# Assignment 4: Morse code decoder

### ECED 3401 - Systems Analysis

Department of Electrical and Computer Engineering Dalhousie University

### Background

Morse code is a telegraph code in which letters, numbers, and some punctuation symbols are represented by sequences of '.' (dits) and '-' (dahs). It was developed by Samuel Morse for transmitting telegraph messages. He erected the first telegraph line between Washington and Baltimore in 1844.

You are to write a Morse code decoder. Your solution should be able to take any valid Morse code message consisting of dits and dahs, and decode it into the equivalent alphabetic character, number, or punctuation marks.

## Input and Output

0123456789

Your program is to accept one *or more* input files containing Morse code and decode the Morse code into text and write the output to the screen.

Morse encodings within a word are separated by a single space. Spaces between words and new lines are separated by three spaces. The encoding software accepts lower case characters and treats them as upper case. For a complete list of the characters to be supported, see the last page of the assignment.

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#### Submission

You are to submit a design document, the source code of your solution, and a test document including screenshots of your test results.

### Marking

The assignment will be marked as follows:

#### Design

A detailed structured-English (pseudocode) description of your solution.

The design should be sufficiently detailed to allow a C programmer (other than yourself) to implement the solution.

Total points: 2.

#### Software

A fully commented, properly indented, magic-numberless, tidy piece of modular software that meets the requirements described above and meets the design description. Avoid "hard-coding" solutions into the application. The solution should be "general purpose", allowing the programmer to modify the system by changing the data, not the software.

Total points: 5.

#### Testing

You must develop a series of tests that demonstrate the correctness of your Morse decoder.

Total points: 3.

#### Dates

Available: 29 September 2022 (4:00pm)

Due: 9 October 2022 (11:59pm)

#### **Notes**

There are brute force solutions to this problem and there are elegant ones. A good design should lead to an elegant solution.

If you are having difficulties with this assignment or any part of the course, please contact Dr. Hughes or one of the course TAs.

The Morse characters that can be encoded are listed on the next page.

This assignment is worth 3% of your overall grade.

Late assignments will be penalized half-a-point per day starting on 10 October 2022 at midnight.

A Morse encoder (text input file to Morse) is available on the course Teams website (there will be malware warnings, they can be ignored):

Channels > General > Files > Class Materials

Late assignments will not be accepted once a solution has been discussed in class.

## International Morse Code

The following sections list alphabetic, numeric, and punctuation encoding for western characters to Morse code. Tables are taken from <a href="International Morse Code">International Morse Code</a>.

#### Alphabetic

Symbol	Morse		
Α	. –		
В			
С			
D			
Е	•		
F			
G			
Н			
I			
J			
K			
L			
М			

Symbol	Morse		
N			
0			
Р			
Q			
R			
S	• •		
T	-		
U			
V			
W	-		
Х			
Υ			
Z			

#### Numeric

Symbol	Morse
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

#### Punctuation

Symbol	Morse
&	
(	
)	
+	
=	
!	
?	
_	

Symbol	Morse		
,			
u			
/			
,			
9			
:			
•			

## Punctuation

Symbol	Meaning	Morse	Symbol	Meaning	Morse
Error	Error (also <hh>)</hh>		į	Exclamation mark	
&	Ampersand			Full-stop (period)	
'	Apostrophe		-	Hyphen	
@	'At' sign		×	Multiplication sign (also x)	
)	Close parenthesis		%	Percentage (literally 0/0)	 
(	Open parenthesis		+	Plus sign	
:	Colon		п	Quotation marks	
,	Comma		?	Question mark (query)	
=	Equals sign		/	Slash	

Space: <a href="https://morsecode.world/international/timing.html">https://morsecode.world/international/timing.html</a>