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# INSTITUTO TECNOLÓGICO DE TOLUCA

**CARRERA**

**INGENIERÍA EN SISTEMAS COMPUTACIONALES**

**DOCUMENTO DE OPTIMIZACIÓN DE CÓDIGO**

**P R E S E N T A:**

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#### METEPEC, ESTADO DE MÉXICO, 10 DE JUNIO DE 2020.

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* **BLOQUE BASICO**

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| Entrada | | | | Optimización de código | Salida | | | |
| Op1 | Op2 | Op | Res |  | Op1 | Op2 | Op | Res |
| num | num2 | + | T1 | Evaluamos expresión algebraica |  | num | = | T1 |
| num | num2 | - | T1 | Evaluamos expresión algebraica |  | num | = | T1 |
| num | num2 | \* | T1 | Evaluamos expresión algebraica |  | num | = | T1 |
| num | num2 | / | T1 | Evaluamos expresión algebraica |  | num | = | T1 |
| var | 0 | + | T1 | Identidad algebraica |  | var | = | T1 |
| 0 | var | + | T1 | Identidad algebraica |  | var | = | T1 |
| var | 0 | - | T1 | Identidad algebraica |  | var | = | T1 |
| var | 1 | \* | T1 | Identidad algebraica |  | var | = | T1 |
| var | 0 | \* | T1 | Identidad algebraica |  | 0 | = | T1 |
| var | 1 | / | T1 | Identidad algebraica |  | var | = | T1 |
| var | 0 | / | T1 | Identidad algebraica |  | error | = | T1 |
| 0 | var | / | T1 | Identidad algebraica |  | 0 | = | T1 |
| num |  | = | T1 | Propagación de copias  Se sustituye el valor de un temporal o variable en las operaciones que la tengan | var | T1 | + | T2 |
| var | num | + | T2 |
| var | T1 | + | T1 | Expresiones comunes  Se elimina un temporal de dos iguales y se cambia en todo el programa |  | T2 | = | T1 |
| var | T1 | + | T2 |

* **NIVEL GLOBAL**

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| Entrada | | | | Optimización de código | Salida | | | |
| Op1 | Op2 | Op | Res |  | Op1 | Op2 | Op | Res |
| var | var2 | + | T1 | Evaluamos expresión  Se sustituyen los valores de las variables globales y se realiza la operación |  | 10 | = | T1 |
| 5 | 5 | + | T1 |
| var | var2 | - | T1 | Evaluamos expresión  Se sustituyen los valores de las variables globales y se realiza la operación |  | 0 | = | T1 |
| 5 | 5 | - | T1 |
| var | var2 | \* | T1 | Evaluamos expresión  Se sustituyen los valores de las variables globales y se realiza la operación |  | 25 | = | T1 |
| 5 | 5 | \* | T1 |
| var | var2 | / | T1 | Evaluamos expresión  Se sustituyen los valores de las variables globales y se realiza la operación |  | 1 | = | T1 |
| 5 | 5 | / | T1 |
| var | var | < | goto etqv1 | Eliminar goto y etiqueta  En el if se invierte el operador relacional para poder eliminar el goto verdadero y la etiqueta verdadera de manera directa | var | var | >= | goto etqf2 |
| var | var | > | goto etqv1 |
| var | var | == | goto etqv1 |
| var | var | =! | goto etqv1 |
|  |  |  | goto etqf2 |
| var | var | <= | goto etqf2 |
| var | var | =! | goto etqf2 |
| var | var | == | goto etqf2 |
|  |  |  | etqf2: |
|  |  |  | etqv1: |
|  |  |  | etiqf2: |
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**Ejemplo**:

1. **Código intermedio**

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| --- | --- |
| 1. int a = 2 2. float suma = 5.5 3. int b = 0 4. int x = 8 5. int g = 0 6. int c = 0 7. T1 = 5 \* a 8. T2 = t1 + 1 9. T3 = a \* 5 10. T4 = t3 + 1 11. T5 = a + 0 12. T6 = t4 \* t5 13. T7 = t2 + t6 14. T8 = a \* 2 15. T9 = t7 + t8 16. T10 = x + 1 17. T11 = t10 + 0 18. T12 = t9 + t11 19. Suma = t12 20. If suma == 15 goto 10 21. Goto 20 22. 10: 23. Float a=4 24. T1 = a + a 25. T2 = t1 + 1 26. T3 = 1 \* 0 27. T4 = t2 + t3 28. T5 = 1 \* x 29. T6 = t4 + t5 | 1. T7 = g / 1 2. T8 = t6 + t7 3. T9 = t8 – b 4. T10 = t9 + c 5. Mul = t10 6. Goto 30 7. 20: 8. Bool e = true 9. Print (“Hola”) 10. I = 0 11. 40: 12. If i <= suma goto 50 13. Goto 60 14. 50: 15. Float l = 96.5 16. 70: 17. If x != suma goto 80 18. Goto 90 19. 80: 20. Print ("hola2") 21. Int po = 56 22. X = x + a 23. Goto 70 24. 90: 25. I = i + 1 26. Goto 40 27. 60: 28. 30: |

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| **CUADRUPLES** |  | **CODIGO OPTIMIZADO** |
| = 2 NULL a  = 5.5 NULL suma  = 0 NULL b  = 8 NULL x  = 0 NULL g  = 0 NULL c  \* 5 a t1  + t1 1 t2  \* 2 5 t3  + t3 1 t4  + 2 0 t5  \* t4 t5 t6  + t2 t6 t7  \* 2 2 t8  + t7 t8 t9  + x 1 t10  + t10 0 t11  + t9 t11 t12  = t12 NULL suma  == suma 15 goto10  NULL NULL NULL goto20  = 4 NULL a  + 4 4 t1  + t1 1 t2  \* 1 0 t3  + t2 t3 t4  \* 1 x t5  + t4 t5 t6  / g 1 t7  + t6 t7 t8  - t8 b t9  + t9 c t10  = t10 NULL mul  NULL NULL NULL goto30  = true NULL e  NULL "hola" NULL print  = 0 NULL i  <= i suma goto50  NULL NULL NULL goto60  = 96.5 NULL l  != x suma goto80  NULL NULL NULL goto90  NULL "hola2" NULL print  = 56 NULL po  + x a x  NULL NULL NULL goto70  + i 1 i  NULL NULL NULL goto40 | Bloque 0:  a = 2  t1 = 4 + 4  b = 0  i = i + 1  g = 0  c = 0  t1 = 10  t2 = 11  t3 = 10  t4 = 11  t5 = 2  t6 = 22  t7 = 33  t8 = 4  t9 = 37  t10 = 9  t11 = 9  t12 = 46  t1 = 4 + 4  if suma != 15 goto10  Bloque 1:  goto20  Bloque 2:  a = 4  t1 = 8  t2 = 9  t3 = 0  t4 = 9  t5 = 8  t6 = 17  t7 = 0.0  t8 = 17.0  t9 = 17.0  t10 = 17.0  mul = 17.0  goto30  Bloque 3:  e = true  print ( "hola" )  i = i + 1  if i >= suma goto50  Bloque 4:  goto60  Bloque 5:  l = 96.5  if x == suma goto80  Bloque 6:  goto90  Bloque 7:  print ( "hola2" )  po = 56  i = i + 1  goto70  Bloque 8:  i = 1  goto40  Bloque 9: | Bloque 0:  if suma != 15 goto20  Bloque 1:  goto30  Bloque 2:  print ( "hola" )  i = i + 1  if i >= suma goto60  Bloque 3:  if x == suma goto90  Bloque 4:  print ( "hola2" )  goto70  Bloque 5:  goto40  Bloque 6: |

**EJEMPLO:**

1. Código Intermedio

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| --- | --- |
| 1. int a = 0 2. float mul = 5.5 3. float suma = 10.0 4. float b = 2.0 5. float l= 0.0 6. float k=0.0 7. T1 = 3 + 5 8. T2 = 3 \* T1 9. Mul = T2 10. If b < a goto 50 11. Goto 40 12. 50: 13. If suma < a goto 10 14. Goto 40 15. 40: 16. If l < k goto 10 17. Goto 20 18. 10: 19. T3=mul+a 20. A=T3 21. T4 = 3 \* 4 22. T5 = 5 \* T4 23. T6=T5+b 24. A = T6 25. T7=a+mul 26. B=T7 27. Goto 30 28. 20: 29. T8 = 5 + 3 30. A = T8 | 1. 60: 2. If a < mul goto 70 3. Goto 80 4. 70: 5. T9= 5 + 3 6. Mul = T9 7. Goto 60 8. 80: 9. J = 0 10. 90: 11. If j < mul goto 100 12. Goto 110 13. 100: 14. T12 = j + 3 15. A = T12 16. Goto 90 17. 110: 18. 30: |

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| **CUADRUPLES** |  | **CODIGO OPTIMIZADO** |
| = 0 NULL a  = 5.5 NULL mul  = 10 NULL suma  = 2 NULL b  = 0 NULL l  = 0 NULL k  + 3 5 t1  \* 3 t1 t2  = t2 NULL mul  < b a goto50  NULL NULL NULL goto40  < suma a goto10  NULL NULL NULL goto40  < l k goto10  NULL NULL NULL goto20  + mul a t3  = t3 NULL a  \* 3 4 t4  \* 5 t4 t5  + t5 b t6  = t6 NULL a  + a mul t7  = t7 NULL b  NULL NULL NULL goto30  + 5 3 t8  = t8 NULL a  < mul a goto70  NULL NULL NULL goto80  + 5 3 t9  = t9 NULL mul  NULL NULL NULL goto60  = 0 NULL i  < i mul goto100  NULL NULL NULL goto110  + j 3 t12  = t12 NULL a  NULL NULL NULL goto90 | Bloque 0:  t3 = mul + a  t9 = 5 + 3  t3 = mul + a  t3 = mul + a  t3 = mul + a  t3 = mul + a  t1 = 8  t2 = 24  t9 = 5 + 3  if b >= a goto50  Bloque 1:  goto40  Bloque 2:  if suma >= a goto10  Bloque 3:  goto40  Bloque 4:  if l >= k goto10  Bloque 5:  goto20  Bloque 6:  t3 = 24  t4 = 3 \* 4  t4 = 12  t5 = 60  t6 = 62  t7 = a + mul  t7 = 86  t8 = 5 + 3  goto30  Bloque 7:  t8 = 8  t9 = 5 + 3  if mul >= a goto70  Bloque 8:  goto80  Bloque 9:  t9 = 8  t12 = j + 3  goto60  Bloque 10:  t12 = j + 3  i=0  if i >= mul goto100  Bloque 11:  goto110  Bloque 12:  t12 = j + 3  a = t12  goto90  Bloque 13: | Bloque 0:  if b >= a goto40  Bloque 1:  if suma >= a goto40  Bloque 2:  if l >= k goto20  Bloque 3:  goto30  Bloque 4:  if mul >= a goto80  Bloque 5:  goto60  Bloque 6:  i=0  if i >= mul goto110  Bloque 7:  goto90  Bloque 8: |