

COMP500 / ENSE501: Week 11 – Exercise:

EXERCISE NAME: IEEE 754

The first four bytes of the binary `floatdata.bin` file contain an integer which describes how many floating-point values are stored in the file following the first four bytes.

Read in the first four bytes, into an `int` to discover how many floating-point values are in the file.

Next, read in each of the floating-point values in the file. For each floating-point value analyse the bits of the number.

Remember, an IEEE-754 floating-point number is made up of the following parts:

- 1 bit – sign bit: 0 means positive, 1 is negative;
- 8 bits – exponent;
- 23 bits – mantissa;

Using the `floatdata.bin` file available on Blackboard, the program's partial output will be as follows:

```
Found 100 floating-point values in floatdata.bin

Analysing 91.760597:
Sign bit:      Positive
8-bit exponent: 133
23-bit mantissa: 3638637

Analysing 40.363304:
Sign bit:      Positive
8-bit exponent: 132
23-bit mantissa: 2192390

Analysing 53.259911:
Sign bit:      Positive
8-bit exponent: 132
23-bit mantissa: 5573158

Analysing 54.510044:
Sign bit:      Positive
8-bit exponent: 132
23-bit mantissa: 5900873
```

To conduct bitwise operations, the float will need to be converted into an unsigned int, utilise the following:

```
unsigned int raw_bits = *(unsigned int*)&float_variable;
```

Ensure the program output is exactly as described, and that the whitespace of your source code is well formatted.