7Segment: BCD To 7segment-Double Dabble: Quiz Solution   www.highlevel-synthesis.com
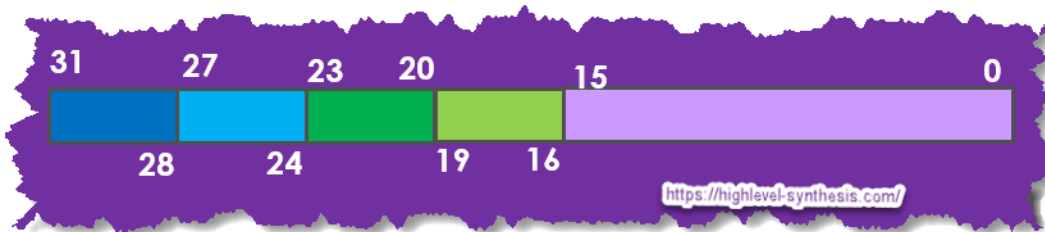
The following figure shows the format of the variable used in the algorithm.

These are the steps to write the desired code

1) First, we should define two data types

```
typedef ap_uint<32>  uint32;
typedef ap_uint<16>  uint16;
```

2) Then we should define the double_dabble function considering the data format.

```
uint32 double_dabble(uint32 scp) {
  uint16 s;
  s = scp << 1;
  if (s(19, 16) > 4)
    s(19, 16) = s(19, 16) + 3;
  if (s(23, 20) > 4)
    s(23, 20) = s(23, 20) + 3;
  if (s(27, 24) > 4)
    s(27, 24) = s(27, 24) + 3;
  return s;
}
```

3) The we should write the binary to BCD function and 15 times call the double_dabble.

```
void binary2bcd(uint16 in_binary,
                          uint16 *packed_bcd) {
#pragma HLS INTERFACE ap_none port=in_binary
#pragma HLS INTERFACE ap_none port=packed_bcd
#pragma HLS INTERFACE ap_ctrl_none port=return

  uint32 scratch_pad = in_binary;

  scratch_pad = double_dabble(scratch_pad);
  scratch_pad = double_dabble(scratch_pad);
  scratch_pad = double_dabble(scratch_pad);
  scratch_pad = double_dabble(scratch_pad);
  …
  scratch_pad = double_dabble(scratch_pad);
  scratch_pad = double_dabble(scratch_pad);
  scratch_pad = scratch_pad << 1;

  *packed_bcd   = scratch_pad(31, 16);
}
```

15 times

https://highlevel-synthesis.com/