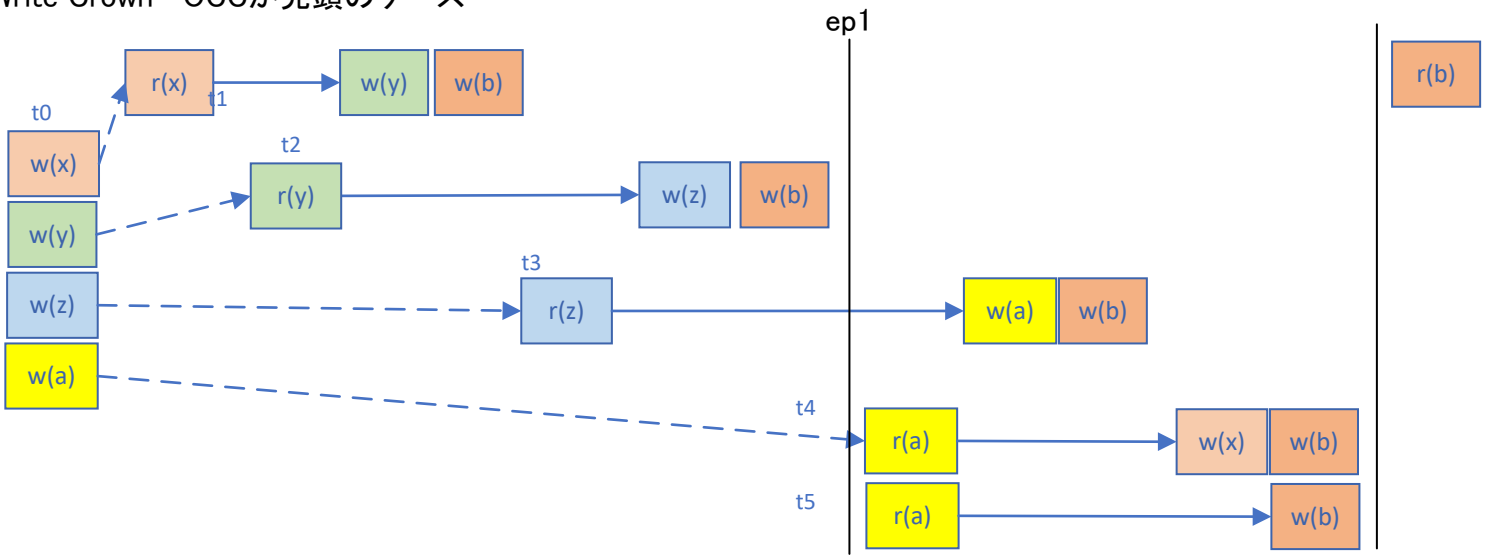
cascading_3tx_1epoch_per_1ope_uncycled

	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	c	OCC	c	OCC	c	LTX	c bd1	OCC	c	OCC	c	LTX	c bd1
t2	OCC	a:t1	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1	OCC	a:t1	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	a:t3	LTX	c bd4	OCC	a:t3	OCC	c	OCC	a:t3	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t3		t3		t3		t4		t3		t3		t4		t3	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	c	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	a bd2 r:t3 w:t1	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	c bd1 r:t3
read b	t1		t3		t4		t1		t3		t4		t1		t1	

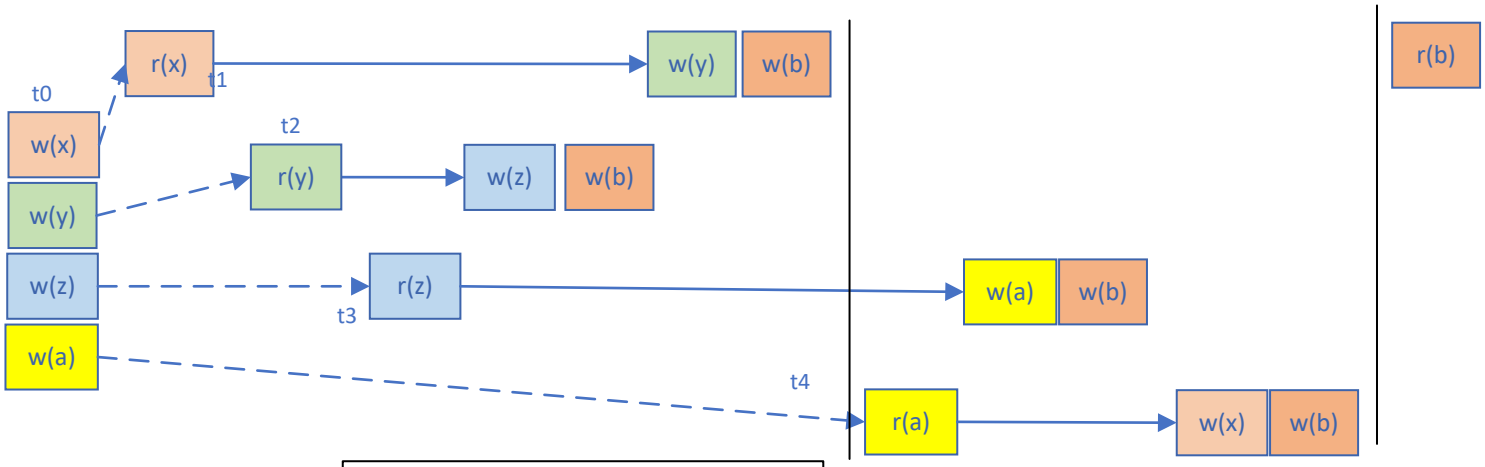
ex write_crown.cascading_all_3tx_1epoch_per_1ope.occ2ltx1occ1

Write Crown　OCCが先頭のケース



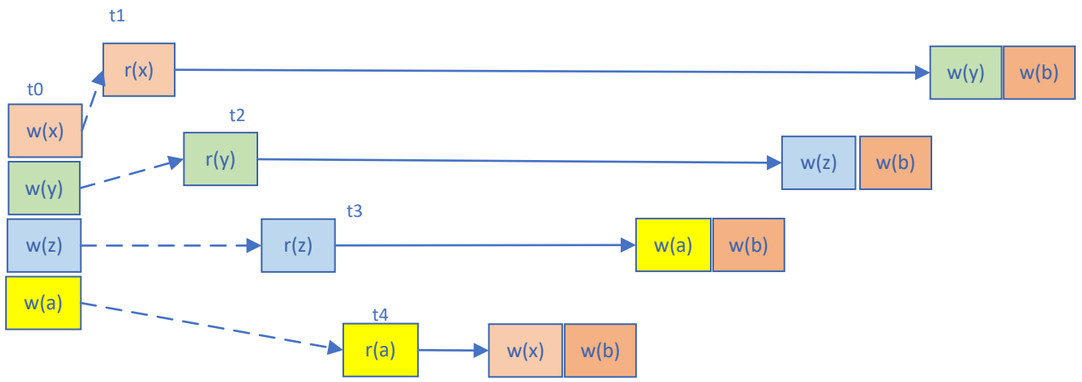
	write_crown	
	start_with_occ_cascading	
t1	OCC	c
t2	LTX	c bd:2
t3	LTX	c bd2 r:t2
t4	LTX	a bd2 r:t3 w:t1
t5	LTX	c bd2 r:t3
read b	t1	

Write Crown　OCCが先頭のケースでオーバーラップする



	write_crown	
	start_with_2occ_overlapped	
t1	OCC	c
t2	OCC	c
t3	LTX	c bd3
t4	LTX	a bd3 r:t3 w:t1
read b	t1	

Write Crown
overlapped_all_4tx_cycled



r(b)

write_crown

overlapped_4tx_cycled

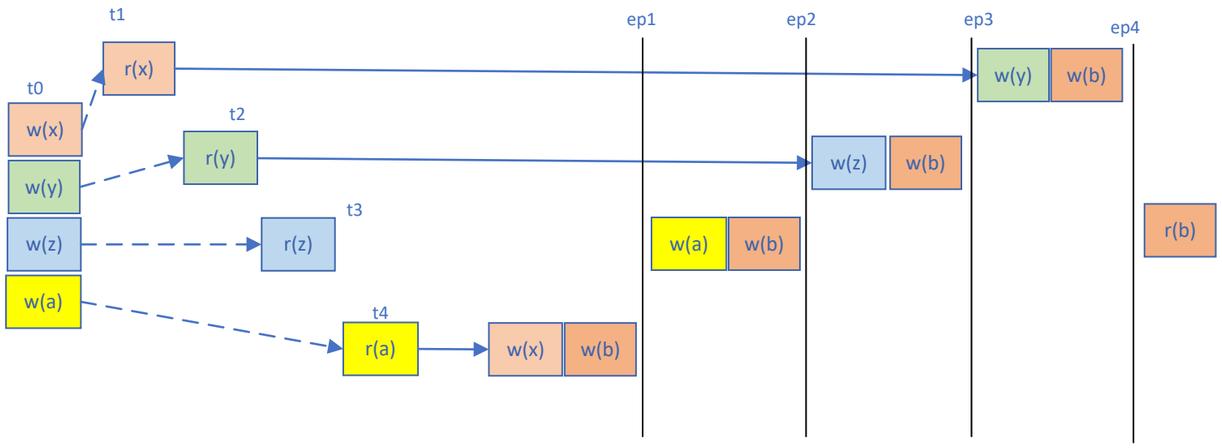
	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	a:t4	OCC	a:t4	OCC	c	OCC	a:t4	LTX	c bd1	OCC	a:t4	OCC	a:t4	LTX	c bd1
t2	OCC	c	OCC	c	OCC	c	LTX	c bd2	OCC	a:t1	OCC	c	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	c	LTX	c bd4	OCC	a:t3	OCC	c	OCC	c	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t2		t2		t1		t4		t3		t2		t4		t3	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	a:t4	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	a bd1 r:t2 w:t1
read b	t1		t3		t4		t2		t3		t4		t1		t1	

on going tx =go
waiting tx = w
waited tx = /w

OCCはできるだけ
early abortさせている

Write Crown overlapped_all_4tx_with_epoch_cycled



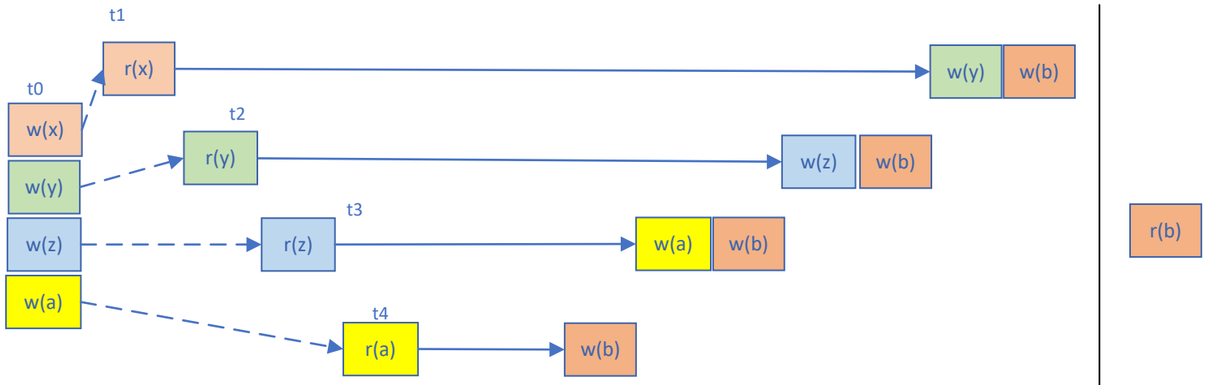
write_crown

overlapped_4tx_with_epoch_cycled

	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	a:t4	OCC	a:t4	OCC	c	OCC	a:t4	LTX	c bd1	OCC	a:t4	OCC	a:t4	LTX	c bd1
t2	OCC	c	OCC	c	OCC	c	LTX	c bd2	OCC	a:t1	OCC	c	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	c	LTX	c bd4	OCC	a:t3	OCC	c	OCC	c	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t2		t2		t1		t4		t3		t2		t4		t3	
ep1	go:t2/t3		go:t2/t3		go:t1/t2/t3		go:t2		go:t1/t3		go:t2/t3		go:t2		go:t1/t3	
	w:NA		w:NA		w:NA		w:NA		w:NA		w:t4		w:NA		w:NA	
	/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:t3		/w:NA		/w:NA	
ep2	go:t2		go:t2		go:t1/t2		go:t2		go:t1		go:t2		go:t2		go:t1	
	w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA	
	/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA	
ep3	go:NA		go:NA		go:t1		go:NA		go:t1		go:NA		go:NA		go:t1	
	w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA	
	/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	a:t4	LTX	c bd1	LTX	c bd1	OCC	a:t4	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	a bd1 r:t2 w:t1
read b	t2		t3		t4		t2		t3		t4		t1		t1	
ep1	go:t2/t3		go:t1/t3		go:t1/t2		go:t2/t3		go:t1/t3		go:t1/t2		go:t1/t2/t3		go:t1/t2/t3	
	w:NA		w:NA		w:NA		w:t4		w:t4		w:NA		w:NA		w:t4	
	/w:NA		/w:NA		/w:NA		/w:t3		/w:t3		/w:NA		/w:NA		/w:t3	
ep2	go:t2		go:t1		go:t1/t2		go:t2		go:t1		go:t1/t2		go:t1/t2		go:t1/t2	
	w:t3		w:NA		w:NA		w:t3/t4		w:NA		w:NA		w:t3		w:t3/t4	
	/w:t2		/w:NA		/w:NA		/w:t3/t2		/w:NA		/w:NA		/w:t2		/w:t2/t3	
ep3	go:NA		go:t1		go:t1		go:NA		go:t1		go:t1		go:t1		go:t1	
	w:NA		w:NA		w:t2		w:NA		w:NA		w:t2		w:t2/t3		w:t2/t3/t4	
	/w:NA		/w:NA		/w:t1		/w:NA		/w:NA		/w:t1		/w:t1/t2		/w:t1/t2/t3	

Write Crown
overlapped_all_4tx



r(b)

write_crown

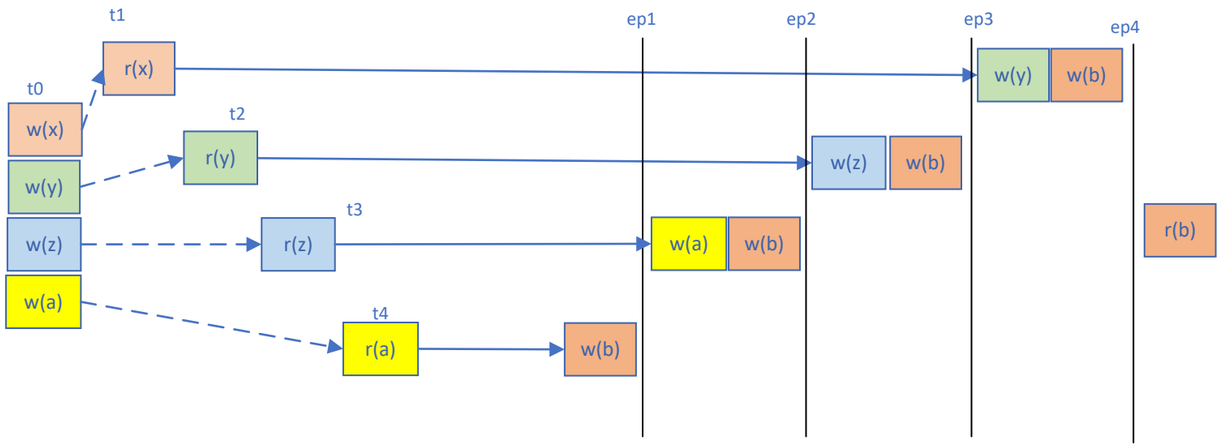
overlapped_4tx_uncycled

	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	c	OCC	c	OCC	c	LTX	c bd1	OCC	c	OCC	a:t4	LTX	c bd1
t2	OCC	c	OCC	c	OCC	c	LTX	c bd2	OCC	a:t1	OCC	c	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	c	LTX	c bd4	OCC	a:t3	OCC	c	OCC	c	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t1		t1		t1		t1		t3		t1		t4		t3	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	c	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	c bd1 r:t2
read b	t1		t3		t4		t1		t3		t4		t1		t1	

on going tx =go
waiting tx = w
waited tx = /w

OCCはできるだけ
early abortさせている



write_crown

overlapped_4tx_with_epoch_uncycled

	occ4		occ3ltx1		occ2ltx1 occ1		occ1ltx1 occ2		ltx1occ3		occ2ltx2		occ1ltx1 occ1ltx1		ltx1occ2ltx1	
t1	OCC	c	OCC	c	OCC	c	OCC	c	LTX	c bd1	OCC	c	OCC	c	LTX	c bd1
t2	OCC	c	OCC	c	OCC	c	LTX	c bd2	OCC	a:t1	OCC	c	LTX	c bd2	OCC	a:t1
t3	OCC	c	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c	LTX	c bd3	OCC	a:t2	OCC	c
t4	OCC	c	LTX	c bd4	OCC	a:t3	OCC	c	OCC	c	LTX	c bd3 r:t3	LTX	c bd4	LTX	c bd4
read b	t1		t1		t1		t1		t3		t1		t1		t3	
ep1	go:t1/t2/t3		go:t1/t2/t3		go:t1/t2/t3		go:t1/t2		go:t1/t3		go:t1/t2/t3		go:t1/t2		go:t1/t3	
	w:NA		w:NA		w:NA		w:NA		w:NA		w:t4		w:NA		w:NA	
	/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:t3		/w:NA		/w:NA	
ep2	go:t1/t2		go:t1/t2		go:t1/t2		go:t1/t2		go:t1		go:t1/t2		go:t1/t2		go:t1	
	w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA	
	/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA	
ep3	go:t1		go:t1		go:t1		go:t1		go:t1		go:t1		go:t1		go:t1	
	w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA		w:NA	
	/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA		/w:NA	

	occ1ltx2 occ1		ltx1occ1 ltx1occ1		ltx2occ2		occ1ltx3		ltx1occ1ltx2		ltx2occ1ltx1		ltx3occ1		ltx4	
t1	OCC	c	LTX	c bd1	LTX	c bd1	OCC	c	LTX	c bd1	LTX	c bd1	LTX	c bd1	LTX	c bd1
t2	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd2	OCC	a:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1	LTX	c bd1 r:t1
t3	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd2 r:t2	LTX	c bd3	OCC	a:t2	LTX	c bd1 r:t2	LTX	c bd1 r:t2
t4	OCC	a:t3	OCC	a:t3	OCC	c	LTX	c bd2 r:t3	LTX	c bd3 r:t3	LTX	c bd4	OCC	a:t3	LTX	c bd1 r:t2
read b	t1		t3		t4		t1		t3		t4		t1		t1	
ep1	go:t1/t2/t3		go:t1/t3		go:t1/t2		go:t1/t2/t3		go:t1/t3		go:t1/t2		go:t1/t2/t3		go:t1/t2/t3	
	w:NA		w:NA		w:NA		w:t4		w:t4		w:NA		w:NA		w:t4	
	/w:NA		/w:NA		/w:NA		/w:t3		/w:t3		/w:NA		/w:NA		/w:t3	
ep2	go:t1/t2		go:t1		go:t1/t2		go:t1/t2		go:t1		go:t1/t2		go:t1/t2		go:t1/t2	
	w:t3		w:NA		w:NA		w:t3/t4		w:NA		w:NA		w:t3		w:t3/t4	
	/w:t2		/w:NA		/w:NA		/w:t2/t3		/w:NA		/w:NA		/w:t2		/w:t2/t3	
ep3	go:t1		go:t1		go:t1		go:t1		go:t1		go:t1		go:t1		go:t1	
	w:NA		w:NA		w:t2		w:NA		w:NA		w:t2		w:t2/t3		w:t2/t3/t4	
	/w:NA		/w:NA		/w:t1		/w:NA		/w:NA		/w:t1		/w:t1/t2		/w:t1/t2/t3	