CpS 230 Homework 4

Zachary Hayes and Ryan Longacre

Concatenate Sections (5 points)

Fill in the following table indicating where in memory each section from each object file will be located. Enter both the *relative offset* (starting at 0) and the *loaded address* (i.e., $base + offset$). Align all sections on 16-byte boundaries (i.e., all the starting addresses should end in “0” in hex).

| **Module/Section** | **Relative Offset** | **Loaded Address** |
| --- | --- | --- |
| **bat.text** | **0** | **0x8d53400** |
| **fox.text** | **32** | **0x8d53420** |
| **bat.data** | **64** | **0x8d53440** |
| **fox.data** | **80** | **0x8d53450** |

Resolve Symbols (10 points)

Indicate the name, source section, offset in source section, and final loaded address of each public symbol, in order of final loaded address.

| **Symbol** | **From** | **Offset** | **Loaded Address** |
| --- | --- | --- | --- |
| **\_drill** | **fox.text** | **3** | **0x8d53423** |
| **golf\_cart** | **fox.data** | **12** | **0x8d5345c** |
| **\_chisel** | **bat.text** | **2** | **0x8d53402** |
| **\_wrench** | **bat.text** | **16** | **0x8d53410** |

Apply Relocations (15 points)

For each relocation (in order of “site”), indicate the source section, offset in source section, final loaded address (“site”), target symbol name, original (pre-fixup) 32-bit hex value, and adjusted (post-fixup) 32-bit hex value.

| **Section** | **Offset** | **Site** | **Target** | **Kind** | **Original Value** | **Adjusted Value** |
| --- | --- | --- | --- | --- | --- | --- |
| **bat.text** | **3** | **0x8d53403** | **bat.data** | **DIR32** | **4** | **0x8d53444** |
| **bat.text** | **9** | **0x8d53409** | **golf\_cart** | **DIR32** | **0** | **0x8d5345c** |
| **bat.text** | **17** | **0x8d53411** | **golf\_cart** | **DIR32** | **0** | **0x8d5345c** |
| **bat.text** | **23** | **0x8d53417** | **bat.data** | **DIR32** | **0** | **0x8d53440** |
| **bat.data** | **4** | **0x8d53444** | **\_drill** | **DIR32** | **0** | **0x8d53423** |
| **fox.text** | **8** | **0x8d53428** | **fox.data** | **DIR32** | **2** | **0x8d53452** |
| **fox.text** | **13** | **0x8d5342d** | **\_chisel** | **REL32** | **0** | **0xffffffd1** |

Generate Final Image (10 pts)

Using a *hex editor* of your choice, construct the sequence of bytes produced by linking the given object files, saving it as **image.bin** and submitting it electronically. **image.bin** should be exactly 96 bytes long and should have an MD5 checksum of **8c000ff2879e019a24f262da4000ee8e**.