MPIN Task

External Document

House of Product | Data Science | Assignment

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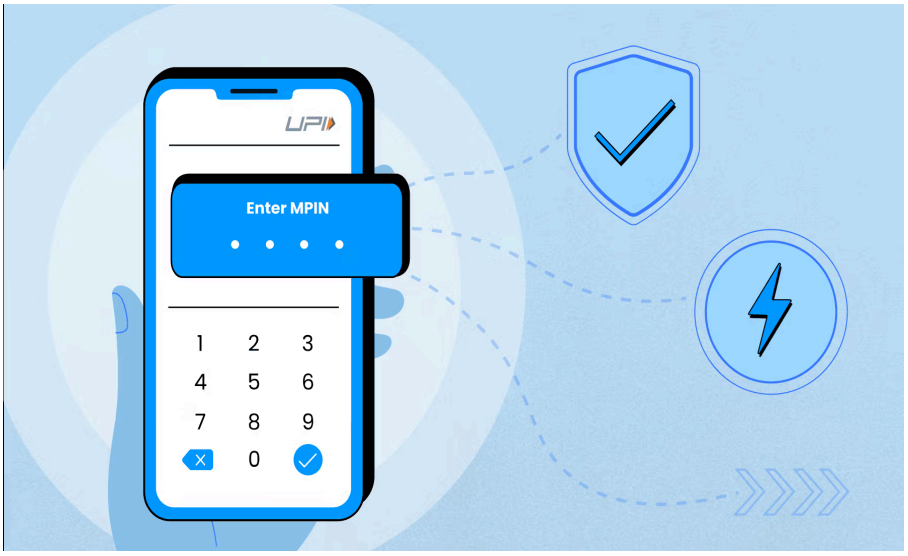
1. Overview of MPIN Identification

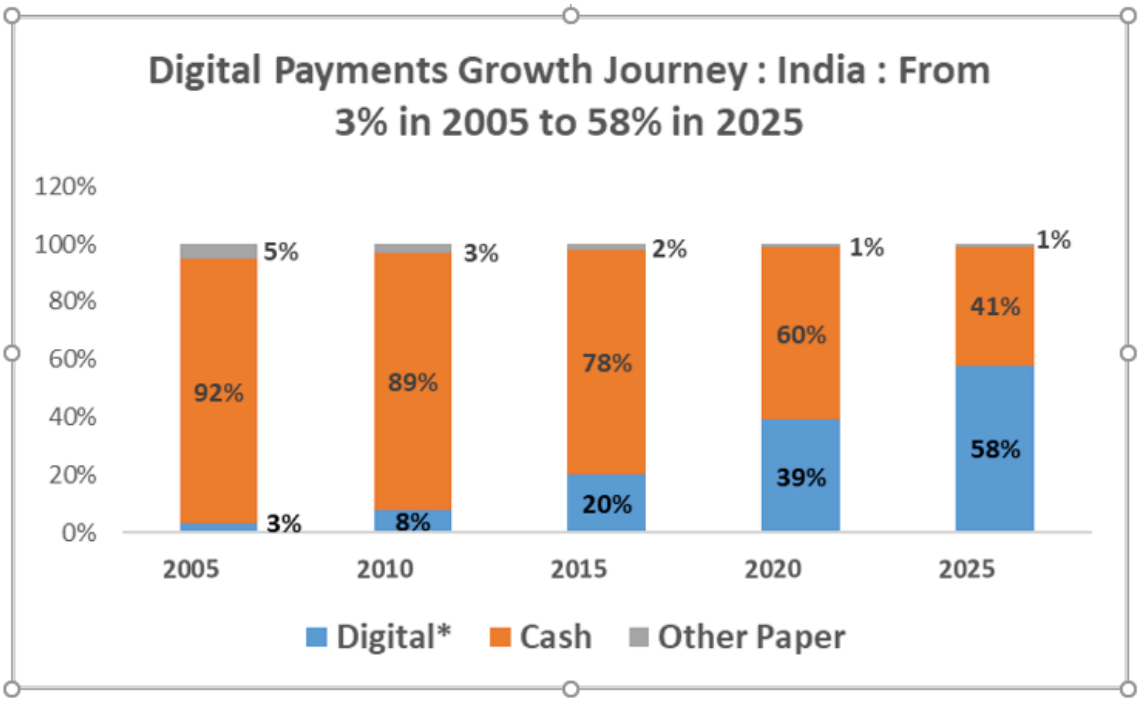
MPIN or Mobile Personalized Identification Number is a unique 4 or 6-digit code e.g 2345 , 6894 , 095701 used for verification whenever any online transaction is undertaken on payment or banking apps. It authenticates the financial transactions done via mobile banking apps. Consumers use MPINs to log in to their accounts on mobile banking apps and carry out transactions. These MPINs ensure that the original account holder is the one making the transaction, providing an added layer of security.

Mobile apps enable online payments through various electronic methods, such as NEFT, RTGS, IMPS, and UPI. While some apps prompt users to create a separate PIN for UPI transactions, others allow U**PI payments with the same MPIN used for logging in** to the mobile banking app. This indicates that the MPIN is used to authenticate UPI transactions in addition to verifying every mobile banking transaction.



1.1 Market Growth

The global digital payment market size was estimated at **USD 114.41 billion in 2024 and is projected to grow at a CAGR of 21.4% from 2025 to 2030. According to the data published by The World Bank,** at the end of 2021, over two-thirds of the adults worldwide were making or receiving digital payments, and the number is expected to increase further in the coming years. The growing adoption of digital payments can be attributed to growing smartphone penetration, increasing internet penetration, increasing adoption of contactless payment methods during the pandemic, and the rise in government initiatives to promote digital payments. And the India growth for the digital market has also skyrocketed from **3% in 2005 to 58 % in 2025.**



2. Problem and frauds in the MPIN authentication

These are some common problems and scams associated with MPINs (Mobile Personal Identification Numbers) in India:

Problems Associated with MPIN:

1. Weak MPIN Selection

2. Confusion with other PINs
3. Forgetting MPIN
4. Storing MPIN on Phone

Scams Associated with MPIN:

1. Phishing/Vishing/Smishing
2. Collect Request" Scams (UPI-specific, but involves MPIN)
3. Unsolicited SMS/Calls for MPIN Generation/Reset

3. Assignment Tasks

Part A: Assume that the MPIN is 4-digits. Write a program that suggests if the MPIN is a commonly used one. Ignore the demographics for this part

Part B: Enhance the above to take user's demographics as input and provides an output
a. Strength: WEAK or STRONG

Part C: Enhance the above to provide the following outputs
b. Strength: WEAK or STRONG
c. If weak then the reason why was it considered weak: It should give from the following the reasons as an array. Array should be empty if Strength is STRONG and non-empty if WEAK

- COMMONLY_USED
- DEMOGRAPHIC_DOB_SELF
- DEMOGRAPHIC_DOB_SPOUSE
- DEMOGRAPHIC_ANNIVERSARY

Part D: Above with a 6-digit PIN

Write code that tests the above written code using a set of inputs. Write at least 20 test case scenarios

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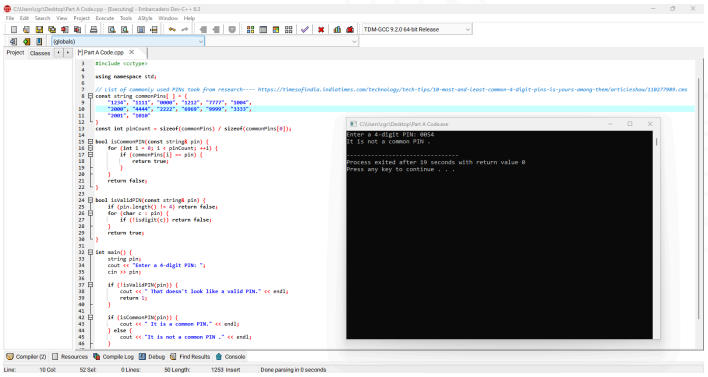
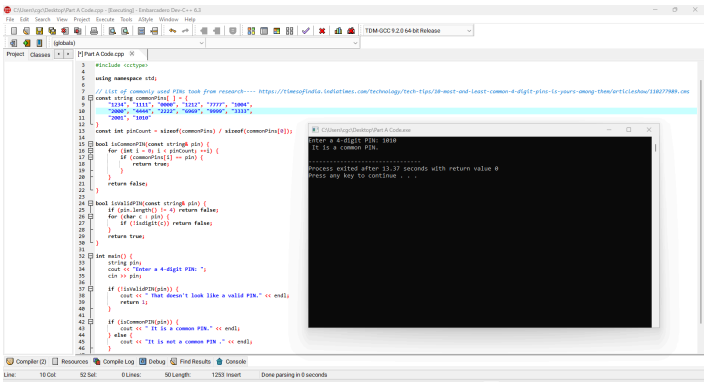
4. Result & Outcomes

Task 1 Part A: Assume that the MPIN is 4-digits. Write a program that suggests if the MPIN is a commonly used one. Ignore the demographics for this part.

For the Part A —

I have tried to make simple brute force approach of simple pin input from user where i have researched the most common PIN used by the user and this result in the scam and with the Time complexity of o(1) and space complexity of o(1). here i have added the **test cases of 5 input of 0054, 1010,1234,1244,9199**

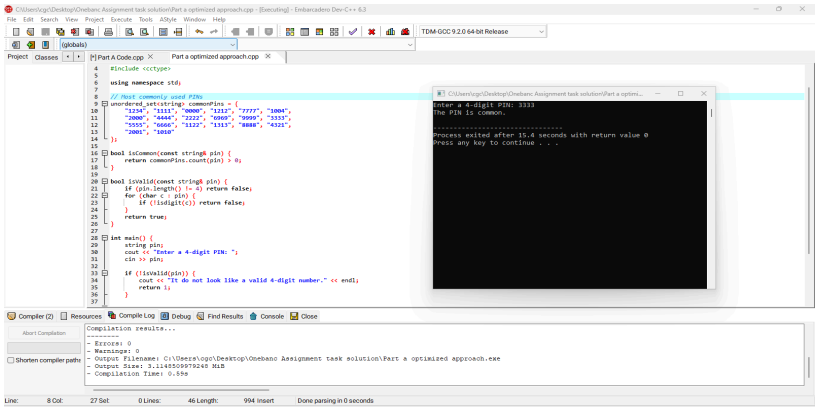


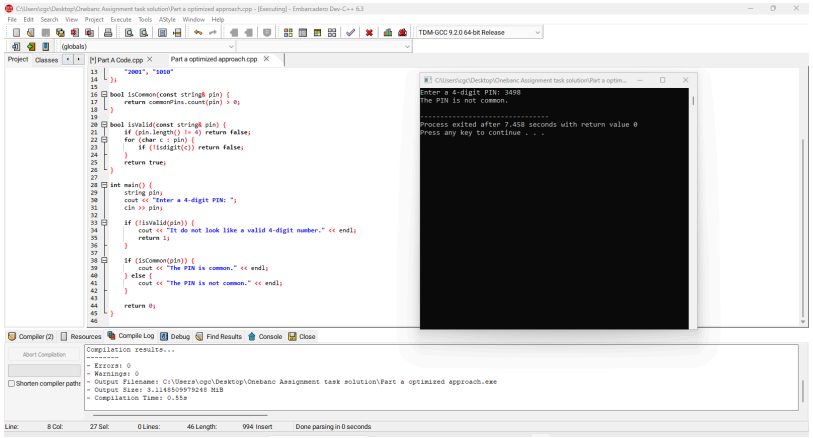


And the code is available at my Drive link – Drive link and all other test cases are also available at the drive link.

Approach 2

Then I implemented a more optimized approach and made it less function centric and implemented the following **test cases: .7560, 6540, 3498, 3333, 9834.**





And the code is available at my Drive link – Drive link and all other test cases are also available at the drive link

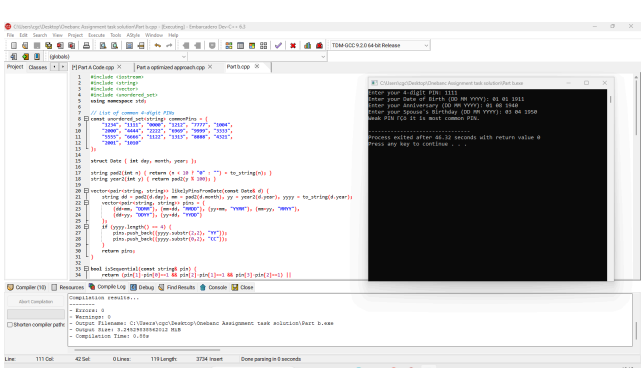
Task 2 Part B: Enhance the above to take user's demographics as input and provides an output

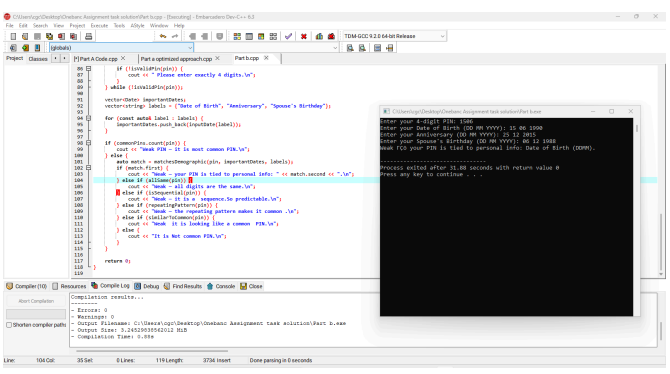
d. Strength: WEAK or STRONG

In this task we are required to take user demographics as input and provide the Strength of the PIN AS Weak and Strong.

Here i have implemented an Cin function and also made an unordered list of PINs. which are most commonly used

For the validation i have made **5 test cases which are 3291, 1506,1111,4645,9058**





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Task Part C: Enhance the above to provide the following outputs

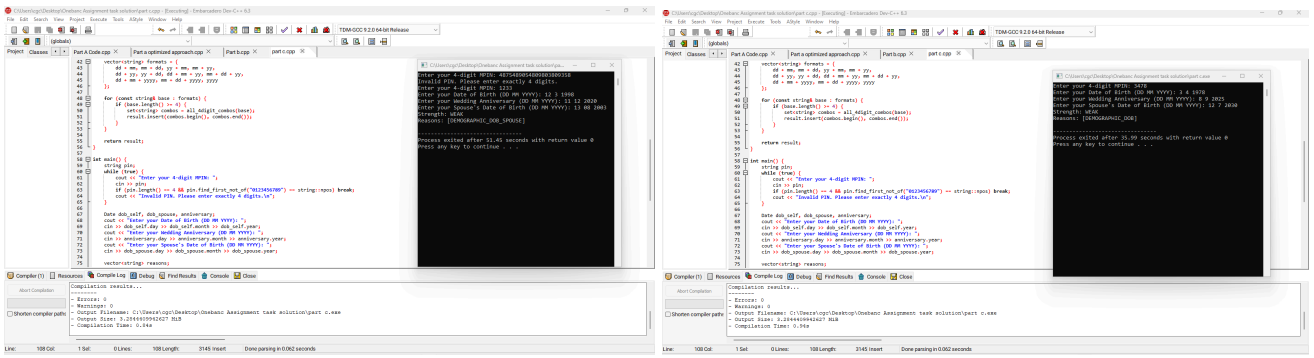
e. Strength: WEAK or STRONG

f. If weak then the reason why was it considered weak: It should give from the following the reasons as an array. Array should be empty if Strength is STRONG and non-empty if WEAK

- COMMONLY_USED
- DEMOGRAPHIC_DOB_SELF
- DEMOGRAPHIC_DOB_SPOUSE
- DEMOGRAPHIC_ANNIVERSARY

Here as discussed above we need to make a programme to get the strength as strong and weak along we also need to provide the reason. If weak then the reason why was it considered **weak and Array should be empty if Strength is STRONG and non-empty if WEAK**

I have made a programme which provides us the reason for its weakness and also makes a similarity check for such demographics with the PIN. for the testing i have made an **5 test cases here also which are 0987 , 1233, 3478 , 4234 , 4564**



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Final Task **Part D:** Above with a 6-digit PIN

Now here comes a challenging part: we are required to make the above programme for the 6 digit number and we know reparations are allowed so total unique test cases can be 100000 made.

Now for this i have used the permutation approach to check the unique digit in the PIN.

I have made this and tested with the **5 test cases which are 097864, 091234,112233,284628,091213**

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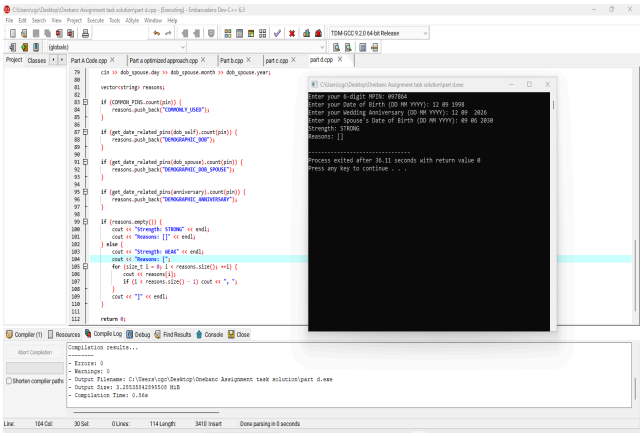

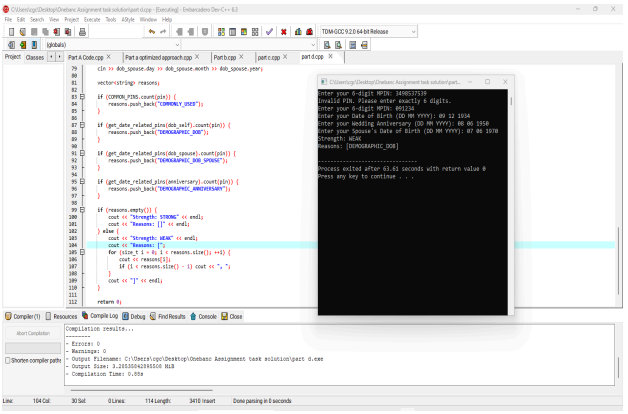

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With this i have tried to approach this from the perspective of the consumer what problems and what various scam cause the user to get such frauds with the above code structure are more focused over the security enhancement to the user. And also tried to make it as simple in implementation by using the basic c++ functions and their application

Obviously we can make it more secure with various different approaches such as blockchain implementation but with the task guidelines adhered to **I have created the programme and also a total of about 25 test cases . with the 5 case scenarios and all of these can be viewed in the drive.** – Drive link **and also in the Github link**

THANK YOU ONEBANC TEAM

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