

MORSE CODE

Samuel Finley Breese Morse¹ conceived the telegraph system, an early communications network. Messages were transmitted through this system using Morse code, an alphabet of electronic marks in which each English letter is represented by some sequence of dashes and dots. For a more complete explanation of Morse code, see en.wikipedia.org/wiki/Morse_code.



The encoding of English letters is shown in this table:

A	. -	I	..	Q	--.-	Y	-.--
B	-...	J	.---	R	-. .	Z	--..
C	-.-.	K	-. -	S	...		
D	-..	L	.-..	T	-		
E	.	M	--	U	..-		
F	..-.	N	-.	V	...-		
G	---.	O	---	W	.---		
H	P	.-.-.	X	-..-		

Morse transmitted the first telegraphic message over an experimental line from Washington D.C. to Baltimore on May 24, 1844. The message, “WHAT HATH GOD WROUGHT,” a quote from Numbers 23:23, was suggested Annie Ellsworth, the young daughter of a friend of Morse.

Timing

International Morse code is composed of five elements:

- dot — one unit long
- dash — three units long
- intra-character gap between the dots and dashes within a letter — one unit long
- short gap (between letters) — three units long
- medium gap (between words) — seven units long

To illustrate, the phrase “MORSE CODE,” written in Morse code format could look something like:

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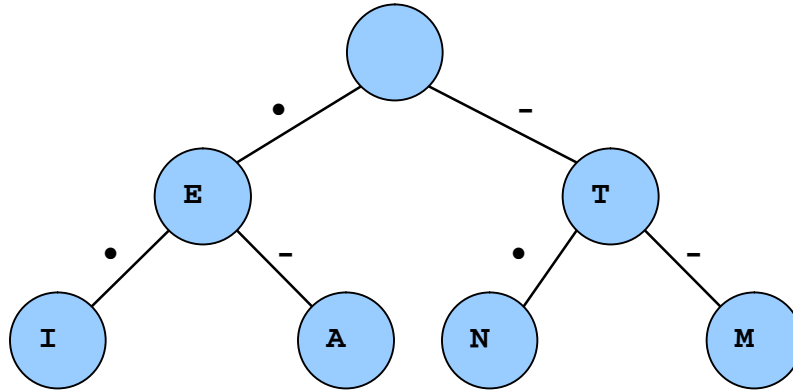
¹ Photograph is courtesy of Library of Congress, Prints and Photographs Division, Detroit Publishing Company Collection.

M O R S E C O D E

Having one space between each letter and seven spaces between the words.

Decoding

Morse code can be decoded with the help of a *dichotomic search tree* as shown below. Each node contains a single letter; each left child corresponds to a dot and each right child to a dash. Part of the dichotomic search tree for Morse code is:



To see the full dichotomic search tree, see the Wikipedia article.

The Assignment

Write a Java application that reads a line of Morse Code and converts it to English characters. You may assume that the input has only the codes of the English letters 'A' to 'Z'. You may also assume that one space separates letters and more than one space separate words. For example:

Input:

--- - - - - . . - - - - -

Output:

MORSE CODE

Input:

. - - - - - - - - - - - - - - . - - - - - - - - - - -

Output:

WHAT HATH GOD WROUGHT