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| Ignacio García Fernández  José Ruiz Esteban  Eduardo Gil Alba  18-11-2024 |

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| GRUPO 63 |
| Procesador de Lenguajes: Analizador Sintáctico |
| Procesadores de Lenguajes |

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# Propósito

En este documento se refleja el procedimiento de diseño para un analizador sintáctico del lenguaje Javascript JS--, para un conjunto de sentencias, de dicho lenguaje. Se muestran más adelante. Se ha dejado planteado su diseño, pero no hemos podido implementarlo en esta entrega.

#### Conjunto de sentencias

* La estructura general de un programa compuesto por funciones y declaraciones.
* Definición de funciones. (**function**, **return**)
* Tipos enteros, lógicos, cadenas y vacío. (**ent**, **bool**, **cad**, **void**)
* Variables y su declaración. (**var**, **int**, **string**, **boolean**)
* Constantes enteras y cadenas de caracteres.
* Sentencias:
  + Asignación:
    - Asignación con y lógico (**&=**)
  + Condicionales:
    - Sentencia condicional compuesta (**if**, **if**-**else**)
  + Llamada a funciones y retorno
* Sentencias de entrada/salida por terminal. (**output**, **input**)
* Expresiones.
  + Aritméticas:
    - Suma (**+**)
  + Relacionales:
    - Igualdad (**==**)
  + Lógicas:
    - Y lógico (**&&**)
* Comentarios.
  + Comentarios de Bloque (/\* \*/)
* Cadenas:
  + Con comillas simple (‘ ‘)

# Analizador Sintáctico

El analizador sintáctico empleará los tokens que recibe del analizador léxico y evaluará si la sentencia es válida para el lenguaje generado por la gramática.

## Gramática

La gramática contiene la sintaxis del lenguaje. En otras palabras, el conjunto de sentencias válidas para nuestro lenguaje. La gramática debe ser de tipo 2, independiente del contexto, lo más general posible, para cubrir todos los posibles casos de uso y no debe ser ambigua, es decir, no puede dar lugar a dos o más arboles sintácticos diferentes.

Calendario

Descripción generada automáticamente con confianza media

## Tabla de Analizador Sintáctico LR(1)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| id | + | == | && | &= | = | ( | ) | { | } | ; | , | function | var | return | if | else | int | boolean | string | void | ent | cad | bool | output | input | eof | $ |
| 0 | d9 |  |  |  |  |  |  |  |  |  |  |  | d8 | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 | d4 |  |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | a |
| 2 | d9 |  |  |  |  |  |  |  |  |  |  |  | d8 | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 | d4 |  |
| 3 | d9 |  |  |  |  |  |  |  |  |  |  |  | d8 | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 | d4 |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | r3 |
| 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d16 | d17 | d18 |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  | d19 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 | r7 |  |  |  |  |  |  |  |  | r7 |  |  | r7 | r7 | r7 | r7 |  |  |  |  |  |  |  |  | r7 | r7 | r7 |  |
| 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d16 | d17 | d18 | d23 |  |  |  |  |  |  |  |
| 9 |  |  |  |  | d25 | d24 | d26 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 11 | d36 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 | d32 |  |  |  |  |  | d31 |  |  |  | r36 |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 13 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | r1 |
| 14 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | r2 |
| 15 | d39 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 | r22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 | r23 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 | r24 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **E** | **ACCION** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| id | + | == | && | &= | = | ( | ) | { | } | ; | , | function | var | return | if | else | int | boolean | string | void | ent | cad | bool | output | input | eof | $ |
| 19 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 20 | d42 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 21 | r9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 | r14 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 23 | r15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 25 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 26 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 27 |  |  |  | d48 |  |  |  |  |  |  | d47 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 |  |  | d49 | r38 |  |  |  | r38 |  |  | r38 | r38 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 |  | d50 | r40 | r40 |  |  |  | r40 |  |  | r40 | r40 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 |  | r42 | r42 | r42 |  |  |  | r42 |  |  | r42 | r42 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 31 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 32 |  | r43 | r43 | r43 |  |  | d52 | r43 |  |  | r43 | r43 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 33 |  | r45 | r45 | r45 |  |  |  | r45 |  |  | r45 | r45 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 |  | r47 | r47 | r47 |  |  |  | r47 |  |  | r47 | r47 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 35 |  | r48 | r48 | r48 |  |  |  | r48 |  |  | r48 | r48 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 |  |  |  |  |  |  |  |  |  |  | d53 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 37 |  |  |  |  |  |  |  |  |  |  | d54 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| 38 |  |  |  | d48 |  |  |  |  |  |  | r35 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 39 |  |  |  |  |  |  |  |  |  |  | d55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 |  |  |  | d48 |  |  |  | d56 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 41 |  |  |  |  |  |  | d58 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 42 | r10 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 43 |  |  |  | d48 |  |  |  |  |  |  | d59 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 |  |  |  | d48 |  |  |  |  |  |  | d60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 45 |  |  |  |  |  |  |  | d61 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 |  |  |  | d48 |  |  |  | r34 |  |  |  | d63 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 47 | r28 |  |  |  |  |  |  |  |  | r28 |  |  | r28 | r28 | r28 | r28 |  |  |  |  |  |  |  |  | r28 | r28 | r28 |  |
| 48 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 49 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 50 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 51 |  |  |  | d48 |  |  |  | d67 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 52 | d32 |  |  |  |  |  | d31 | r32 |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 53 | r29 |  |  |  |  |  |  |  |  | r29 |  |  | r29 | r29 | r29 | r29 |  |  |  |  |  |  |  |  | r29 | r29 | r29 |  |
| 54 | r30 |  |  |  |  |  |  |  |  | r30 |  |  | r30 | r30 | r30 | r30 |  |  |  |  |  |  |  |  | r30 | r30 | r30 |  |
| 55 | r4 |  |  |  |  |  |  |  |  | r4 |  |  | r4 | r4 | r4 | r4 |  |  |  |  |  |  |  |  | r4 | r4 | r4 |  |
| 56 | d9 |  |  |  |  |  |  |  | d69 |  |  |  |  |  | d12 |  |  |  |  |  |  |  |  |  | d10 | d11 |  |  |

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| id | + | == | && | &= | = | ( | ) | { | } | ; | , | function | var | return | if | else | int | boolean | string | void | ent | cad | bool | output | input | eof | $ |
| 57 |  |  |  |  |  |  |  |  | d71 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d16 | d17 | d18 | d74 |  |  |  |  |  |  |  |
| 59 | r25 |  |  |  |  |  |  |  |  | r25 |  |  | r25 | r25 | r25 | r25 |  |  |  |  |  |  |  |  | r25 | r25 | r25 |  |
| 60 | r26 |  |  |  |  |  |  |  |  | r26 |  |  | r26 | r26 | r26 | r26 |  |  |  |  |  |  |  |  | r26 | r26 | r26 |  |
| 61 |  |  |  |  |  |  |  |  |  |  | d75 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 62 |  |  |  |  |  |  |  | r31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 63 | d32 |  |  |  |  |  | d31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d33 | d34 | d35 |  |  |  |  |
| 64 |  |  | d49 | r37 |  |  |  | r37 |  |  | r37 | r37 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 65 |  |  | r39 | r39 |  |  |  | r39 |  |  | r39 | r39 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 66 |  | r41 | r41 | r41 |  |  |  | r41 |  |  | r41 | r41 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 67 |  | r44 | r44 | r44 |  |  |  | r44 |  |  | r44 | r44 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 68 |  |  |  |  |  |  |  | d77 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 69 | d9 |  |  |  |  |  |  |  |  | r13 |  |  |  | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 |  |  |
| 70 | r6 |  |  |  |  |  |  |  |  | r6 |  |  | r6 | r6 | r6 | r6 |  |  |  |  |  |  |  |  | r6 | r6 | r6 |  |
| 71 | d9 |  |  |  |  |  |  |  |  | r13 |  |  |  | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 |  |  |
| 72 |  |  |  |  |  |  |  | d81 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 73 | d82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 74 |  |  |  |  |  |  |  | r17 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 75 | r27 |  |  |  |  |  |  |  |  | r27 |  |  | r27 | r27 | r27 | r27 |  |  |  |  |  |  |  |  | r27 | r27 | r27 |  |

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| id | + | == | && | &= | = | ( | ) | { | } | ; | , | function | var | return | if | else | int | boolean | string | void | ent | cad | bool | output | input | eof | $ |
| 76 |  |  |  | d48 |  |  |  | r34 |  |  |  | d63 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 77 |  | r46 | r46 | r46 |  |  |  | r46 |  |  | r46 | r46 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 78 |  |  |  |  |  |  |  |  |  | d84 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 79 | d9 |  |  |  |  |  |  |  |  | r13 |  |  |  | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 |  |  |
| 80 |  |  |  |  |  |  |  |  |  | d86 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 81 |  |  |  |  |  |  |  |  | r11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 82 |  |  |  |  |  |  |  | r19 |  |  |  | d88 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 83 |  |  |  |  |  |  |  | r33 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 84 | r21 |  |  |  |  |  |  |  |  | r21 |  |  | r21 | r21 | r21 | r21 | d90 |  |  |  |  |  |  |  | r21 | r21 | r21 |  |
| 85 |  |  |  |  |  |  |  |  |  | r12 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 86 | r8 |  |  |  |  |  |  |  |  |  |  |  | r8 | r8 | r8 | r8 |  |  |  |  |  |  |  |  | r8 | r8 | r8 |  |
| 87 |  |  |  |  |  |  |  | r16 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 88 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | d16 | d17 | d18 |  |  |  |  |  |  |  |  |
| 89 | r5 |  |  |  |  |  |  |  |  | r5 |  |  | r5 | r5 | r5 | r5 |  |  |  |  |  |  |  |  | r5 | r5 | r5 |  |
| 90 |  |  |  |  |  |  |  |  | d92 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 91 | d93 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 92 | d9 |  |  |  |  |  |  |  |  | r13 |  |  |  | d5 | d12 | d6 |  |  |  |  |  |  |  |  | d10 | d11 |  |  |
| 93 |  |  |  |  |  |  |  | r19 |  |  |  | d88 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 94 |  |  |  |  |  |  |  |  |  | d96 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **E** | **ACCION** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| id | + | == | && | &= | = | ( | ) | { | } | ; | , | function | var | return | if | else | int | boolean | string | void | ent | cad | bool | output | input | eof | $ |
| 95 |  |  |  |  |  |  |  | r18 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 96 | r20 |  |  |  |  |  |  |  |  | r20 |  |  | r20 | r20 | r20 | r20 |  |  |  |  |  |  |  |  | r20 | r20 | r20 |  |

Nuestro analizador sintáctico, es un analizador sintáctico ascendente, es decir, el árbol generado por este analizador se construye desde las hojas. En concreto, necesitará un token, en cada iteración. Para su implementación, hemos construido una tabla que determina qué acción realizará nuestro analizador en un determinado estado, compuesta por los tokens en cada columna y los estados en las filas. Las acciones definidas pueden ser reducir por la Regla i (ri), desplazar el estado m (d m), aceptar o error (las celdas no definidas de la tabla, denotadas con sombreado). De tal forma que, las acciones de reducción generarán un “parse”, una secuencia de reglas, que determina la construcción del árbol sintáctico, sin necesidad de una estructura para ello. Tendremos una pila, en la que iremos introduciendo, pares de símbolos y estados. En cada iteración, el estado de la cima de la pila y el token proporcionado por el léxico determina la siguiente acción.

#### Análisis de Conflictos

Existe un conflicto, si en un estado para un determinado token, existen dos o más acciones. No se podría determinar cuál de las acciones se debe ejecutar. Los conflictos que se pudieran producir serían de tipo reducción-reducción o reducción-desplazamiento. Dicho de otro modo, en el primer caso, que hubiese dos o más acciones de reducción para un mismo token y en el segundo, una o más acciones de reducción y una o más acciones de desplazar.

En nuestro caso, se pudieran haber presentado conflictos de reducción-desplazamiento, en 16 estados. Los estados 12, 26, 28, 29, 38, 46, 52, 65, 69, 71, 76, 79, 82, 84, 92 y 93. Se observa que, cada columna, token, en ese estado, fila, tiene una sola acción. Por lo tanto, está gramática es válida y la tabla está lista para su implementación.

# ANEXO

#### Casos de prueba

No hemos conseguido implementarlo en esta entrega.

#### Tabla GOTO

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E** | **GOTO** | | | | | | | | | | | | | | | | | | | |
| P | B | F | T | E | C | I | S | F1 | F2 | F3 | H | A | K | L | X | Q | R | U | V |
| 0 | 1 | 2 | 3 |  |  |  |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | 13 | 2 | 3 |  |  |  |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | 14 | 2 | 3 |  |  |  |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  | 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  | 22 |  |  |  |  | 20 |  |  | 21 |  |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  | 27 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |
| 11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12 |  |  |  |  | 38 |  |  |  |  |  |  |  |  |  |  | 37 |  | 28 | 29 | 30 |
| 13 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 14 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 19 |  |  |  |  | 40 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |
| 20 |  |  |  |  |  |  |  |  |  | 41 |  |  |  |  |  |  |  |  |  |  |
| 21 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 23 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 |  |  |  |  | 43 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |
| 25 |  |  |  |  | 44 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |
| 26 |  |  |  |  | 46 |  |  |  |  |  |  |  |  |  | 45 |  |  | 28 | 29 | 30 |
| 27 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| **E** | **GOTO** | | | | | | | | | | | | | | | | | | | |
| P | B | F | T | E | C | I | S | F1 | F2 | F3 | H | A | K | L | X | Q | R | U | V |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 31 |  |  |  |  | 51 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |
| 32 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 33 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 34 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 35 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 36 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 37 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 38 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 39 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 40 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 41 |  |  |  |  |  |  |  |  |  |  | 57 |  |  |  |  |  |  |  |  |  |
| 42 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 43 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 44 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 45 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 46 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 62 |  |  |  |
| 47 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 48 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 64 | 29 | 30 |
| 49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 65 | 30 |
| 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 66 |
| 51 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 52 |  |  |  |  | 46 |  |  |  |  |  |  |  |  |  | 68 |  |  | 28 | 29 | 30 |
| 53 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 54 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 56 |  |  |  |  |  |  |  | 70 |  |  |  |  |  |  |  |  |  |  |  |  |
| 57 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 58 |  |  |  | 73 |  |  |  |  |  |  |  |  | 72 |  |  |  |  |  |  |  |
| 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 63 |  |  |  |  | 76 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |

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| **E** | **GOTO** | | | | | | | | | | | | | | | | | | | |
| P | B | F | T | E | C | I | S | F1 | F2 | F3 | H | A | K | L | X | Q | R | U | V |
| 63 |  |  |  |  | 76 |  |  |  |  |  |  |  |  |  |  |  |  | 28 | 29 | 30 |
| 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 65 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 68 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 69 |  | 79 |  |  |  | 78 |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 70 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 71 |  | 79 |  |  |  | 80 |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 72 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 73 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 74 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 75 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 76 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 83 |  |  |  |
| 77 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 78 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 79 |  | 79 |  |  |  | 85 |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 80 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 81 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 82 |  |  |  |  |  |  |  |  |  |  |  |  |  | 87 |  |  |  |  |  |  |
| 83 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 84 |  |  |  |  |  |  | 89 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 85 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 86 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 87 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 88 |  |  |  | 91 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 89 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 90 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 91 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 92 |  | 79 |  |  |  | 94 |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| 93 |  |  |  |  |  |  |  |  |  |  |  |  |  | 95 |  |  |  |  |  |  |
| 94 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 95 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 96 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |