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**Lab 1 - Option B (Password Cracking)**

**Introduction**

For this first Lab we were asked to do the following, implement a recursive method to generate all possible passwords ranging from the numbers zero to nine. The password being generated had some requirements that need to be followed first the numbers three and seven which are the length of password cannot be hardcoded inside the method they must only be used as parameters and we can have at most two nested loop inside the method. The Method used to generate all possible passwords must be recursive.

**Proposed Solution design and implementation**

Starting with the first method called possible generating, I started by generating the digits for later use in the lab the way we were supposed to generate this digits was for example generate 000 then 001 and so on what I had to make sure to do was to get those zeros in there so I created a for each loop that ranged the digits from zero to nine as asked as one of the requirements after generating those numbers I printed them to check if they were generating correctly. After being able to generate my digits I read the text file and split it into columns to be able to either get the salt value of the user or the hash password and save them into a variable. Being finished with reading and splitting the text file, generating the digits we are now able to combine the salt value of the users with the generated password, to be able to do that I created a method called concatenate which as the name says it concatenates the generated password and salt value. After that I just hashed the new password created by combining the salt value and the generated password to create a new hashed password which was going to be compared with the hash password of the user to check if they matched or not.

**Experimental Results**

As a result, after running my code and making various different print statements just to check if everything was running correctly the digits are generating from 0 to 9 starting with three zeros the two zeros and a 1 etc. The combination of the salt value and the generated passwords was also good it generated the digits with every user to be able to test that I first test it with three then with a length of four and so on just to verify. Finally, the hashed password made by the concatenation of the salt and the generated password also generated and I was able to compare it with the one in the text file.

**Conclusion**

Being able to master recursion is going to be a big part of this course and learning how to used it efficiently really helps understand not only the thought process but also the coding process. Having print statements in different parts of the code really helps check that what you are trying to do works, also it helps debug the code and check for any errors that might cause the code to crash.