example, bit string 102 may represent data to be transmitted across the Internet, an intranet, a telephone line, a satellite, a local area network, a wide area network, a wireless network, and/or an optical network. Additionally, bit string 102 may represent data to be stored in a memory module, such as a random access memory (RAM), a static RAM (SRAM), a cache memory, or a scratchpad memory; or in a storage module, such as a hard drive, a compact disc, an optical platter, and/or a magnetic tape. The bit string may represent any information including video and audio data.

The relational differentiation encoding module 100 encodes bit string 102 into two fractal components 104 and 106 over a medium 108 to produce a new bit string 110. The original bit string 102 may be reconstituted from the encoded bit string 110 without any loss by reversing the encoding process.

Referring to FIG. 1B, relational differential encoding may be implemented in a computer system 120. A relational differential encoding module 100 receives input data 125, encodes the data into a compact representation 130, and either stores the data in a data store 135 or transmits the data through a network interface 140. The relational differential encoding module may be used with any data within the computer system. FIG. 1B also shows a relational differentiation decoding process 145 whereby encoded data from the data store 135 or the network interface 140 may be decoded into output data 150. The data 150 output from the decoding process is the same as the original data 125 input to the relational differentiation encoding process.

Relational differentiation encoding represents a target value by constructing a set of values containing the target value in a compact form and then by differentiating the target from the other values in the constructed set. For example, one method of using relational differentiation encoding is to determine whether the target value is odd or even. A single bit can be used, with a value of "1" representing odd and a value of "0" representing even. Determining whether the target is odd or even constructs a set of values within which the target lies.

Next, the target must be differentiated from the other values within the constructed set. One way to differentiate the target is to simply count the ordinal