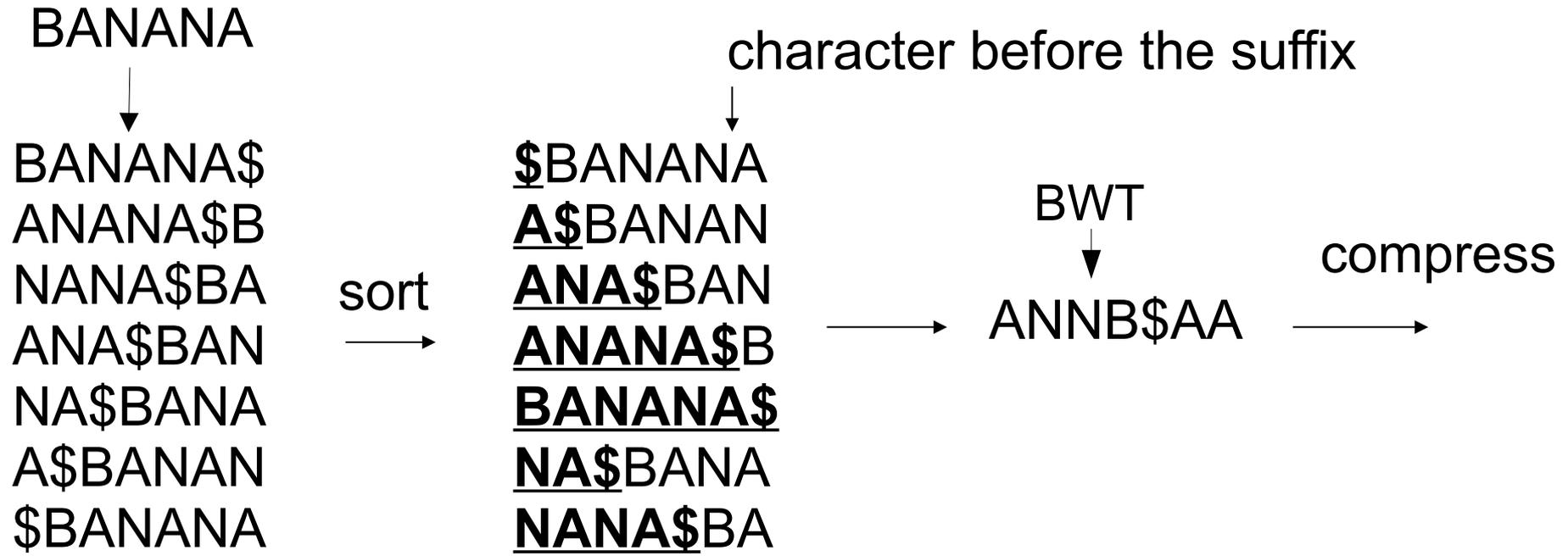


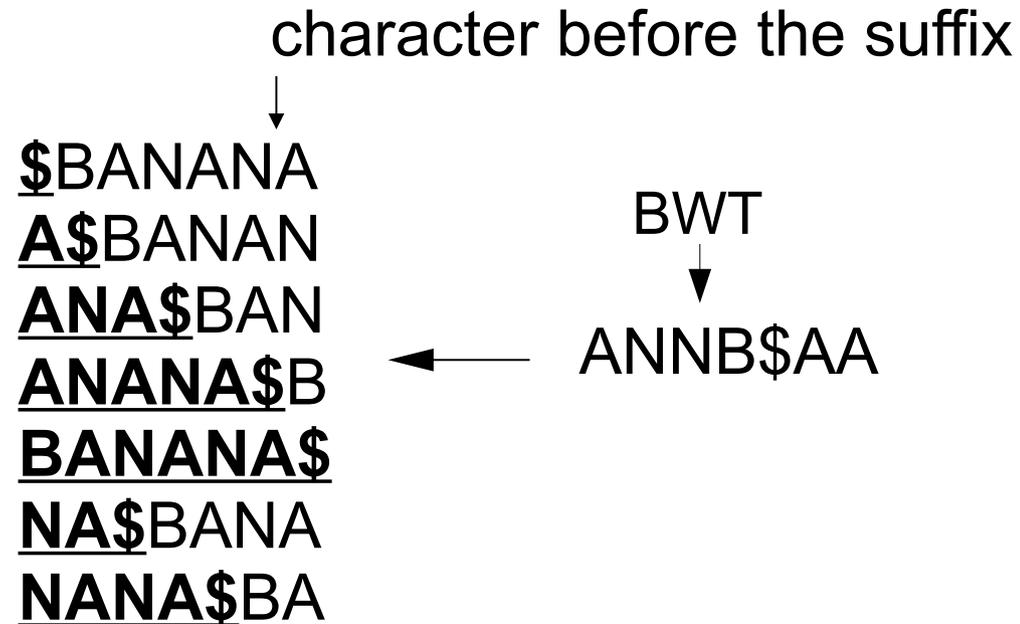
CMSC423: Chapter 9
The Burrows Wheeler Transform

The Burrows-Wheeler Transform

- Originally designed for compression

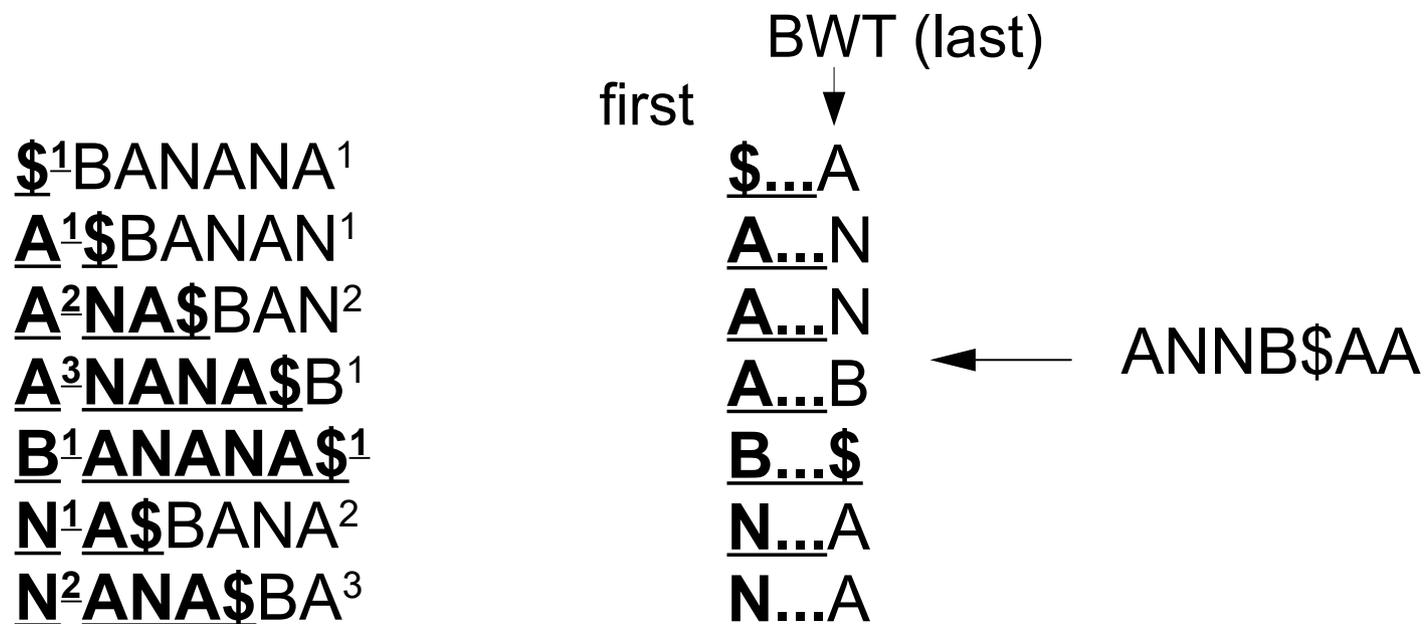


Unscrambling the BWT?



Note: characters in last column occur in same order as in first column

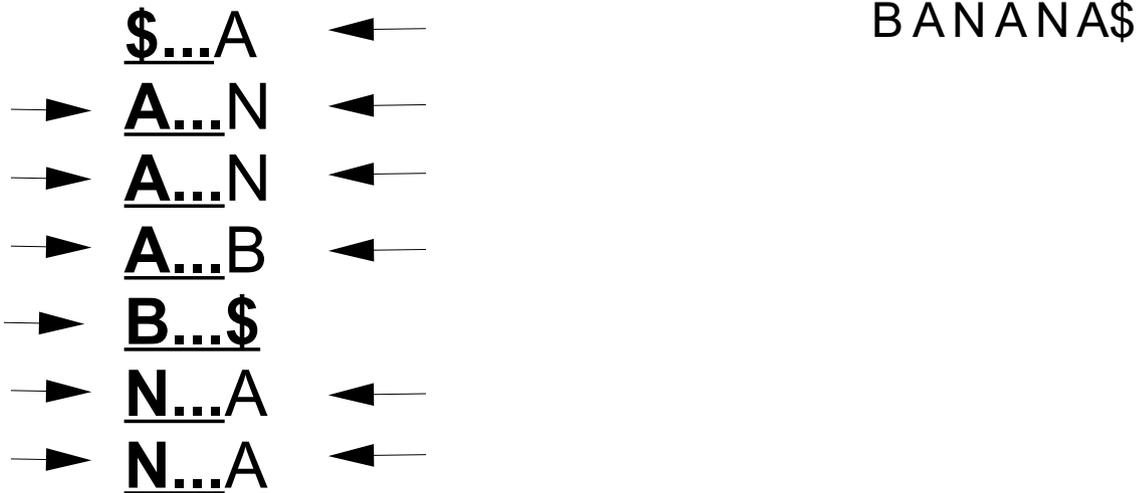
Unscrambling the BWT?



Note: characters in last column occur in same order as in first column

Provides link allowing jumps back and forth between columns

Unscrambling the BWT?

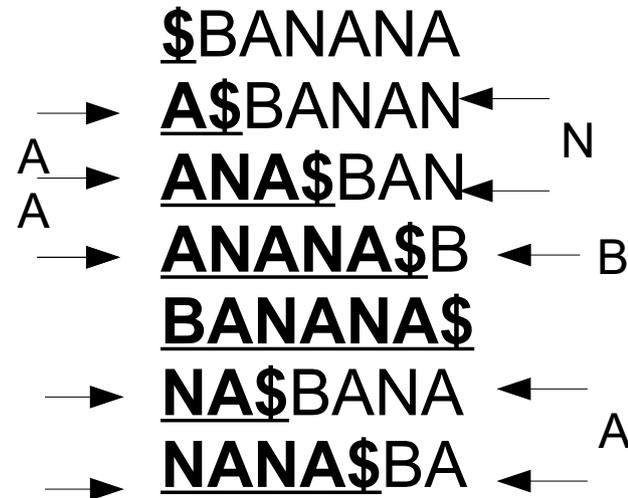


Note: characters in last column occur in same order as in first column

Provides link allowing jumps back and forth between columns

BWT – string matching

- Look for “BANA”
- Start at end (match right to left)
- Find character in rightmost column
- Identify corresponding range in first column
- Switch back to last column
- ...
- Running time?



BWT – string matching

- How do we know the first A in the pattern is the 2nd/3rd from the top of the matrix?
- Note: add'l data needed: # of times each letter appears before every pos'n
- Running time?

<u>\$</u> BANANA	ABN\$
<u>A</u> \$BANAN	0000
<u>A</u> NA\$BAN	1000
<u>A</u> NANA\$B	1010
<u>B</u> ANANA\$	1020
<u>N</u> A\$BANA	1120
<u>N</u> ANA\$BA	1121
	2121

$O(\text{len}(P))$ operations. Each may cost $O(\log(\text{len}(T)))$