put will do one of three possible actions:

- 1. update the value of an existing entry;
- 2. add a new entry but not change top;
- 3. add a new entry and change top and possibly add new levels.

| В | | | | | | | 0 | | | @T | | | |
|---|---|---|---|--|---|---|---|---|--------|----|---|---|---|
| В | | F | G | | | | 0 | | | Т | U | | |
| В | С | F | G | | K | M | 0 | Q | | Т | U | W | Z |
| | | | | | | | | | R 3 | | | | |

Remember any entry in the top level list could be top.

| | В | | | | | | | 0 | | | @T | | | |
|--|---|---|---|---|--|----|---|---|---|--|----|---|---|---|
| | В | | F | G | | | | 0 | | | Т | U | | |
| | В | С | F | G | | K | M | 0 | Q | | Т | U | W | Z |
| | | | | | | *K | | | | | | | | |

put.txt Fri Mar 20 16:36:10 2020 2

1. put(K, 3) calls rFind(@, K) and gets back a bottom entry (*).

| В | | | | | | | 0 | | | @T | | | | |
|---|---|---|---|--|---------|---|---|---|--|----|---|---|--------|---|
| В | | F | G | | | | 0 | | | Т | U | | | |
| В | С | F | G | | K | M | 0 | Q | | Т | U | W | | Z |
| | | | | | *K 3 | | | | | | | | Х 2 | |

put.txt Fri Mar 20 16:36:10 2020 3

put(K, 3) sets its value.

| | В | | | | | | | 0 | | | @T | | | |
|--|---|---|---|---|--|---|--------|---|---|--|----|---|---|---|
| | В | | F | G | | | | 0 | | | Т | U | | |
| | В | С | F | G | | K | M | 0 | Q | | Т | U | W | Z |
| | | | | | | | M 0 | | | | | | | |

2. put(N, 6) calls rFind(*, N) and gets back null.

put.txt Fri Mar 20 16:36:10 2020 4

| В | | | | | | | 0 | | @T | | | |
|---|---|---|---|---|---|---|---|---|----|---|---|---|
| В | | F | G | | | | 0 | | Т | U | | |
| В | С | F | G | K | M | N | 0 | Q | Т | U | W | Z |

5

put.txt Fri Mar 20 16:36:10 2020

2. put(N, 6) calls rAdd(*, N, 6) and gets back null because N did not three heads in a row (see rAdd.pdf).

| | В | | | | | | | | 0 | | | @T | | | |
|--|--------|---|---|---|--|---|---|---|---|---|--|----|---|---|---|
| | В | | F | G | | | | | 0 | | | Т | U | | |
| | В | С | F | G | | K | M | N | 0 | Q | | Т | U | W | Z |
| | B 3 | | | | | | | | | | | | | | |

^{3.} put(D, 7) calls rFind(*, D) and gets back null.

put.txt Fri Mar 20 16:36:10 2020 6

| В | +D | 0 | @T | |
|---|----|---|----|--|

put.txt Fri Mar 20 16:36:10 2020

| В | | +D | | | | | | | O | | | @T | | | |
|---|---|--------|---|---|--|---|---|---|---|---|--|----|---|---|---|
| В | | D | F | G | | | | | 0 | | | Т | U | | |
| В | С | D | F | G | | K | M | N | 0 | Q | | Т | U | W | Z |
| | | D 7 | | | | | | | | | | | | | |

^{3.} put(D, 7) calls rAdd(*, D, 7) and gets back a new Entry (+) because D was lucky and threw three heads in a row.

| put.txt | Fri | mar | 20 | T0:30:T0 | 2020 | 8 |
|---------|-----|-----|----|----------|------|---|
| | | | | | | |
| | | | | | | |

| В | | @D | | | | | | | 0 | | | Т | | | |
|--------|---|----|---|---|--|---|---|---|---|---|--|---|---|---|---|
| В | | D | F | G | | | | | 0 | | | Т | U | | |
| В | С | D | F | G | | K | M | N | 0 | Q | | Т | U | W | Z |
| B 3 | | | | | | | | | | | | | | | |

^{3.} put(D, 7) makes this new Entry the top. put starts flipping a coin.

| put.txt | Fri | Mar | 20 | 16:36:10 | 2020 | 9 |
|---------|-----|-----|----|----------|------|---|
| | | | | | | |

@D

0 Т В D T U В D F G 0 В С D F G K M N 0 U W Z G I J K L M N 6 7 0 2 9 0 6 A B С D F 0 Ρ Q R S Т U W Х Z 8 8 4 6 3 5 6 3 2 0

^{3.} put(D, 7) flips heads, so it creates a new Entry whose value is the old top and makes that Entry the new top.

@D

D O

B D F G O T U

B C D F G K M N O Q T U W Z

A B С D F G I J K L M N O P Q R S Т U W X Z 1 8 7 0 2 9 0 6 8 4 6 3 5 6 3 2 0

3. put(D, 7) flips heads, so it creates a new Entry whose value is the old top a nd makes that Entry the new top.

@D

D

В D 0

В D F G T U

B C D F G K M N O Q $\texttt{T}\quad \texttt{U}\quad \texttt{W}\qquad \quad \texttt{Z}$

 $\hbox{\tt A} \hbox{\tt B} \hbox{\tt C} \hbox{\tt D} \hbox{\tt F} \hbox{\tt G} \hbox{\tt I} \hbox{\tt J} \hbox{\tt K} \hbox{\tt L} \hbox{\tt M} \hbox{\tt N} \hbox{\tt O} \hbox{\tt P} \hbox{\tt Q} \hbox{\tt R} \hbox{\tt S} \hbox{\tt T} \hbox{\tt U} \hbox{\tt W} \hbox{\tt X} \hbox{\tt Z}$ 7 8 6 7 0 2 9 0 6 8 4 6 3 5 6 3 4 2 0

3. D's luck finally runs out: put(D, 7) flips tails.