

HufGen : Huffman Decoder Generator Tool:

Introduction:

The tool is capable of generating a synthesizable VHDL code to 'decode' Huffman bit streams. The input to the tool is a Huffman table, which lists the 'encoded' and 'decoded' values. The output is a VHDL RTL code, which is capable of 'decoding' input serial Huffman bit string, producing the 'decoded' values as output.

Features:

- Full Synthesizable VHDL output.
- The VHDL implementation does **NOT** use any memory for decoding Huffman bit string.
- The decoded values are produced instantaneously.
- Automatic testbench is also generated to verify the so produced VHDL Huffman decoder.

The input Huffman table format:

The input Huffman table should be as given below:

```
-----  
linbits = 0  
x0      x1      hlen      hcod  
0       0       1       1  
0       1       3       001  
1       0       2       01  
1       1       3       000  
-----
```

The above example is taken from the MP3 specification (ISO 11172 part 3) layer 3. It's the 'Huffman code table 1' from the specifications.

x0 and x1 are the 'encoded' values corresponding to each 'hcod'. 'hlen' is the number of bits used by the hcod. The tool takes this table as an input and generates a synthesizable VHDL output, which gives x0, and x1 values as soon as the corresponding 'hcode' is received by the decoder.

A worked out example:

The following figure gives a block diagram of an actual Huffman decoder designed using the tool. Please note that the following diagram is for illustration purpose only, and actual implementation may differ from the same.

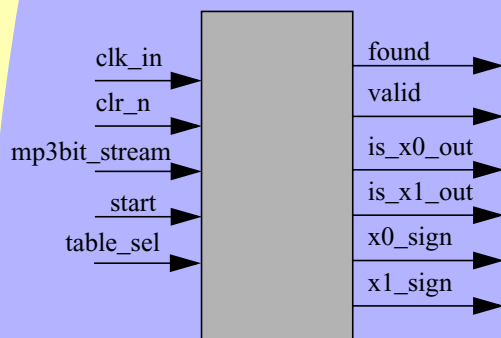


Fig 1.0 Huffman decoder for MP3 bitstream

This Huffman decoder was designed using this tool which was used to decode the incoming MP3 bit stream. The decoder supports All the Huffman code tables given in ISO 11172-part3 Layer III.

The Tool:

The tool consists of several scripts written in csh and perl. After downloading the tool.tar.gz file in your working directory, do the following at Unix prompt

- 1). `gzip -d huff_tool.tar.gz`
- 2). `tar -xvf huff_tool.tar`

This will create a directory called 'huff_tool' inside which there will be following scripts

I) csh scripts

master.csh
rem_n_lines.csh

II) perl scripts

ex1.pl
found.pl
gen_inp.pl

III) Other files

also there are two other files

- 1). head : VHDL header file
- 2). trail : VHDL trailer file.
- 3). huf_cod_T30 : Example Huffman table file

USAGE of the tool:

Just type on Unix prompt

```
./master.csh huf_cod_T30
```

It will produce corresponding VHDL file as:

```
huf_cod_T12.vhdl
```