,   
   
   
 ,   
 ,   
   
   
   
 .   
   
   
 :   
 ,   
   
 ! . "   
   
 , #   
   
   
 $ : . % & : #  
 (finite-state automata),

#  
 (finite-state transducers),   
 (weighted transducers)   
 :   
 ; (Hidden Markov - HMM).   
 , &   
 !   
 $   
 Perl   
   
 $ ! $   
   
   
 .

B ,   
   
   
 ,   
   
 . C   
   
   
! $   
   
 & .

&   
   
 $ . " “

”   
   
   
 . ;   
 “   
 ”   
   
   
 , . . # “ ”. "   
   
   
   
 $   
   
   
 . ; $   
   
   
   
 : $199 $25 $24.99?   
  **,**  #   
   
   
   
   
   
   
 $   
   
   
 .   
   
   
   
   
   
   
 &   
! $ ,   
 &   
   
   
 ( PC, Max UNIX ).

% !   
   
 ,   
 &   
   
  **.** R #

1

,   
   
   
 #-   
 &   
   
 .

S   
   
 $   
   
   
 ,   
   
   
   
   
 .   
   
   
 UNIX (Vi, Perl, Emacs), Microsoft Word, Word-Perfect.

, &   
, # :

•   
   
   
   
 •

•

•

(   
 R #  
 (1965 .)) !   
 $   
 ,   
   
   
 . X $ . % $   
 #   
 ,   
   
 $   
 -$ !   
 ( ,   
 ,   
   
 $ ).

B   
 “ “.

Y   
   
   
   
   
   
   
 ,   
   
   
 , !   
   
   
 !   
   
   
.   
 &   
   
   
   
   
   
 . Z   
   
   
   
   
   
   
   
 ,   
   
 -   
   
   
   
   
 Perl. [   
   
   
   
 **,**  . [   
   
   
 &   
   
 .

& &   
! $ , & , $   
 web   
 $ . B   
   
   
   
   
 . R   
 & , &   
   
   
 . ] ,   
   
 . [

2

&  
 .

X #-   
   
   
   
 $ . X   
 “   
 ”, /   
 /. [   
 / /   
   
   
 &   
 “ ”. "   
   
 ,   
   
   
. Z   
 Perl,   
   
   
 . [   
   
   
 ( /!/)   
 ( /urgl/). B   
   
$   
   
   
 -   
   
 ! (   
   
 &   
   
   
$ ) :

|  | B |
| --- | --- |
| /   / | “Z      ” |
| / / | “;   ;   ” |
| / R / | “; , ,” |
| /  / | “      ” |
| /!/ | “   &   $ !” |

– . [   
 ,   
 /   
 /   
   
   
 S  
 . ;   
   
   
 [ ]. X   
 $   
 . % & $ , / [ S] /   
 & “ ” “S”.

|  | % | B |
| --- | --- | --- |
| / [ S]  / | S | “S  ” |
| / [1234567890] / | X | “g 7 5” |

/ [1234567890] /   
 . R   
 $   
   
   
   
 ! ,   
 ( . .   
   
   
   
   
   
 ). / [h i j k S C l Z m R n ; X " B % [ o Y : p g q ] m" r" s t] /. (-) &   
 #   
 $ . ; / [2-5] /

$ 2, 3, 4, 5. ; / [ - ] / , , . S   
 :

3

|  | % | B |
| --- | --- | --- |
| / [A-t] / | j | “    ” |
| / [a- ] / | ; | “   ” |
| / [0-9] / | S   $ ! | “j **1**: o ” |

R   
   
 ^   
   
 , #   
   
   
   
 . h ^ &   
 [,   
 $   
 . X , / [^a] /   
   
   
   
 (   
 $   
   
 $ )   
   
 . [ ^ &   
 . h & ,   
   
   
 . % & $   
 :

|  | % | B |
| --- | --- | --- |
| [^ A-t] | X | “X Z  ” |
| [^ "] | X “ ”   “"” | “   ” |
| [e ^] | “e” “^” | “j   ^” |
| a^ | ; “a^ ” | “ **a^** ” |

Z   
   
   
   
   
 . X   
   
   
   
   
 ? X   
 ,   
 /?/,   
 “   
   
 & ”   
   
 & $ :

|  | % | B |
| --- | --- | --- |
| ? |  | “” |
| ? |  | “” |

;   
 “  
   
   
   
$   
   
   
 ”. B   
   
   
 ,   
   
 . X   
 $ , #   
 ,   
   
   
:

!

!

!

!

!

…………

4

[   
 , #

,   
   
   
 . k #

“  
   
 ”   
 \*   
   
   
   
 R #  
 \*. l   
 “  
   
   
   
   
 ”. a\*   
 “  
   
   
   
 - ”. [ &   
 .   
   
   
   
 - /aa\*/,   
 “   
   
   
   
 - ”. Z / [a]\* /   
 “  
   
 - - ”. [ &   
   
 .

l  
   
 ,   
 $   
 :

. [   
 $ / [0-9][0-9] \*/. B

,   
 #-   
   
 “   
 ”   
   
 . [ R #  
 +,   
 “   
   
   
   
 $ ”. [ / [0-9]+ /   
   
 “   
 ”. Z   
   
   
   
   
 $ / \* ! / / + ! /.

;  
   
 $   
   
 (/ . /) , #   
   
 .

|  | % | B |
| --- | --- | --- |
| / . / | X #   “ ” | , |

Z   
   
 R #  
 \*   
 “ #   
   
 $ ”. X ,   
 #   
   
 ,   
 aardvark, & . ;   
 / aardvark . \* aardvark /.

R $   
   
 $ , “ ”. X #- ^ $ . % ^   
   
   
 . q   
 / ^h /   
 h   
   
 . Z   
   
 ^ :   
   
   
 , $   
   
   
   
   
 . % $   
   
 . % $   
   
   
   
 /^R \./$   
 , # ! “R ”.

Z & : \b   
   
   
 , \B   
   
   
   
 . [ /\b \b/   
 ,   
   
   
 “ ”. ;  
   
   
 , Perl   
   
 ;   
   
 !   
 $   
 $   
 Perl C.

5

***,***

B ,   
   
   
 :   
   
 . #   
   
   
 . X   
   
   
 “ ”,   
   
 ,   
 , & | . ; /

| /   
   
   
   
 .

B   
   
   
   
 -   
 . X , ,   
   
! $   
   
 . R guppy ( ) guppies? X / gupp | ies /, & &   
 guppy ies. [ , &   
 guppy   
   
 |. l   
   
   
   
 ( ) . ; / gupp ( y|ies ) / ,   
   
   
 y ies.

R   
 , R #  
 \*. " R #  
 \*   
   
   
   
 $ ,   
 $   
 . B ,   
 &   
   
$   
   
 . Z , #   
 R   
 1, R   
 2, R   
 3. Z /

R   
 [0-9]+ \*/   
   
   
 . l   
   
 ,   
 $   
 . %   
 / (R   
 [0-9]+ \*)\*/, #   
 R   
 ,   
   
 . Z ,   
   
 #   
   
 . % & $   
 ,   
 #-   
 #-  
 .

| R | ( ) |
| --- | --- |
| i | \* + ? {} |
| B | the ^ my end$ |

;   
 . [a- ]\* “   
 ”. [a- ]\*   
 “  
   
 ”,   
   
   
 & , , , , .   
   
   
   
 #-   
 .

6

R ( )   
 ,   
 &  
 . X , ‘ the Xer they were, the Xer they will be’, :   
 &   
 . B X X /1, : the(.\*)er they were the \1er they will be. [ /1 &   
 &   
 . [ &   
 The bigger they were, the bigger they will be,   
   
   
 The bigger they were, the faster they will be. g : \2   
   
   
 $ . X the (.\*)er they (.\*), the\1er they \2 &   
 The bigger they were,

the bigger they were,   
   
   
 The bigger they were, the bigger they will be. [   
 ( . . 1, 2, 3 .  
.).

B ,   
   
 ,   
   
   
 #   
   
 “the”. B (  
   
   
) : /the/. S   
 , $ &   
 ,   
   
   
   
 (  
 . The).

" : /[tT]he/. X   
   
 ,   
   
 “the” (  
 . other theology). [ ,   
   
 ,   
   
$   
 $   
   
 , . . /\b[tT]he\b/.

k ,   
   
   
 /\b/? ; , /\b/

,

“the”   
 #   
 , &   
 (the\_ the25). X   
   
 ,   
   
$ ,   
   
   
 the: /[ˆa-z][tT]he[ˆa-z]/.

X &   
 : #   
 “the”,   
   
 . [ #   
 [^a-z],   
 theS ,   
   
   
 (   
 -   
) “the”- . ;   
   
 , “the”   
   
   
   
   
 -   
 : /(ˆ|[ˆa-z])[tT]he[ˆa-z]/.

7

***-***

X   
 -   
   
   
 . k ,   
 ,   
   
   
   
 . B 233 Mhz 32;B   
 - 1000$. l   
   
 &   
 233Mhz 32 MB, “Compaq” “Mac”, 999.99$.   
 $ &   
   
 .

B   
   
   
 $   
 . S   
   
 ,   
   
 $ ! . l , Perl   
 “   
”, ,   
 $   
   
 #   
 : /$[0-9]+/. % &   
 . ]   
 $ !   
 : /$[0-9]+\.[0-9][0-9]/. [ $199.99,   
   
 $199. [   
 $   
   
   
 , ,   
 $   
 : /\b$[0-9]+(\.[0-9][0-9])?\b/.

h &   
   
   
 $ ( Mhz)   
 (   
   
 & MB)? [   
 : /\b[0-9]+ \*(Mhz|[Mm]egahertz)\b/; /\b[0-9]+ \*(MB|[Mm]egabytes?)\b/.

l , “ ”\*   
   
   
 “  
   
 ”. #   
 ( GB = Gigabytes),   
   
   
   
 ( “5.5 GB”): /\b[0- 9](\.[0-9]+)? \*(GB|[Gg]igabytes?)\b/.

X ,   
 , $   
  
 :/\b(Win|Win95|Win98|WinNT|Windows \*(NT|95|98)?)\b/; /\b(Mac|Macintosh|Apple)\b/.

& $   
   
 $   
 :

| ^  $ #  . |
| --- |

8

| \ $         &  \t $  \r &  \n  \f  |  ()  []   , # [^] ^ [] &  [-] - [] !  !  \w - , $ ! '\_' ,   : [a-zA-Z0- 9\_]  \W     \w  \s     ,   : [\ \t\r\n\f]  \S     \s  \d $ ! ,   : [0-9]  \D     \d  $  “ ” -     #-   :  \*   0 +   1 ?  {n}   n  {n,}   n {,m}   m - {n,m}   n m  “  ” -     #- :  \*? , +? , ?? , {n}? , {n,}? , {,m}? , {n,m}? |
| --- |

% & $ ! :

| i |
| --- |

9

| g |
| --- |

[ $   
$   
   
 :

| B  $ 0: $ ,   &         #-   $   .  B  $ 1: "   a|b|c..., &     #- , &     $   .  B  $ 2: ?, \*, + {n,m} &       #- #   , & $     . ??, \*?, +?, {n,m}? &       #- #   , & $     .  B  $ 3: h     ,   #- (  -) , & , &       #- (  #- )   , $     . % &   #- &   &   . .     . |
| --- |

%   
 # R #  
 \* R #  
 +, &   
 , !   
 .   
 /{ 3 }/   
 “   
 3   
   
   
 ”. % &   
 , / {n, m} /   
 n m   
   
   
 , / {n, } /   
   
 n   
   
   
 .

**(Finite-State Automat)**

% &   
   
   
 , # &   
   
   
   
 : #  
 (Rh).   
   
   
   
 (   
   
   
 , #   
 ). ! &   
 #  
   
   
 ! &   
   
   
   
   
   
 , & .   
   
   
   
 , #  
   
   
 & .

10

***!***

*,   
   
   
   
,   
   
 .*

*(   
 , !   
 "   
   
 # )*

X   
   
 $ . k !   
   
 :

baa!

baaa!

baaaa!

baaaaa!

baaaaaa!

baaaaaaa!

………….

B   
   
 baa+!. Y 1   
   
   
 .

**1:   
   
 .**

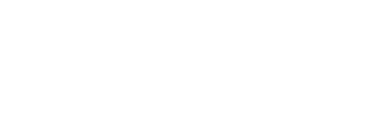
****

h ( #  
 , FSA)   
   
   
 , #   
   
 $ , &   
   
, #   
 . B   
   
   
 & !: #  
   
   
   
   
   
 ( &   
   
 ),   
   
   
   
 # ,   
   
 . X & , . h   
   
 ! . %   
 0   
 ,   
 & . %   
 4 #  
   
 ,   
 . Z & ,   
 ! .

11

R #  
   
   
   
 (   
 )   
   
   
   
   
. B   
   
   
   
   
   
   
   
   
 ,   
 ! 2.

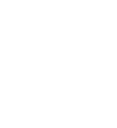
**2**

****

;   
   
 (q0), &   
   
   
 $ : &   
 . h   
   
   
 & &   
 , ,   
 # &   
 &   
 . h #  
   
   
   
 ,   
   
   
   
 $ . h   
   
   
   
 #  
   
 , &   
   
   
 #  
   
 ,   
   
   
 .

; $   
   
 . R   
   
   
 ! , $   
   
   
 ,   
 , &   
 . % $   
   
 ! 1.

**3**

****

12

X   
 4   
 , #  
   
 ( #  
   
 , ), 0   
   
 & . B : “h   
   
 0 b,   
   
   
 1. h   
 0 !,

.”

B !   
   
 !   
   
 :

• Q:   
 N   
 q0, q1, …, qN

• ë:   
 (   
 )

• q0:

• F:   
 #  
   
 , F   
   
 Q

í(q,i):   
 !   
 $   
 $   
 . k   
   
   
 qìQ iìë, í(q,i) &   
   
 q’ìQ. í   
 Q x ë Q;

l   
 $ ! 1, Q={q0, q1, q2, q3, q4}, ë={a,b,!}, F={q4} í(q,i) !   
   
 $   
   
 ! 3.

Y 4   
   
   
   
 , # $   
   
 . h   
 D-RECOGNIZE   
   
   
   
   
   
 . k   
   
 , #   
   
 ;   
   
 #. % & &   
   
   
 , #   
 .

D-RECOGNIZE   
 . &   
 ,   
   
   
   
 ,   
 # . [ , D RECOGNIZE # #   
   
. X   
 , #   
   
   
 ,   
   
 (   
   
 & ).

D-RECOGNIZE   
 $   
   
   
   
   
 &   
 (index, current-state) &   
   
   
   
   
   
 , #   
 $ . D-RECOGNIZE ,   
 . [ #   
   
 . h , #

13

( &   
 )   
 , .

h   
   
   
 , D-RECOGNIZE $   
 ,   
   
 . B   
 &   
 (current-state) #   
 $   
, &   
   
   
 $   
 . R   
 $   
   
 &   
 (current state)   
   
 (index),   
   
 . h   
 $   
 ,   
 .

**4:** h , #   
   
 . [ & accept ( ), $   
   
   
   
 #  
   
 ,   
   
 .

**function** D-RECOGNIZE(*tape, machine*) **return** accept or rejest

*index* ñ Beginning of tape

*current-state* ñ Initial state of machine

**loop**

**if** End of input has been reached **then**

**if** current-state is an accept state **then**

**return** accept

**else**

**return** reject

**elsif** *transition-table[current-state, tape[index]]* is empty **then return** reject

**else**

*current-state 7 transition-table[current-state, tape[index]]*

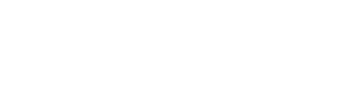
*index 7 index+1*

**end**

Y 5   
   
   
 #  
   
 $ & baa!

14

**5:** "   
   
   
   
   
   
 #1   
   
 $ .



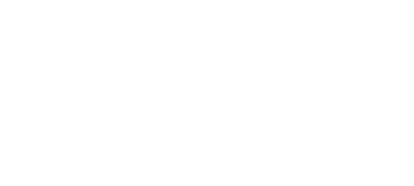
B   
   
   
   
 ,   
   
 q0. X   
   
 b   
   
   
   
   
   
 q1,    
   
   
 $   
   
 [q0, b]. %   
   
   
 q2,  &   
   
 q3,    
 q3,  !   
 q4. k   
 ,   
   
   
   
   
   
   
   
 q4.  %   
 q4    
 , . .   
   
 baaa!,   
   
   
 $ .

h &   
 ,   
   
   
   
 $   
 . abc   
   
   
   
   
 q0   
 ( . .   
 $   
 0). k   
   
 ,   
 &   
   
 ,   
 . X   
   
 $   
 ,   
   
   
 , &   
 &   
   
   
 . [ , #   
   
 ,   
 &   
 $   
   
 ,   
 ,   
   
 #   
 . l $   
 , ! 6   
 ! 1 &   
 qf.

; & ! ! 1   
   
   
   
 $ . h   
 , ,   
 q0    
   
 # , . R   
 #  
   
 , # . [ ,   
 3,   
   
 !   
 4,

15

3. l   
   
   
   
   
   
 : #  
 . X   
   
 #   
   
   
 $ & ,   
   
   
   
 $ .

**6:** k   
   
 &   
 ! 1.

**/ 0 1:** *:  
 ,   
;   
   
   
   
   
,   
   
   
 < < ;   
 < "   
 < < .*

"! $   
   
   
 ,   
   
   
   
   
   
   
 ( &   
 !   
   
   
 ). h   
 $   
 : ë = ,b,! . k # m (   
   
 )   
 L(m),   
 “ ! $   
 !

m”. "! $   
 !   
   
   
 $ m

#  
 :

L(m) = {baa!, baaa!, baaaa!, baaaaa!, baaaaaa! …}

h   
 !   
   
   
 , &   
   
 ( )   
 ! . "! $   
   
 &   
 , # $ , . &  
   
   
   
   
   
 ( ! $

). X

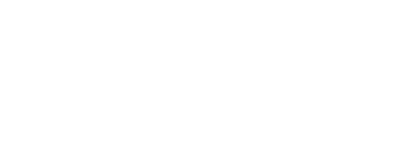
! $   
   
   
   
 , !   
 , !   
 . [

16

! $   
 ;   
   
 !   
   
   
   
   
   
   
 .

! $   
 ,   
   
   
   
 -   
 & . B   
   
   
   
 , # !   
 $ . R & ,   
 , #   
 # ,   
 & . R ! $   
 &   
 # & ! 10 $   
 , 3 , 1 35 $   
 .  
.

l   
   
 , #   
 1 99, $   
 .

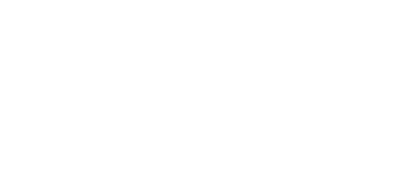
**7**: R   
   
 1 99   
   
 # .

% $   
 . Y 8   
 ,   
   
   
   
 ! 7   
 $   
 .

%   
 ; & $ . [ &   
 , &   
 $   
   
   
 ,   
   
   
   
   
   
 $   
   
   
   
 , 10 $   
 2 . [   
   
 . l #  
   
 ! 7 8   
   
 # . X &   
   
   
 -   
 .

17

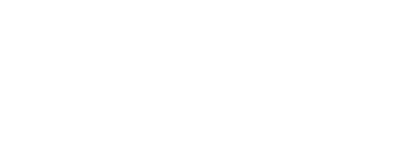
**8:** R   
 $   
 .



***" !   
 (" $%)***

% & #  
 –   
   
   
 . X ! 9   
 XkRh &   
 $ .

**9:** XkRh   
 $ (XkRh #1).

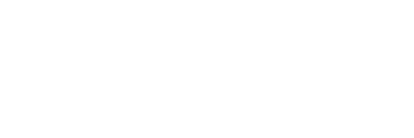


S   
   
   
 ,   
 ! 9   
 2   
 3. R   
   
 2   
   
   
   
 3. h ,   
   
 XkRh.

18

Z & XkRh, #   
 ,   
 . % , #   
 $   
 .

**10:** k XkRh   
 $ (XkRh #2).



***" $%***

h   
   
   
$   
   
 $   
 XkRh   
   
 ,   
   
 , . [   
   
   
   
   
 . [   
   
   
   
 &   
   
 ,   
   
   
   
 . % &   
   
   
   
 :

• **5 67   
 0:** R   
   
 ,   
 , ,   
   
 ,   
   
   
   
 .

• **/ 0 6 6 8 9 :** [   
   
 ,   
   
 .

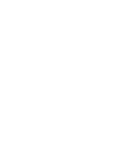
• **:   
6 :** R   
   
   
 ,   
   
   
 & .

] &   
   
 . [   
   
 ,   
   
, #   
 &   
   
   
   
   
 . % &

19

:   
   
   
   
   
   
   
! $   
 ,   
   
 . R &   
   
   
   
 ,   
   
   
 $ ( &   
   
   
   
 ), # &   
   
   
 , #   
   
   
   
 .

**11**

****

B #   
 $   
   
   
   
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 XkRh   
   
   
   
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 $ ND-RECOGNIZE   
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**12**

**function** ND-RECOGNIZE(tape, machine) **returns** accept or reject

*agenda* ñ{( Innitial state of machine, beginning of tape)}

*current-search-state* ñNEXT(*agenda*)

**loop**

**if**ACCEPT-STATE? (*current-search-state*) returns true **then**

**return** accept

**else**

*agenda*ñ agendaöGENERATE-NEW-STATES(*current-search-state*) **if** *agenda* is empty **then**

**return** reject

**else**

*current-search-state* ñNEXT(*agenda*)

**end**

**function** GENERATE-NEW-STATE(*current-state*) **returns** a set of search-states

*current-node*ñ the node the current search-state is in

*index* ñ the point on the tape the current search-state is looking at **return** a list of search states from transition table as follows: (*transition-table*[*current-node, e*], *index*)

ö

(*transition-table*[*current-node, tape* [*index*]], *index+1*)

**function** ACCEPT-STATE?(*state*) **returns** true or false

*current-state 7* the node search-state is in

*index* ñ the point on the tape search-state is looking at

**if** *index* is at the end of the tape **and** *current-node* is an accept state of

machine **then**

**return** true

**else**

**return** false

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 ND-RECOGNIZE baaa!. $   
   
   
   
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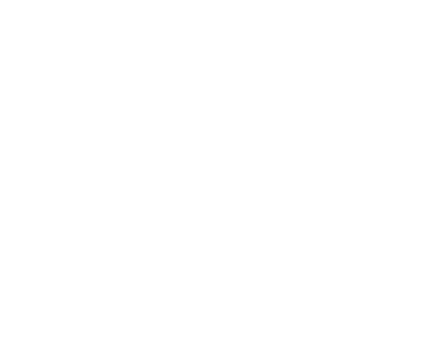
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 [q2, a] &   
 q2  q3. %

22

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23

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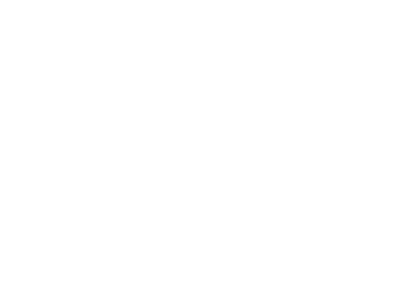
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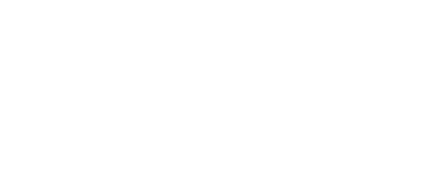
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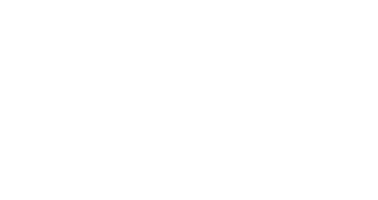
28

**15:** R   
   
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32