Data Structure Assignment 3
Open Source的使用 Guide

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1 System architecture

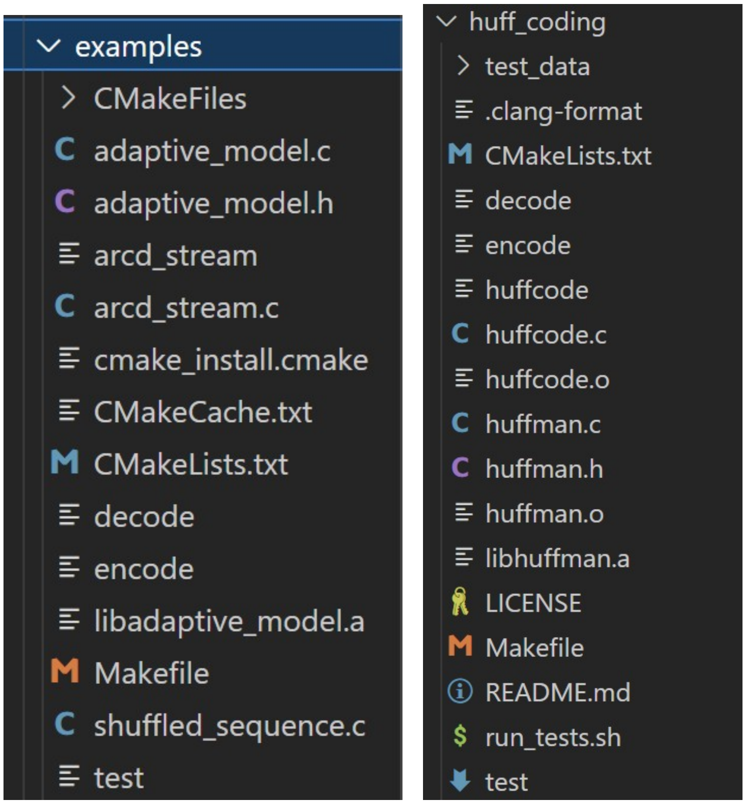
Compiler：Visual Studio Code
Version: 1.74.0
OS: Windows_NT x64 10.0.22000

Building environment：Windows 10 Linux Subsystem(WSL2)
Release: Ubuntu 20.04 LTS
Kernel: Linus 5.10.16.3-microsoft-standard-WSL2

Extensions
gcc version：9.3.0
gdb version：9.2
git version：2.25.1

2 Build Guide

Arithemtic coding使用CMake與Makefile編譯程式。
Huffman coding使用Makefile編譯程式。



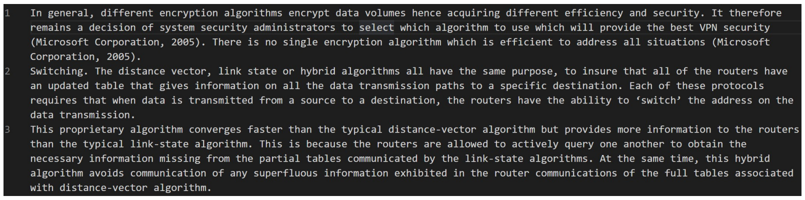
```
examples
  CMakeFiles
  adaptive_model.c
  adaptive_model.h
  arcd_stream
  arcd_stream.c
  cmake_install.cmake
  CMakeCache.txt
  CMakeLists.txt
  decode
  encode
  libadaptive_model.a
  Makefile
  shuffled_sequence.c
  test
```

```
huff_coding
  test_data
  .clang-format
  CMakeLists.txt
  decode
  encode
  huffcode
  huffcode.c
  huffcode.o
  huffman.c
  huffman.h
  huffman.o
  libhuffman.a
  LICENSE
  Makefile
  README.md
  run_tests.sh
  test
```

Figure 1: Result of Makefile

3 Execute Guide

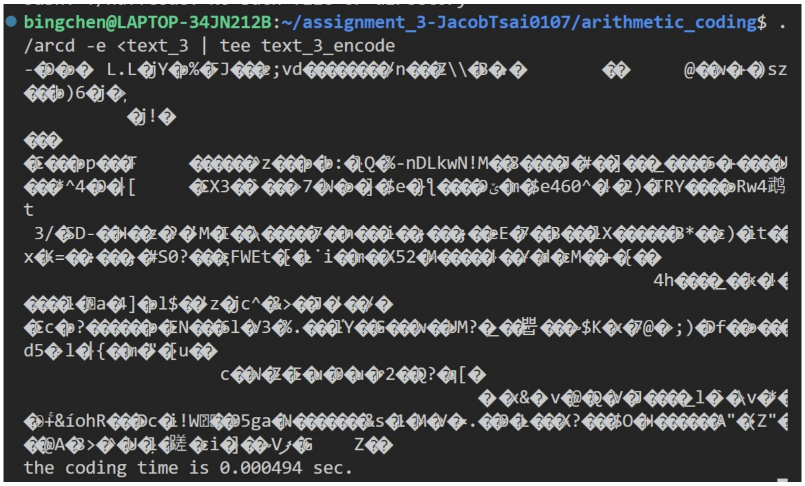
本次測試文件為4個網路上隨機生成之短文，下圖為其中一篇文章及其執行結果，全文如下：



```
In general, different encryption algorithms encrypt data volumes hence acquiring different efficiency and security. It therefore
remains a decision of system security administrators to select which algorithm to use which will provide the best VPN security
(Microsoft Corporation, 2005). There is no single encryption algorithm which is efficient to address all situations (Microsoft
Corporation, 2005).
Switching. The distance vector, link state or hybrid algorithms all have the same purpose, to insure that all of the routers have
an updated table that gives information on all the data transmission paths to a specific destination. Each of these protocols
requires that when data is transmitted from a source to a destination, the routers have the ability to ‘switch’ the address on the
data transmission.
This proprietary algorithm converges faster than the typical distance-vector algorithm but provides more information to the routers
than the typical link-state algorithm. This is because the routers are allowed to actively query one another to obtain the
necessary information missing from the partial tables communicated by the link-state algorithms. At the same time, this hybrid
algorithm avoids communication of any superfluous information exhibited in the router communications of the full tables associated
with distance-vector algorithm.
```

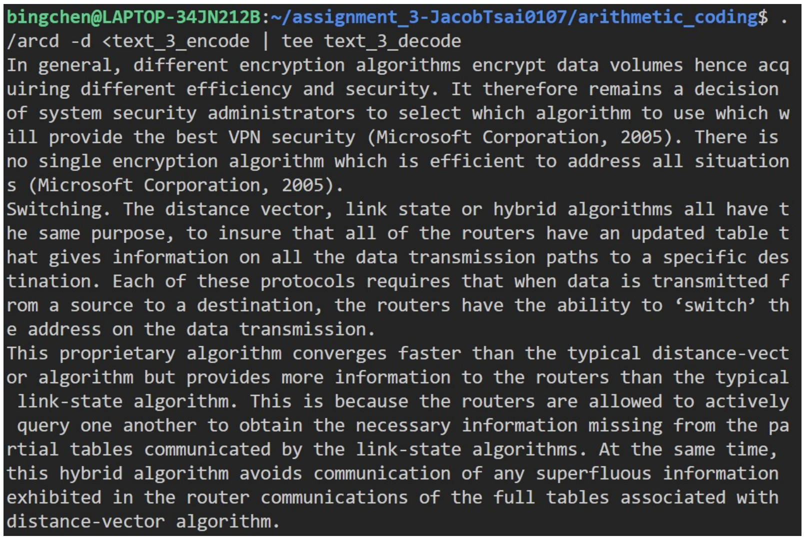
Figure 2: Test file

下圖為Arithemtic coding的運行結果，詳細指令請見README。



```
bingchen@LAPTOP-34JN212B:~/assignment_3-JacobTsai0107/arithmetic_coding$ .
/arcd -e <text_3 | tee text_3_encode
-���� L.L�jY�p%�FJ���;vd���������/n���Z\\�B�.�        ��      @���w�+�)sz
���b)6�j�,
          �j!�
���
�C���pp���T     �������^z���p�b:�lQ�%-nDLkwN!M��8����J�#��]���_����6�+����U
���*^4�O�|[     �CX3��`���7�N�o�]�$e�}l����9ﺩ�m�$e460^�!�2)�TRY����oRw4鵡
t
 3/�SD-��H��z�?�'M�I��\�����7��n���i��;���;��eE�7��B���lX������B*��c)�it��
x�K=��:���;�#S0?���;FWEt�[�L˙i��m��X52�M�����!��Y�d�cM��+�{��
                                                                  4h����_��k�!�
����l�a�4]�pl$��'z�jc^�&>��J�'��/�
�Cc�p?������p�EN���6l�V3�%.���lY��G���w��UM?�_��䏩���~$K�x�7@��;)�Df��o���
d5�l�|{��m�"�[u��
                    c��N�Z�E�u�0�u�r2��Q?�q[�
                                                    ��x&�v�@�Q�V�J����_l�`�\v�*�
�0ǂ&íohR���Dc�i!W��05ga�N��������&s�1�M�V�-.��0�L���X?���$O�H������A"�(Z"�
��@A�3>�^�U�l�蹉�ci�]��~V۶�G    Z��
the coding time is 0.000494 sec.
```

Figure 3: Arithemtic Encoding



```
bingchen@LAPTOP-34JN212B:~/assignment_3-JacobTsai0107/arithmetic_coding$ .
/arcd -d <text_3_encode | tee text_3_decode
In general, different encryption algorithms encrypt data volumes hence acq
uiring different efficiency and security. It therefore remains a decision
of system security administrators to select which algorithm to use which w
ill provide the best VPN security (Microsoft Corporation, 2005). There is
no single encryption algorithm which is efficient to address all situation
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this hybrid algorithm avoids communication of any superfluous information
exhibited in the router communications of the full tables associated with
distance-vector algorithm.
```
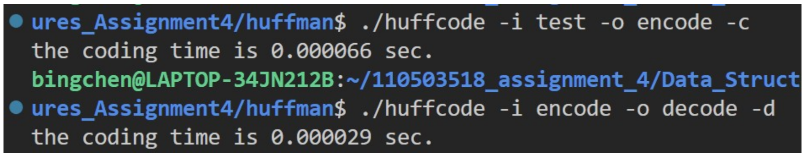

Figure 4: Arithemtic Decoding

下圖為Huffman coding的運行結果，詳細指令請見README。



```
● ures_Assignment4/huffman$ ./huffcode -i test -o encode -c
  the coding time is 0.000066 sec.
  bingchen@LAPTOP-34JN212B:~/110503518_assignment_4/Data_Struct
● ures_Assignment4/huffman$ ./huffcode -i encode -o decode -d
  the coding time is 0.000029 sec.
```

Figure 5: Huffman Encoding and Decoding