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REPORT FOR PROJECT 2 CMPE 300

DESIGN CHOICES

- We decided to make our main code file the control room and create another code file for the other machines to make the code more readable and writable.
- We sent the all string from the input file (except the first line) to the children to make the implementation easier
- We used three checks in our loop in the control room that receives messages to make sure we have received every possible message
- We hold the maintenance logs in a 2-dimensional list to keep them in order easily
- We created two finite state machines for machines which represent the *enhance-chop-split* and *reverse-trim* cases.
- We used *wait* functions in unblocking messages to make sure that we send a new message after the previous one had send.

ADVANTAGES OF PARALLEL PROGRAMMING

In this project, most of the machines on the tree have no relation with each other's work. So, they do not need to wait for the others to finish their work. Thanks to parallel programming we are able to make all the machines work at the same time.

Also, once a parent machine gets its input it does not have to wait for its child or any other process to finish its current work too. With parallel programming, we are able to implement our program in this manner.

If we did not use parallel programming, we would have to implement our program in way that all machines work one by one in a certain order. As a result of this, all the machines would have to wait unnecessarily long times. To make this more obvious, we may consider the last machine before the control room. In traditional programming, this machine would have to wait for all machines to finish their all process cycles. In parallel programming, it just has to wait for the longest distance from a leaf node just for one production cycle. Therefore, we can safely say parallel programming has made us able to implement this program way more efficiently.

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MOCK INPUT
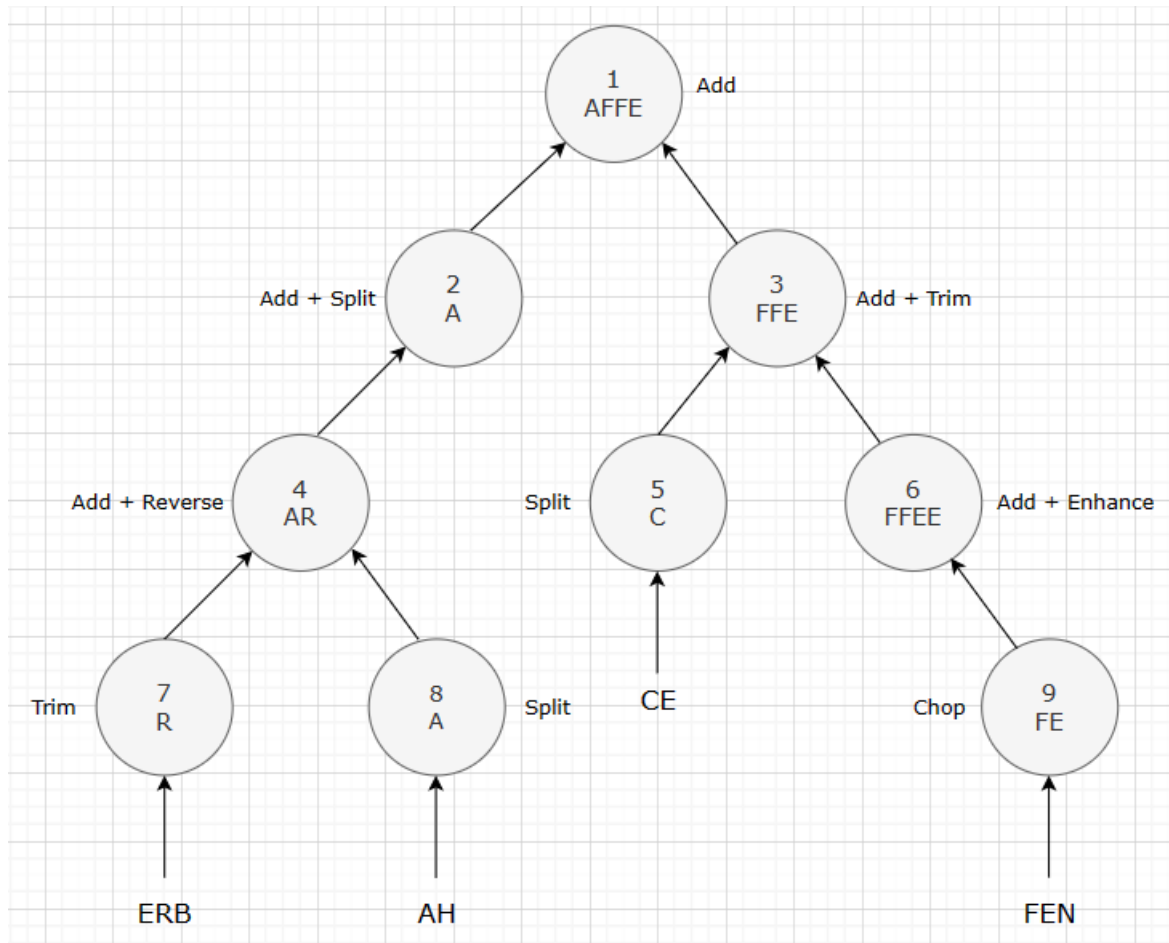
IF THIS WAS A REAL INDUSTRY 4.0 PROJECT

If this was a real Industry 4.0 project aiming to implement a digital twin, the possible challenges for the implementation would be the following:

- In our project, the machines were working during maintenance. In other scenarios, this might not be the case, this may have to be handled separately. We would have to send messages to machines when they are on and off maintenance process.
- In real industry projects, we would have to handle some unexpected situations such as power issues or problems in product supply to make our model more realistic and flexible.

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- We would have to make our program more compatible than it is now. We had to make the user able to add or remove machines from process or make changes in the processes. So, the implementation would have to be more abstract than now.