Introduction

In this exercise, C++ code is developed to read data from an LS-DYNA (.k) input file and write it into a text file. The goal is to search for a certain keyword in the input file and read the parameter values following the corresponding keyword's name. On the output file, the keyword's name is printed and is followed by a list of the parameters read from the input file.

The LS-DYNA input file (.k) has the following format:

- A keyword's name is written as a left justified format and starts with a (*).
- A line starting with a ($) sign is a comment and is ignored while reading input.
- Blank lines that are not part of a keyword parameter set cause error.

The following figure presents some keywords as listed in the LS-DYNA .k input file.

```
*CONTROL_TERMINATION
$    endtim    endcyc    dtmin    endneg    endmas
 3.000E-02
$
*CONTROL_ENERGY
$     hgen      rwen    slnten     rylen
         2         2         2
$
*CONTROL_OUTPUT
$    npopt    neecho    nrefup    iaccop     opifs     ipnint    ikedit
         1         3
$
*DATABASE_BINARY_D3PLOT
$       dt      lcdt
 5.000E-04
$
*DATABASE_EXTENT_BINARY
$    neiph     neips    maxint    strflg    sigflg    epsflg    rltflg    engflg

$    cmpflg    ieverp    beamip
                   1
$
*DATABASE_BINARY_D3THDT
$       dt      lcdt
    999999
$
$
```

For instance, for the keyword (*CONTROL_TERMINATION), the following result is written to the output file.

```
*CONTROL_TERMINATION
{3.000E-2, 0, 0, 0, 0, 0, "", ""}
```

If the value of a parameter is not set, then its default value is assigned and written to the output file.

Keywords and Assumptions

In this study, the code is developed to read parameters for the keywords (*CONTROL_TERMINATION), (*AIRBAG_SIMPLE_AIRBAG_MODEL), and *NODE. Variables and their default values for these keywords are as follows:

*CONTROL_TERMINATION

Card 1	1	2	3	4	5	6	7	8
Variable	ENDTIM	ENDCYC	DTMIN	ENDENG	ENDMAS	NOSOL		
Type	F	I	F	F	F	I		
Default	0.0	0	0.0	0.0	1.0E+08	0		
Remarks	1		2					

*AIRBAG_SIMPLE_AIRBAG_MODEL

Card 1	1	2	3	4	5	6	7	8
Variable	SID	SIDTYP	RBID	VSCA	PSCA	VINI	MWD	SPSF
Type	I	I	I	F	F	F	F	F
Default	none	0	0	1.	1.	0.	0.	0.
Remark			optional					

Card 3	1	2	3	4	5	6	7	8
Variable	CV	CP	T	LCID	MU	AREA	PE	RO
Type	F	F	F	I	F	F	F	F
Default	none	none	none	none	none	none	none	none

Card 4a	1	2	3	4	5	6	7	8
Variable	LOU	T_EXT	A	B	MW	GASC		
Type	I	F	F	F	F	F		
Default	0	0.	0.	0.	0.	0.		

Card 4b	1	2	3	4	5	6	7	8
Variable	LOU							
Type	I							
Default	0							

For the *AIRBAG_SIMPLE_AIRBAG_MODEL keyword, there are additional variables present in the LS-DYNA manual. However, here we assume variables shown in the figure for simplicity. Card 1 and Card 3 are always required and are assumed to always be present. Card 4a and Card 4b are conditional. Card 4a appears in the input if CV=0 and Card 4b appears when CV ≠ 0. Furthermore, the following assumptions are considered while developing the code:

- Each line is presented in the fixed format mentioned in the LS-DYNA manual. This means that each line is 80 characters and is divided into 8 columns of 10 characters. Value of variables are defined in each column.
- If an additional blank line is present, the code will make an error and execution will be stopped.
- If the set of variables is not complete for a keyword, the code will not execute and will exit with an error.
- If a line contains a comma ",", then the content of the line will be divided based on the comma.