

CPSC 320: Intermediate Algorithm Design and Analysis

Schedule transformation example

Schedule transformation example

- Theorem:

If S is a reduced schedule that is the same as S_{FF} for the first j requests, then there is a reduced schedule S' that is the same as S_{FF} for the first $j+1$ requests, and incurs no more misses than S .

Case 1: item is already in the cache

Request	S_{FF}		S		S'	
	Action	Cache	Action	Cache	Action	Cache
After j requests		a f i e		a f i e		a f i e
i	None	a f i e	None	a f i e	None	a f i e

($j+1$)st request



Case 2: S evicts the same item as S_{FF}

Request	S_{FF}		S		S'	
	Action	Cache	Action	Cache	Action	Cache
After j requests		a f c e		a f c e		a f c e
i	Evict e Read i	a f c i	Evict e Read i	a f c i	Evict e Read i	a f c i

($j+1$)st request

Case 3a: S evicts a different item from S_{FF}

Request	S_{FF}		S		S'	
	Action	Cache	Action	Cache	Action	Cache
After j requests		a f c e		a f c e		a f c e
i	Evict e Read i	a f c i	Evict f Read i	a i c e	Evict e Read i	a f c i
a				a i c e		a f c i
b			Evict c Read b	a i b e	Evict c Read b	a f b i
d			Evict a Read d	d i b e	Evict a Read d	d f b i
f			Evict e Read f	d i b f		d f b i

these behave the same

Case 3b: S evicts a different item from S_{FF}

Request	S_{FF}		S		S'	
	Action	Cache	Action	Cache	Action	Cache
After j requests		a f c e		a f c e		a f c e
i	Evict e Read i	a f c i	Evict f Read i	a i c e	Evict e Read i	a f c i
a				a i c e		a f c i
b			Evict c Read b	a i b e	Evict c Read b	a f b i
d			Evict a Read d	d i b e	Evict a Read d	d f b i
y			Evict e Read y	d i b y	Evict f Read y	d y b i

these behave the same

Case 3c: S evicts a different item from S_{FF}

Request	S_{FF}		S		S'	
	Action	Cache	Action	Cache	Action	Cache
After j requests		a f c e		a f c e		a f c e
i	Evict e Read i	a f c i	Evict f Read i	a i c e	Evict e Read i	a f c i
a				a i c e		a f c i
b			Evict c Read b	a i b e	Evict c Read b	a f b i
d			Evict a Read d	d i b e	Evict a Read d	d f b i
f			Evict i Read f	d f b e	Evict i Read e	d f b e

these behave the same