Computer Systems 4F14

Concurrency

Coursework

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Material adapted from Per Ola Kristensson, Lent 2020

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Task

- The code should consist of exactly one C++ file with the name `4f14_crsid.cc` (where "**`crsid`**" is your CRSid, e.g. "jtj21"). No external libraries beyond the C++ Standard Template Library are allowed. Your code must compile correctly running the following command on a modern GCC compiler:

```
g++ -Wall -std=c++11 -pthread 4f14_crsid.cc -o 4f14
```

a) Implement a simple thread-safe double-linked list data structure in which each node holds a `std::string`.

b) Implement a method that adds 140 nodes to the double-linked list with each string of each node consisting of 3–9 characters, inclusive (the number of characters in the interval chosen at random), each character being a letter between *a* and z, inclusive, again chosen at random. This method should run once in the main function right after the double-linked list has been created in the main function of the program.

c) Start a background thread that runs continually in the background and traverses the list in order and concatenates all the strings of the nodes in the list in order into one string which is output to standard output when the entire double-linked list has been traversed. When there are no nodes in the list, the thread should stop running.

d) Start another background thread that every 0.5 seconds randomly selects a node, among the total number of nodes currently in the list, and then removes the node from the list. When there are no more nods in the double-linked list, the thread should stop running.

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Assessment

- You will be required to book a 10-minute oral viva examination slot; slots will be available at the start of next term.
- In the oral viva you will be asked to explain how much you have done and the reasoning behind your code and why it works / does not work quite as you intended. It is intended to be a constructive discussion **about your code**, not an examination of your understanding of concurrency in general.
- You will be provided with some immediate feedback at the viva and brief textual feedback via Moodle afterwards.
- It is extremely important that you name your file `4f14_crsid.cc`, where **`crsid`** is you CRSid (for example: "`4f14_jtj21.cc`").
- Do **not** share your code with anyone and do not share your coursework code online either before of after examination of this module.

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Deadlines

- The **deadline** is Thursday 1st April 2021.
- The assessment must be uploaded to Moodle.
- The exact Moodle upload deadline is 1st April 2021 16:00 UK time.
- Do **not** share your code with anyone and do not share your coursework code online either before of after examination of this module.