

CSE Example

Example

Three address code

```
T1 = A + B
T2 = T1 + C
T3 = A + B
C = T1 + T2
T4 = T1 + C
D = T3 + T2
```

Optimized code

Available expressions:

Example

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```
T1 = A + B
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```

Optimized code

```
T1 = A + B
```

Available expressions: [A+B, T1]

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```

Optimized code

```
T1 = A + B
T2 = T1 + C
```

Available expressions: [A+B, T1] [T1+C, T2]

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Optimized code

```
T1 = A + B
T2 = T1 + C
T3 = T1
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Available expressions: [A+B, T1] [T1+C, T2]

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Optimized code

```
T1 = A + B
T2 = T1 + C
T3 = T1
C = T1 + T2
```

Available expressions: $[A+B, T1]$, $[\cancel{T1+C}, \cancel{T2}]$, $[T1+T2, C]$

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Optimized code

```
T1 = A + B
T2 = T1 + C
T3 = T1
C = T1 + T2
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```

Available expressions: [A+B, T1], [T1+T2, C], [T1+C, T4]

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Optimized code

```
T1 = A + B
T2 = T1 + C
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```

Available expressions: [A+B, T1], [T1+T2, C], [T1+C, T4], [T3+T2, D]

what about $A = A + B$?

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- no available expression!

missed opportunity?

Three address code

```
T1 = A + B
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```

*Need an optimization called
Global Value Numbering (GVN)*

Optimized code

```
T1 = A + B
T2 = T1 + C
T3 = T1
C = T1 + T2
T4 = T1 + C
D = C
```

Available expressions: [A+B, T1], [T1+T2, C], [T1+C, T4], [T3+T2, D]

next: the trouble of aliasing