CS 241 - MIPS Executable Relocatable Linkable (.merl) File Format

A .merl file is an executable MIPS binary file that is augmented by a table containing relocation and linking information. A .merl file has three components:

- **Header**: Three words consisting of
  - *Cookie*: a word containing 0x10000002 (which happens to be the binary encoding of the MIPS instruction `beq $0,$0,2`)
  - *Length*: the length (in bytes) of the .merl file
  - *CodeLength*: the length (in bytes) of the header plus the MIPS program (see below)

- **MIPS program**: a MIPS binary program encoded so as to execute correctly when loaded at RAM address 0xc (immediately following the header)

- **Relocation and External Symbol Table**: zero or more table entries, each having one of the following format:
  - *relocation entry*: each relocation entry contains two words:
    - *format code*: a word containing **0x01**
    - *location*: the location in the .merl file where the relocatable value is encoded
  - *external symbol definition*:
    - *ESD format code*: a word containing **0x05**
    - *value* -- a 32 bit word encoding the (relocatable) value of the defined symbol
    - *name* -- a 32 bit word encoding *n*, the number of characters in the symbol name, followed by *n* words, each encoding one of the characters in ASCII
  - *external symbol reference*: a relocatable value whose encoding is imported from some other .merl file, consisting of
    - *ESR format code*: a word containing **0x11**
    - *location*: the location in the .merl file where the value is to be encoded, once known
    - *name* -- a 32 bit word encoding *n*, the number of characters in the symbol name, followed by *n* words, each encoding one of the characters in ASCII

A .merl file may be executed at location 0 as a .mips binary, or may be used as input to a loader or linker which creates a .mips binary to be executed at some other location, or which creates another .merl file.