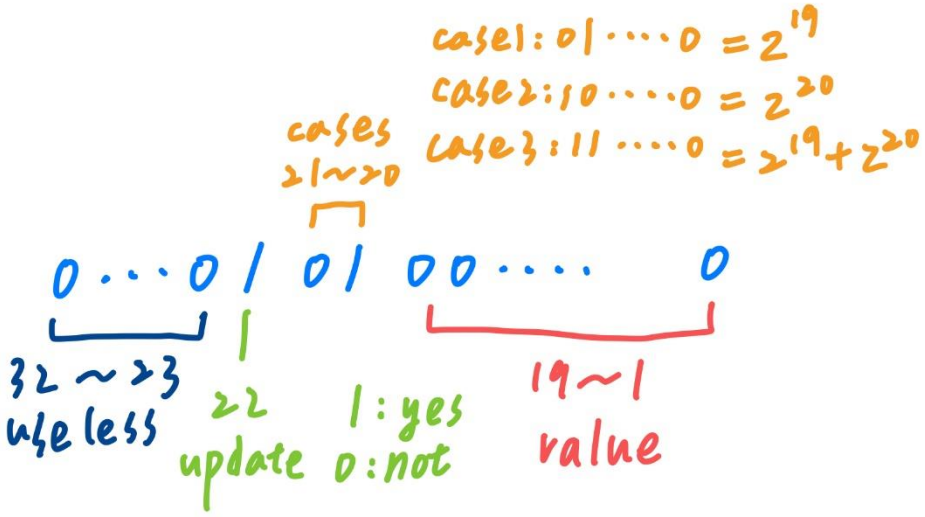
PA2 Report

Data structure:

Two uint-type arrays. The first one is an 1D array records the chords pairs, and the other one is a 2D array record the max number of non-intersect chords from i to j. The 2D array has each element with 32-bits, the first 1~19th bits are used to document the number of non-intersect chords (a.k.a value), while the 20~21th bits are used to remember which cases it is(case 1/2/3), then the 22th bit help record whether the value has been updated, the remained 10 bits are not used(shown as figure below).



Since the max input would be 180,000, 19th bits max value=2^19-1(=524287>180000) is large enough. In addition, if using uint8_t, the max value can be stared is 2^7=255, and consequently being insufficient in this assignment.

Findings:

a. Top-down DP will be faster than bottom-up DP in this case. This is due to when performing top-down DP, there's no need to go through each case, it only visits the cases that are useful for finding the final answer, and it saves some time.
b. Printing the answer simultaneously as the program runs can reduce the running time. Because it won't waste time to go through the gigantic array from start to finish again.
c. Use data type uint in binary to save some space. When using ordinary int type, it would cost many spaces by using multi-dimension array to store the value and other attributes. While using the uint32_t, each single element can be divided into the units of bit and can further be used for storing different attribute.