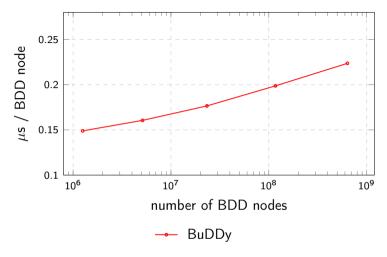
Adiar:

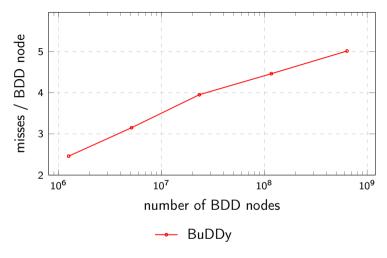
Binary Decision Diagrams in External Memory

Steffan Christ Sølvsten, Jaco van de Pol, Anna Blume Jakobsen, and Mathias Weller Berg Thomasen TACAS 2022

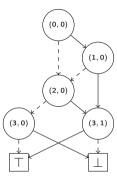




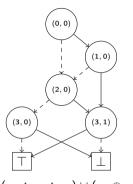
Minimal running time for the Queens problems.



Cache-misses for the Queens problems.



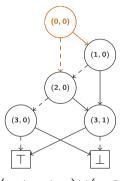
(a) $(x_0 \land x_1 \land x_3) \lor (x_2 \oplus x_3)$



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Priority Queue: *Qcount*:

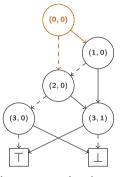
_



(a) $(x_0 \land x_1 \land x_3) \lor (x_2 \oplus x_3)$

Priority Queue: Q_{count}:

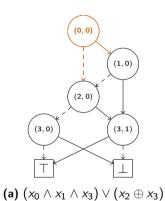
3



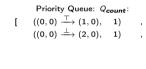
(a) $(x_0 \land x_1 \land x_3) \lor (x_2 \oplus x_3)$

Priority Queue: Qcount:

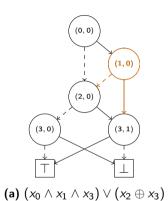
[
$$((0,0) \xrightarrow{T} (1,0), 1)$$
 , $((0,0) \xrightarrow{\bot} (2,0), 1)$,



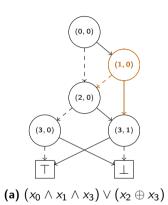
Seek	Sum	Result
(1,0)	0	0



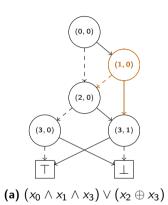
]



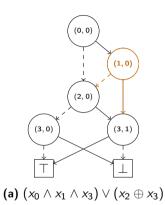
Seek	Sum		Result
(1,0)	0		0
]	Priority Queue: Q_0 $((0,0) \xrightarrow{\top} (1,0),$ $((0,0) \xrightarrow{\bot} (2,0),$	1)	: , ,

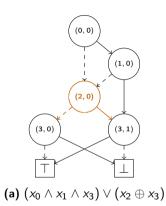


Seek (1, 0)	Sum 1	Result 0
J	Priority Queue: Q_0 $((0,0) \xrightarrow{\perp} (2,0),$,
		1

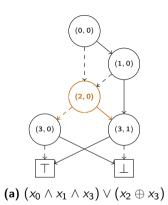


Seek 1, 0)	Sum 1		Resul
I	Priority Queue: Q_0 $((0,0) \xrightarrow{\perp} (2,0),$	1)	:
	$((1,0) \xrightarrow{\perp} (2,0),$ $((1,0) \xrightarrow{\top} (3,1),$,	,

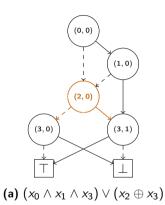


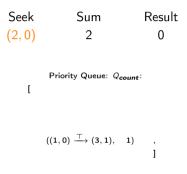


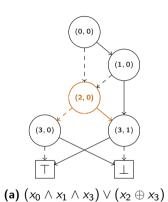
Seek Sum Result (2,0) 0 0 0
$$(2,0) \qquad 0 \qquad 0$$
 Priority Queue: Q_{count} :
$$((0,0) \xrightarrow{\bot} (2,0), \quad 1) \qquad , \qquad ((1,0) \xrightarrow{\top} (3,1), \quad 1) \qquad , \qquad]$$



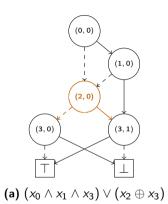
Seek (2,0)	Sum 1		Resul
]	Priority Queue: Q	ount	:
	$((1,0) \xrightarrow{\perp} (2,0),$	1)	,
	$((1,0) \xrightarrow{\top} (3,1),$	1)	, 1
]



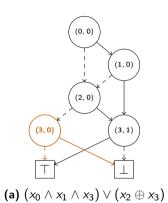




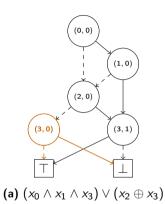
Seek (2, 0)	Sum 2	Resul [.] 0
ĵ	Priority Queue: <i>Q_{col}</i>	unt:
	$((2,0) \xrightarrow{\perp} (3,0), 2)$ $((1,0) \xrightarrow{\top} (3,1), 3)$ $((2,0) \xrightarrow{\top} (3,1), 3)$	

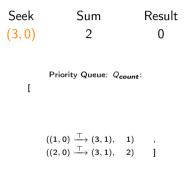


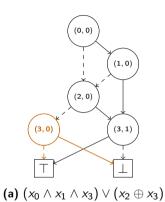
Seek (3,0)	Sum 0	Resul [.] 0
[Priority Queue: <i>Q</i> _{co}	ount:
	$((2,0) \xrightarrow{\perp} (3,0),$ $((1,0) \xrightarrow{\top} (3,1),$ $((2,0) \xrightarrow{\top} (3,1),$	

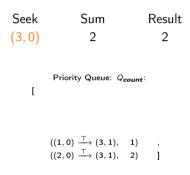


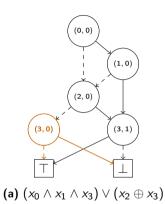
Seek (3,0)	Sum 0	Result 0
]	Priority Queue: Q	count:
	$((2,0) \xrightarrow{\perp} (3,0),$ $((1,0) \xrightarrow{\top} (3,1),$ $((2,0) \xrightarrow{\top} (3,1),$	

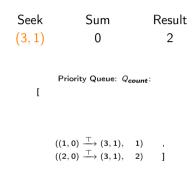


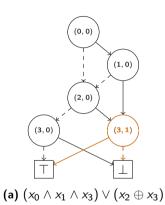


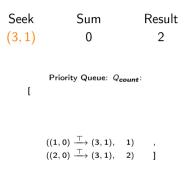


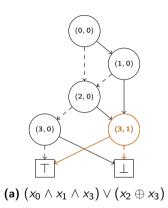




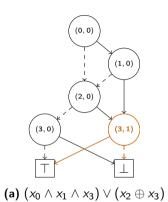




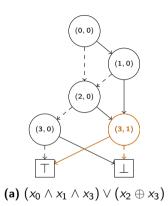




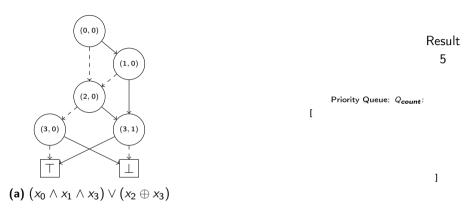
Seek (3, 1)	Sum 1	Result 2
I	Priority Queue: <i>Q</i>	ount:
	$((2,0) \xrightarrow{\top} (3,1),$	2)]



Seek	Sum	Result
(3, 1)	3	2
ı	Priority Queue:	Q _{count} :
]

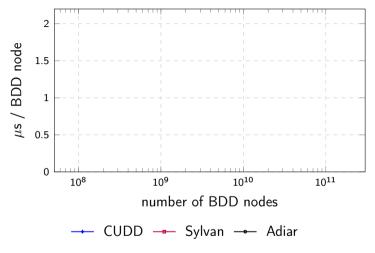


Seek (3, 1)	Sum 3	Result 5
Į	Priority Queue:	Qcount:
		1

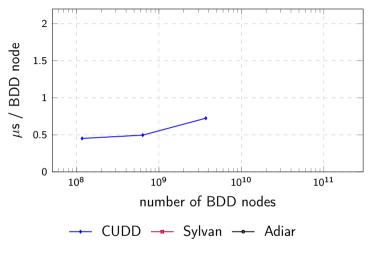


Adiar

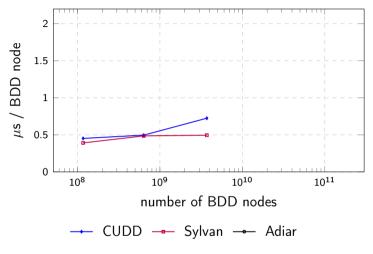
github.com/ssoelvsten/adiar



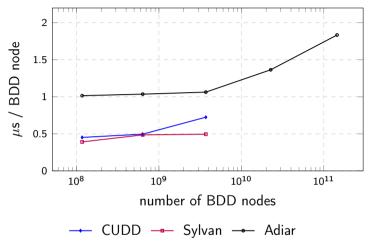
Minimal running time for the *Queens* problems.



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Algorithm	Time (s)	
$f\leftrightarrow g\equiv \top$	0.38	

Checking the (EPFL Benchmark) voter circuit's single output gate ($|N_f| = |N_g| = 5.76$ MiB).

Algorithm	Time (s)	
$f \leftrightarrow g \equiv \top$	0.38	
$O(N \log N)$	0.058	

Checking the (EPFL Benchmark) voter circuit's single output gate ($|N_f| = |N_g| = 5.76$ MiB).

Algorithm	Time (s)		
$f\leftrightarrow g\equiv \top$	0.38		
$O(N \log N)$	0.058		
O(N)	0.006		

Checking the (EPFL Benchmark) voter circuit's single output gate ($|N_f| = |N_g| = 5.76$ MiB).

Steffan Christ Sølvsten

■ soelvsten@cs.au.dk

y @ssoelvsten

Adiar

</> github.com/ssoelvsten/adiar

