# Northern Michigan University (Marquette Co, MI)
# CS 444-01-25F: Parallel And Distributed Processing

## Program 4
## Due: Wednesday 15 October 2025 9:00 A.M. EDT

## Unisex Bathroom

Create a folder called “PG5” in the top level of your CS444-01-25F folder. Place all files pertaining to this assignment into the top level of your PG2 folder. Place a (possibly empty) file called “DONE” into this folder when you are ready to have your programs graded. The only files you need to turn in are the .cc and .h files. Please don't turn in any files other than these!!

Consider the following class:

```
class Person {
 public:
  string Name;
  char sex; // either 'M' or 'F'
  void EnterBathroom ();
  void ExitBathroom ();
};
```

You are allowed to add any private data field or method you care to, BUT no alteration should be made to the public fields.

This program is to simulate a unisex bathroom, not unlike the one used on the *Ally McBeal* program. However, this bathroom is a little more prudish than the ones those crazy attorneys at Cage and Fish use. There cannot be both men and women in the bathroom at any time. And, considering that there are only six stalls, no more than six people can be in there either.

You are to write semaphore code to control the EnterBathroom and ExitBathroom methods to make sure that the rules are not violated. I will write the main method, and I will send people to the bathroom whenever I darn well please.

Your EnterBathroom method should check to see if it is OK for that person to enter the bathroom. If it is not OK, that person should wait until s/he can enter. If the person has to wait, a message should be sent to the screen that the person is waiting. When the person does enter, a message to that extent should be printed.

Your ExitBathroom method should print out an appropriate message. No one should ever have to wait to leave the bathroom.

(For the purposes of this problem and as it relates to semaphores, there are exactly two sexes. Do not interpret ANY political opinion from this, or, really, any endorsement of real-life bathroom policy of any kind.)

Feel free to add any global variables, semaphores or otherwise, to make this program work. Your program must be FAIR. Someone who is waiting to use the bathroom will eventually get to enter no matter what. (Unless people enter the bathroom and never leave—you have no control over that—but my main will ensure that that never happens. My main will also make sure that no one will leave the bathroom without having entered it first; you won't have to worry about that.) Also your program has to use the resources to the best of its ability: there are six stalls in the bathroom; they shouldn't be empty if people are waiting, unless they have to remain empty to ensure fairness. My main will create the threads and start the threads and worry about memory leaks and all that. Your task is to coordinate the semaphores so that the tasks are completed fairly.

You will need to create a `Person.cc` file containing your source code, global variables, and all that. You will also need to create a `Person.h` file with your class definitions as you've defined them, so that my main program can include your classes correctly. I will compile my main together with your code to make an executable.