

Final exam - software part

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Prison Break Simulation

We would like to build an application that simulates the escaping of 10 Palestinian political prisoners from Gilboa prison. Instead of digging an underground tunnel to escape, the 10 prisoners have agreed to jump over the 8-meter wall that surrounds the prison. We'll assume the 10 prisoners have found a way to get out of their detention cells and can reach safely the 8-meter wall from the inner side. We just want to simulate the last part of the prison break which consists of jumping over the wall.

The 10 prisoners have agreed on the following:

1. The physically strongest 4 prisoners will create the first base (B_1) by putting arm in arm and sticking together like a concrete block. That base will hold the structure about to get formed.
2. The next 3 physically strongest prisoners will create the second base (B_2) by moving, one by one, on top of shoulders of the guys of B_1 .
3. Among the 3 remaining prisoners, the physically strongest 2 will create the third base (B_3) by climbing, one by one, on top of shoulders of the guys at B_1 and then on top of shoulders of the guys at B_2 consecutively.
4. The last prisoner will climb consecutively on the shoulders of B_1 prisoners, then B_2 prisoners and then B_3 prisoners. At this stage, with the help of B_3 prisoners, he should be able to hold his hands on the top of the wall. We'll call that last prisoner base B_4 .
5. Using B_4 's body as a holder, one prisoner of base B_3 will climb on the wall top and strengthen B_4 . At this stage, we just have 1 prisoner in base B_4 on the shoulders of 1 prisoner in base B_3 on the shoulders of 3 prisoners in base B_2 who are themselves on the shoulders of 4 prisoners in base B_1 .
6. 2 prisoners of base B_2 will use consecutively B_3 's body and B_4 's body as holders to climb to the wall top. At this stage, we just have 1 prisoner in base B_4 on the shoulders of 1 prisoner in base B_3 who himself is standing on the shoulders of 1 prisoner in base B_2 who himself is standing on the shoulders of 4 prisoners in base B_1 .
7. Now the prisoner of base B_3 will hold tight to the legs of prisoner at base B_4 . Similarly, the prisoner of base B_2 will hold tight to the legs of prisoner at base B_3 .
8. The 4 prisoners of base B_1 will use consecutively B_2 's body, B_3 's body and B_4 's body as holders to climb to the wall top.
9. The last member of base B_2 will use consecutively B_3 's body and B_4 's body as holders to climb to the wall top.
10. The last member of base B_3 will use B_4 's body as a holder to climb to the wall top.
11. The prisoners on the wall top will pull the last prisoner at base B_4 . Now all the prisoners are at the top of the wall.

12. To get down from the wall to the outer side of the prison, 3 out of the 4 strong prisoners that formed initially the base $B1$ will now form each a base as follows: One will hold to the wall top thus creating base $B4$, the second will use his body to go down and hold strong to his legs thus creating base $B3$, the third will use the body of the prisoner at $B4$ and $B3$ as holders, will go down and hold strong to the legs of the prisoner at base $B3$ thus creating base $B2$.
13. All the other prisoners (7 remaining prisoners) will use the bodies of prisoners at $B4$, $B3$ and $B2$ to descend the wall.
14. Once the 7 prisoners are on the ground, they will form a nest on which the 3 prisoners at base $B2$, $B3$ and $B4$ can jump into. Afterwards, they can run away and enjoy their freedom.

What you should do

- Create a folder called `final`.
- Under the folder `final`, create a file called `final.txt`. In that file, describe shortly, **in a tabular format**, your vision of how you would implement the above-described prison break using the multi-processing approach (e.g. tabulate the steps that you would implement). The table should show the sequence of actions that would take place to build the prison break. Discuss as well the data structure(s) you intend to use and the communication techniques you would employ to make the implementation happen. Keep the table short.
- In the same file `final.txt`, repeat the previous step using the multi-threading approach.
- Write the C-code *only* for one of the prisoners in base $B4$ in a file named `prisoner_b4.c`. Insert comments to add clarity to the code.
- Send the zipped folder that contains your source code, your executable and any additional file you might have created as a reply to my ritaj memo entitled **encs514 final exam - June 4, 2022**.