classmate
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7 INTRODUCTION TO MACHINE INDEPENDENT CODE OPTIMIZATIONS

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LOCAL COMMON SUB-EXPRESSION ELIMINATION

B5:

$t_6 = 4*i$	$t_6 = 4*i$
$x = a[t_6]$	$x = a[t_6]$
$t_7 = 4*i$	$t_7 = t_6$
$t_8 = 4*j$	$t_8 = 4*j$
$t_9 = a[t_8]$	$t_9 = a[t_8]$
$a[t_7] = t_9$	$a[t_7] = t_9$
$t_{10} = 4*j$	$t_{10} = t_8$
$a[t_{10}] = x$	$a[t_{10}] = x$
goto B_2	goto B_2

COPY PROPAGATION

B5:

$t_6 = 4*i$	$t_6 = 4*i$
$x = a[t_6]$	$x = a[t_6]$
$t_7 = t_6$	$t_7 = t_6$
$t_8 = 4*j$	$t_8 = 4*j$
$t_9 = a[t_8]$	$t_9 = a[t_8]$
$a[t_7] = t_9$	$a[t_6] = t_9$
$t_{10} = t_8$	$t_{10} = t_8$
$a[t_{10}] = x$	$a[t_8] = x$
goto B_2	goto B_2

DEAD CODE ELIMINATION

$t_6 = 4 * i$	$t_6 = 4 \times i$
$x = a[t_6]$	$x = a[t_6]$
$t_7 = t_6$ ⟶	~~$t_7 = t_6$~~
$t_8 = 4 * j$	$t_8 = 4 * j$
$t_9 = a[t_8]$	$t_9 = a[t_8]$
$a[t_6] = t_9$	$a[t_6] = t_9$
$t_{10} = t_8$ ⟶	~~$t_{10} = t_8$~~
$a[t_8] = x$	$a[t_8] = x$
goto B_2	goto B_2

GLOBAL COMMON SUBEXPRESSION ELIMINATION

See the control flow graph (CFG) please in the slides...

(2) copy propagation CP
(3) dead code elimination DCE

GCSE couldn't uncover the common sub-expressions earlier.

(1) GCSE (2) CP (3) DCE e
(4) GCSE (5) CP (6) DCE

the live range of variable t_2 got increased in the optimized program that could translate to increased register pressure.