This is brief explanation of variable pairing with NWAOBDDs - specifically which incoming edge is matched with a specific outgoing edge.

For the purposes of this definition the edges are numbered from 0 to $v-1$ where v is the number of variables represented by the NWAOBDD.

(1) For a given outgoing edge representing the variable i at level k, its paired incoming edge represents the variable $i + 2^{k+1} - 3$

(2) If x is an outgoing edge at level $k+1$, then $x+1$ and $(x+1)+2^{k+1}-2$ are represented by outgoing edges at level k

(3) If the NWAOBDD has n levels total, then the outgoing edges at level n are 0 and $2^{n+1}-2$

From 1,2,and 3, we can get the level and pairings of every variable represented by the NWAOBDD. For example, a 3-level NWAOBDD has outgoing edges represented by 0 and 14 at level 3 (from def. 3). At level 2, it has outoing edges $1, 7, 15, 21$ (from def. 2) and at level 1, it has outgoing edges $2, 4, 8, 10, 16, 18, 22, 24$.

Using definition 2, we can pair incoming and outgoing edge to get the following pairings $(0, 13), (14, 27)$ for level 3, $(1, 6)(7, 12)(15, 20)(21, 26)$ at level 2, and $(2, 3)(4, 5)(8, 9)(10, 11)(16, 17)(18, 29)(22, 23)(24, 25)$ for level 1.

Is variable i an outgoing-edge variable at level k, geven the value of offset accumulated from maxLevel?

```
bool P(offset, i, k) {
    unsigned a = offset;
    unsigned b = offset + 2^{k+1} - 3;
    unsigned c = offset + 2^{k+1} - 2;
    unsigned d = offset + 2^{k+1} - 5;

    if (i==a || i==c) return true;
    else if (i==b || i==d) return false;
    else if (i<b)                // a < i && i < b
         return P(a+1, i, k-1);
    else                         // c < i && i < d
         return (c+1, i, k-1);
}
```