

# Muhammad Yassa - Stable Marriage Problem with backtracking. Short Report/Summary.

Saturday, 14 October 2023 10:41 PM

The program makes use of backtracking method and check functions to solve the Stable Marriage problem. The problem requires us to pair 3 men and 3 woman based on their preferences so that no marriage is unstable. A pairing is unstable if the new man prefers the current woman and the current woman prefers the new man or vice versa. The code outputs all solutions. We initialize an array q to represent the solution, where the col is the man and the column value is the woman assigned to that man, and initialize 2 3x3 arrays which contain the rankings of the women by the men and vice versa . We assign the first woman to the first man and use two while loops to increment between columns (men) and rows (women), the outer while loop checks If column number has reached 3, meaning all columns have been filled, and calls the print function to print out the solution and then we backtrack. If column number has not reached 3, we set the value of q[c] to 0, which assigns the first woman to the new man. The inner while loop increments between all 3 women, and an if function is used to check if the value of the column has reached 3, meaning none of the women passed the check function, so we backtrack. The woman passes all checks when the current man does not prefer the new woman and the new woman does not prefer the current man, AND when the current woman does not prefer the new man and the new man does not prefer the current woman, AND if the woman has not already been assigned to another man. If a woman passes all checks, we break inner while loop and move to the next man. Program keeps backtracking till all possible solutions are found and printed, until column number goes below 0 and both while loops are exited and the program returns with code 0.

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Solution #1:
MAN 0 :WOMAN 1
MAN 1 :WOMAN 0
MAN 2 :WOMAN 2
Solution #2:
MAN 0 :WOMAN 1
MAN 1 :WOMAN 2
MAN 2 :WOMAN 0
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