

CS 186 Discussion 3

Buffers and PySpark

Logistics

- Homework 2 due 2/11
- Homework 3 released end of this week
 - PySpark Fundamentals
 - Sorts and Buffers in PySpark

Revisiting SQL...

[A]

```
SELECT S.sname
FROM Sailors S
WHERE NOT EXISTS
    (SELECT B.bid FROM Boats B
     WHERE B.color='pink'
     AND EXISTS
        (SELECT R.bid
         FROM Reserves R
         WHERE R.bid=B.bid AND R.sid!=S.sid));
```

Revisiting SQL...

```
[C]
SELECT sname
FROM
  (SELECT sid
   FROM Reserves
   EXCEPT
    (SELECT sid
     FROM
       (SELECT Reserves.sid, PinkBoats.bid
        FROM Reserves,
          (SELECT bid
           FROM Boats
            WHERE color='pink') PinkBoats
        EXCEPT
         (SELECT sid, bid
          FROM Reserves))))))
R, Sailors S
WHERE R.sid = S.sid;
```

PySpark Demo

Buffers

Buffers

- General information:
<frame #, page_id, pin_count, dirty>
 - Only replace frame if `pin_count == 0`
 - Write to disk if dirty bit is on

“Clock” Replacement Policy

- *Approximation* of LRU
- Store reference bit instead of last access time for page frames
- When pin_count drops to 0,
 - Flip reference bit on
- If clock hand reaches an “on” ref.
 - Flip reference bit off
- If clock hand reaches an “off” ref.
 - Replace page

Worksheet – Clock Policy

Just read A, B, C, D

A													
	B												
		C											
			D										

Now request A

Worksheet – Clock Policy

Just requested A

A				*									
	B												
		C											
			D										

Now request F

Worksheet – Clock Policy

Just requested A

A				*										
	B													
		C												
			D											

Now request F

Worksheet – Clock Policy

Just requested A

A				*										
	B													
		C												
			D											

Now request F

Worksheet – Clock Policy

Just requested A

A				*									
	B												
		C											
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Now request F

Worksheet – Clock Policy

Just requested A

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	B												
		C											
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Now request F

Worksheet – Clock Policy

Just requested A

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	B													
		C												
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Now request F

Worksheet – Clock Policy

Just requested F

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	B													
		C												
			D											

Now request A

Worksheet – Clock Policy

Just requested F

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		C												
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Now request A

Worksheet – Clock Policy

Just requested A

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	B					A								
		C												
			D											

Now request D

Worksheet – Clock Policy

Just requested A

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	B					A								
		C												
			D				*							

Now request D

Worksheet – Clock Policy

Just requested D

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	B					A							
		C											
			D				*						

Now request G

Worksheet – Clock Policy

Just requested D

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	B					A							
		C											
			D				*						

Now request G

Worksheet – Clock Policy

Just requested G

A				*	F								
	B					A							
		C							G				
			D				*						

Now request D

Worksheet – Clock Policy

Just requested D

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	B					A							
		C							G				
			D				*		*				

Now request G

Worksheet – Clock Policy

Just requested G

A				*	F								
	B					A							
		C						G		*			
			D				*		*				

Now request E

Worksheet – Clock Policy

Just requested G

A				*	F								
	B					A							
		C						G		*			
			D				*		*	*			

Now request E

Worksheet – Clock Policy

Just requested E

A				*	F								
	B					A							
		C						G		*			
			D				*		*		E		

Now request D

Worksheet – Clock Policy

Just requested D

A				*	F									
	B					A								
		C						G		*				
			D				*		*		E			

Now request F

Worksheet – Clock Policy

Just requested F

A				*	F								
	B					A							F
		C						G		*			
			D				*		*		E		