Lazy Exact Deduplication

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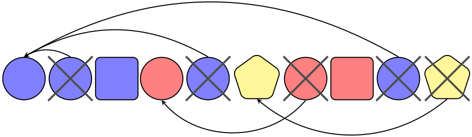

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Lazy deduplication: 'Lazy' in the sense that we postpone disk lookups, until we can do them as a batch. (Lazy is exact.)

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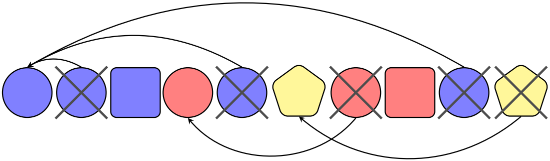

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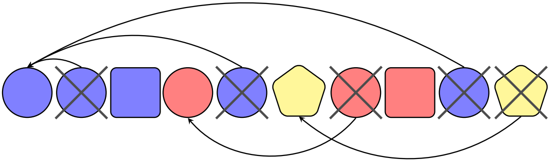

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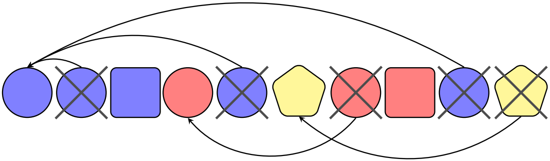

- The data is broken up into *chunks* (Rabin Hash).
- The chunks are *fingerprinted* (SHA1): same fingerprint $\Longrightarrow$ duplicate chunk.

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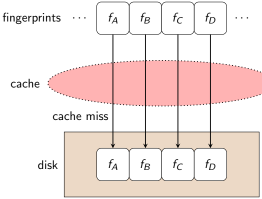

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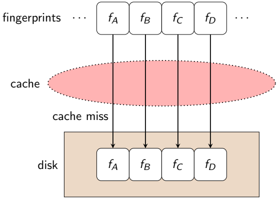

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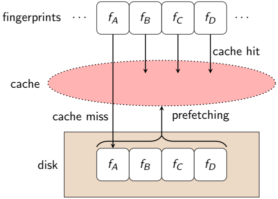
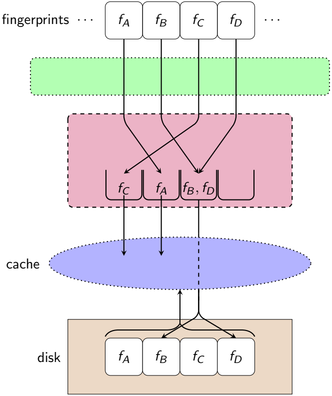


The second time we see fingerprints f_A, f_B, ...

Lazy deduplication...



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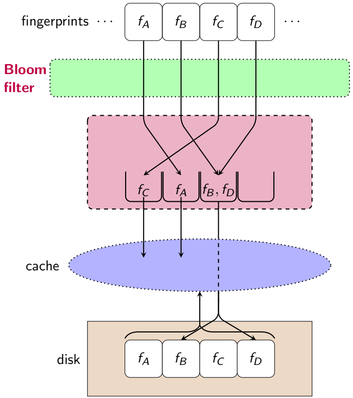

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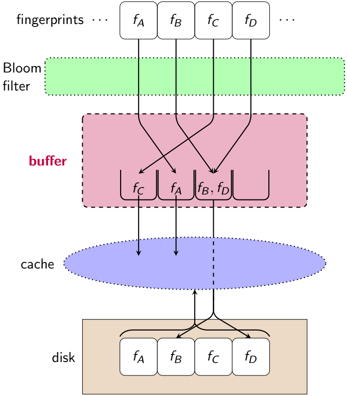

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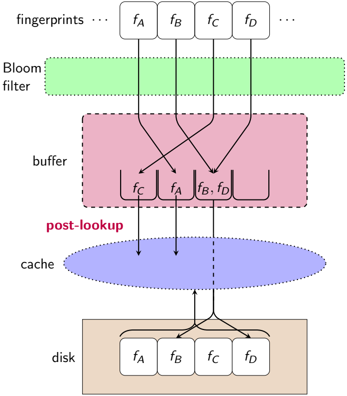

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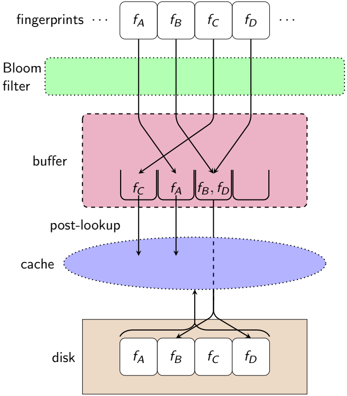

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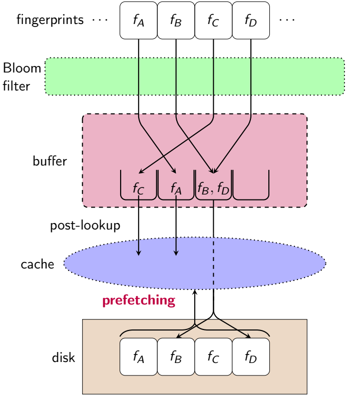
- prefetching: bidirectional; triggers post-lookup



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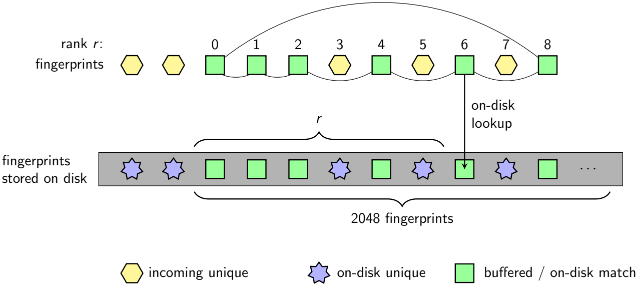
It looks like this:



Experimental results...

(See our paper for the details and further experiments.)

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The time it takes to deduplicate a dataset (on SSD):

	Vm (220GB)	Src (343GB)	FSLHomes (3.58TB)
eager way	282 sec.	476 sec.	5824 sec.
lazy way	151 sec.	226 sec.	3939 sec.

(eager = non-lazy [exact] way—i.e., no buffering before accessing the disk)

Conclusion: Lazy is faster.

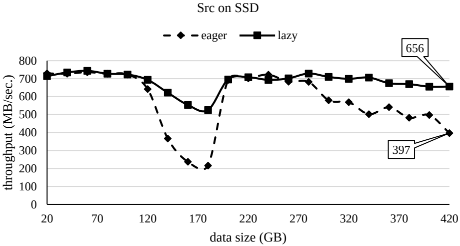
On-disk lookups...

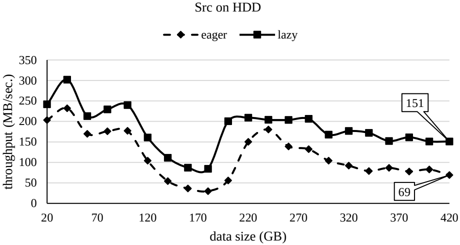
Disk access time (sec.) on SSD:

	Vm		Src		FSLHomes	
	eager	lazy	eager	lazy	eager	lazy
on-disk lookup	176	20	325	45	4598	1639
prefetching	46	60	52	68	298	655
other	59	71	99	113	928	1645
total disk access	222	80	377	113	4896	2294
total dedup.	282	151	476	226	5824	3939

Conclusion: Lazy reduces the disk bottleneck.

Throughput...





Conclusion: Lazy has better throughput on both SSD and HDD, but moreso on slower HDD.

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danke
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ngiyabonga
شكراً جزيلاً
Баярлалаа
спасибо
faafetai lava
kiitos
dankie
nandri
mersi
kia ora
barka
welalin
tack
teşekkür ederim
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