QUESTION #1

The attached cpp source code file (the one introduced in the classroom before) is a multi-threaded application, which spawns two (child) threads after it is started. Each of the two child threads executes a for loop, which performs printf system call in each iteration of the for loop. While the two child threads execute their for loop, the main (the parent) thread waits for the two threads to finish.

Q1: Which level(s) of tightly-coupled parallel computers (fine-grain, medium-grain, and coarse grain) may be applied to the program? Technically justify your response.

Q2: Which of the Flynn’s parallel model (SIMD, MISD, and MIMD) may be applied? Technically justify your response.

```
main:
  li $t0, 100
  ...
LOOP_BEGIN:
  ...
sub  $t0, $t0, 1
bnez $t0, LOOP_BEGIN
  ...
jr  $31
```

"the size of a loop structure" means the number of instructions in this area.
QUESTION #2

Which of the following Venn diagrams ((a) through (e)) best represents the functional relationship* between SIMD and MIMD (select the best option)? Justify your choice (3 points for choosing the correct option and 17 points for correct justification).

(a) [Venn diagram with SIMD and MIMD overlapping]
(b) [Venn diagram with SIMD and MIMD separate]
(c) [Venn diagram with SIMD completely inside MIMD]
(d) [Venn diagram with MIMD completely inside SIMD]
(e) None of (a) through (d)

Note*: “function” in “functional relationship” means “what can be performed” and “what can not be performed” (or “how SIMD can/can’t execute operations” and “how MIMD can/can’t execute operations”).