Program 1 - Hamming Code Implementation

Description of the Program

This program will encode, check, and decode parity bits for Hamming74 and Hamming1511. To use the program, run the executable, and from there, type one of the commands {encode, parity, or decode} followed by a bitstring of the corresponding length, separated by a space.

Dependencies

The program relies on a few headers in the Standard C Library, the Standard C++ Library and the Standard Template Library, namely <string>, <iostream>, and <cctype>.

Description of Functions

bool isValidCommand(string command)

This function takes a string, called command, and checks to make sure it is valid. It returns true or false, based on the validity of the input string.

bool parseInput(string input, string &command, string &bitstring)

This function takes in a string, called input, and two empty strings, command and bitstring. It will parse the input string, put the substring corrosponding to the command in the command container, and the bitstring in the bitstring container. It will then return true or false depending, true if the command is valid, or false if it is not.

string decode74(string bitstring)

This function takes in a 7-bit bitstring, as a string container, and returns the decoded 4-bit data. The returned string is the decoded 4-bit data.

string decode1511(string bitstring)

This function takes in a 15-bit bitstring, as a string container, and returns the decoded 11-bit data. The returned string is the decoded 11-bit data.

string encode74(string bitstring)

This function takes in a 11-bit bitstring, as a string container, and returns the encoded 15-bit parity matrix. The returned string is the 15-bit encoded string.

string encode1511(string bitstring)

This function takes in a 11-bit bitstring, as a string container, and returns the encoded 15-bit parity matrix. The returned string is the 15-bit encoded string.

string vectoroutput(string bitstring)

This function takes a string, called bitstring, and formats it for output. For example: let the input string = “ABCDE.” This function will return “<A, B, C, D, E>”

void parity74(string bitstring)

This function checks the Hamming74 parity of the input string, and corrects it, if necessary. It will output Z and the corrected X to Standard Out.

void parity1511(string bitstring)

This function checks the Hamming1511 parity of the input string, and corrects it, if necessary. It will output Z and the corrected X to Standard Out.

Compilation Instructions

To compile, make sure you have C++11, and run the makefile.

To use, run the executable. See the description on page 1 for further usage

Description of Testing and Verification Procedures

To test, I used several online resources for hamming74 and hamming1511 to check my bitstrings.

Description of Submission

The zipped folder includes a makefile, and one .cpp file for the program.