

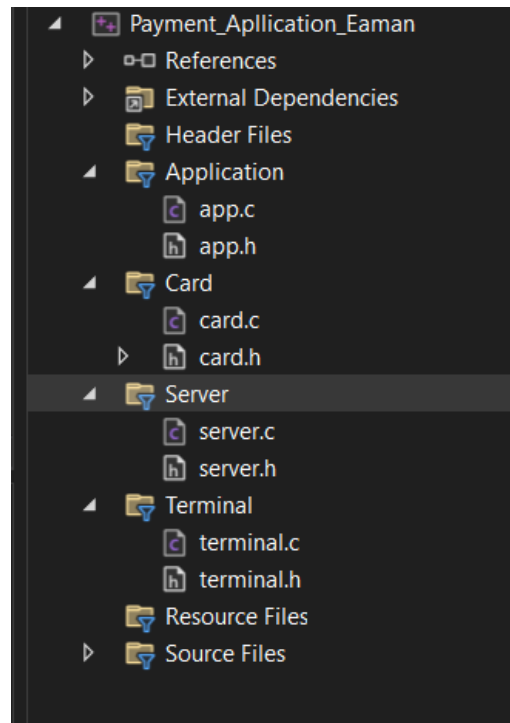


Payment Application Project

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Folder structure



Std.h

```
std.h  card_test_cardholder.cpp
Payment_Application_Eaman (Global Scope)
1  #ifndef STD_H
2  #define STD_H
3
4  #include <stdio.h>
5  #include <stdlib.h>
6
7
8  typedef unsigned char    uint8_t;
9  typedef unsigned short   uint16_t;
10 typedef unsigned int      uint32_t;
11
12 typedef signed char       sint8_t;
13 typedef signed short      sint16_t;
14 typedef signed int        sint32_t;
15
16
17 #endif // std types
```

Card.h

```
std.h*  card.h  terminal.c*  server.c  card.c*  app.c
Payment_Application_Eaman  (Global Scope)

1
2  #ifndef CARD_H_INCLUDED
3      #define CARD_H_INCLUDED
4
5
6  #include "std.h"
7  #include <string.h>
8
9  typedef struct ST_cardData_t
10 {
11     uint8_t cardHolderName[25];
12     uint8_t primaryAccountNumber[20];
13     uint8_t cardExpirationDate[6];
14 }ST_cardData_t;
15
16 typedef enum EN_cardError_t
17 {
18     CARD_OK, WRONG_NAME, WRONG_EXP_DATE, WRONG_PAN
19 }EN_cardError_t;
20
21 EN_cardError_t getCardHolderName(ST_cardData_t* cardData);
22 EN_cardError_t getCardExpiryDate(ST_cardData_t* cardData);
23 EN_cardError_t getCardPAN(ST_cardData_t* cardData);
24
25 #endif
26
```

terminal.h

```
terminal.h  std.h  card_test_cardholder.cpp
Payment_Application_Eaman  (Global Scope)

1
2  #ifndef TERMINAL_H_INCLUDED
3      #define TERMINAL_H_INCLUDED
4
5  #include "card.h"
6  #include "std.h"
7  #include <stdio.h>
8  #include <time.h>
9  #define MAX_TRANSACTION_AMOUNT 10000
10
11 typedef struct ST_terminalData_t
12 {
13     float transAmount;
14     float maxTransAmount;
15     uint8_t transactionDate[11];
16 }ST_terminalData_t;
17
18 typedef enum EN_terminalError_t
19 {
20     TERMINAL_OK, WRONG_DATE, EXPIRED_CARD, INVALID_CARD, INVALID_AMOUNT, EXCEED_MAX_AMOUNT, INVALID_MAX_AMOUNT
21 }EN_terminalError_t;
22
23 EN_terminalError_t getTransactionDate(ST_terminalData_t* termData);
24 EN_terminalError_t isCardExpired(ST_cardData_t* cardData, ST_terminalData_t* termData);
25 EN_terminalError_t getTransactionAmount(ST_terminalData_t* termData);
26 EN_terminalError_t isBelowMaxAmount(ST_terminalData_t* termData);
27 EN_terminalError_t setMaxAmount(ST_terminalData_t* termData, float maxAmount);
28 // EN_terminalError_t isValidCardPAN(ST_cardData_t* cardData); Optional
29
30 #endif

90 %  No issues found  Ln: 1  Ch: 1  SPC  CRLF
```

app.h

```
app.h  x terminal.h  std.h  card_test_cardholder.cpp
Payment_Application_Eaman  (Global Scope)

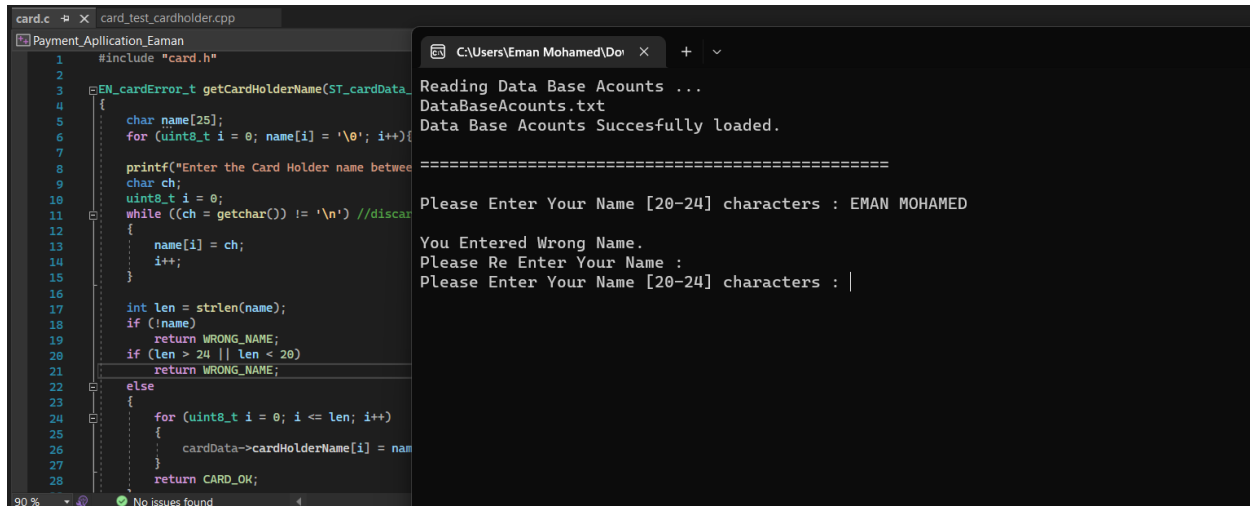
1  #ifndef APP_H_INCLUDED
2      #define APP_H_INCLUDED
3
4
5  #include "std.h"
6  #include "card.h"
7  #include "server.h"
8  #include "terminal.h"
9
10
11  void appStart(void);
12
13  #endif
14
```

Server.h

```
server.h  x app.h  terminal.h  std.h  card_test_cardholder.cpp
Payment_Application_Eaman  (Global Scope)

1  #ifndef SERVER_H_INCLUDED
2      #define SERVER_H_INCLUDED
3
4
5  #include "terminal.h"
6  #include "card.h"
7  #include "std.h"
8
9
10  typedef enum EN_transState_t
11  {
12      APPROVED, DECLINED_INSUFFICIENT_FUND, DECLINED_STOLEN_CARD, FRAUD_CARD, INTERNAL_SERVER_ERROR
13  }EN_transState_t;
14
15
16  typedef enum EN_serverError_t
17  {
18      SERVER_OK, SAVING_FAILED, TRANSACTION_NOT_FOUND, ACCOUNT_NOT_FOUND, LOW_BALANCE, BLOCKED_ACCOUNT, RUNNING_ACCOUNT
19  }EN_serverError_t;
20
21
22  typedef struct ST_transaction_t
23  {
24      ST_cardData_t cardHolderData;
25      ST_terminalData_t terminalData;
26      EN_transState_t transState;
27      uint32_t transactionSequenceNumber;
28  }ST_transaction_t;
29
30  typedef enum EN_accountState_t
31  {
32      RUNNING,
33      BLOCKED
34  }EN_accountState_t;
35
36
37  typedef struct ST_accountsDB_t
38  {
39      float balance;
40      EN_accountState_t state;
41      uint8_t primaryAccountNumber[20];
42  }ST_accountsDB_t;
43
44
45  EN_transState_t recieveTransactionData(ST_transaction_t* transData);
46  EN_serverError_t isValidAccount(ST_cardData_t* cardData, ST_accountsDB_t* accountReference);
47  EN_serverError_t isBlockedAccount(ST_accountsDB_t* accountReference);
48  EN_serverError_t isAmountAvailable(ST_terminalData_t* termData, ST_accountsDB_t* accountReference);
49  EN_serverError_t saveTransaction(ST_transaction_t* transData);
50
51  void listSavedTransactions(void);
52
53  #endif
```

Test_cardholder_name



```
card.c  card_test_cardholder.cpp
Payment_Application_Eaman
1 #include "card.h"
2
3 EN_cardError_t getCardHolderName(ST_cardData_t cardData)
4 {
5     char name[25];
6     for (uint8_t i = 0; name[i] = '\0'; i++) {}
7
8     printf("Enter the Card Holder name between 20-24 characters : ");
9     char ch;
10    uint8_t i = 0;
11    while ((ch = getchar()) != '\n') //discard unwanted characters
12    {
13        name[i] = ch;
14        i++;
15    }
16
17    int len = strlen(name);
18    if (!name)
19        return WRONG_NAME;
20    if (len > 24 || len < 20)
21        return WRONG_NAME;
22    else
23    {
24        for (uint8_t i = 0; i <= len; i++)
25        {
26            cardData->cardHolderName[i] = name[i];
27        }
28        return CARD_OK;
29    }
30 }
```

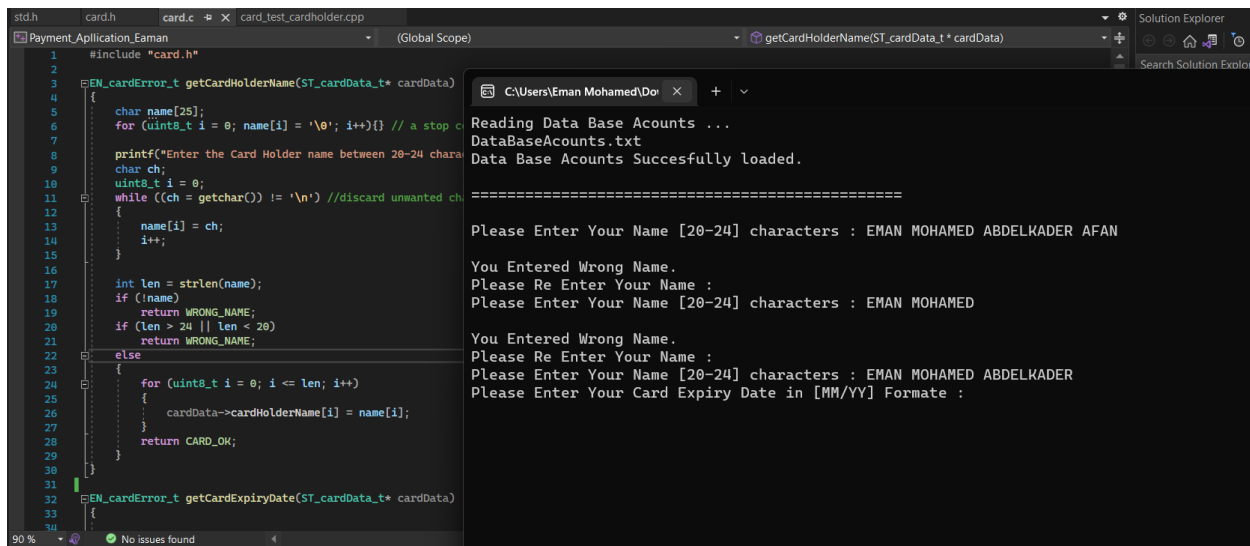
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

Please Enter Your Name [20-24] characters : EMAN MOHAMED

You Entered Wrong Name.
Please Re Enter Your Name :
Please Enter Your Name [20-24] characters : |

characters less than 20



```
std.h  card.h  card.c  card_test_cardholder.cpp
Payment_Application_Eaman (Global Scope) getCardHolderName(ST_cardData_t* cardData)
1 #include "card.h"
2
3 EN_cardError_t getCardHolderName(ST_cardData_t* cardData)
4 {
5     char name[25];
6     for (uint8_t i = 0; name[i] = '\0'; i++) {} // a step c
7
8     printf("Enter the Card Holder name between 20-24 characters : ");
9     char ch;
10    uint8_t i = 0;
11    while ((ch = getchar()) != '\n') //discard unwanted characters
12    {
13        name[i] = ch;
14        i++;
15    }
16
17    int len = strlen(name);
18    if (!name)
19        return WRONG_NAME;
20    if (len > 24 || len < 20)
21        return WRONG_NAME;
22    else
23    {
24        for (uint8_t i = 0; i <= len; i++)
25        {
26            cardData->cardHolderName[i] = name[i];
27        }
28        return CARD_OK;
29    }
30 }
31
32 EN_cardError_t getCardExpiryDate(ST_cardData_t* cardData)
33 {
34 }
35 }
```

Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

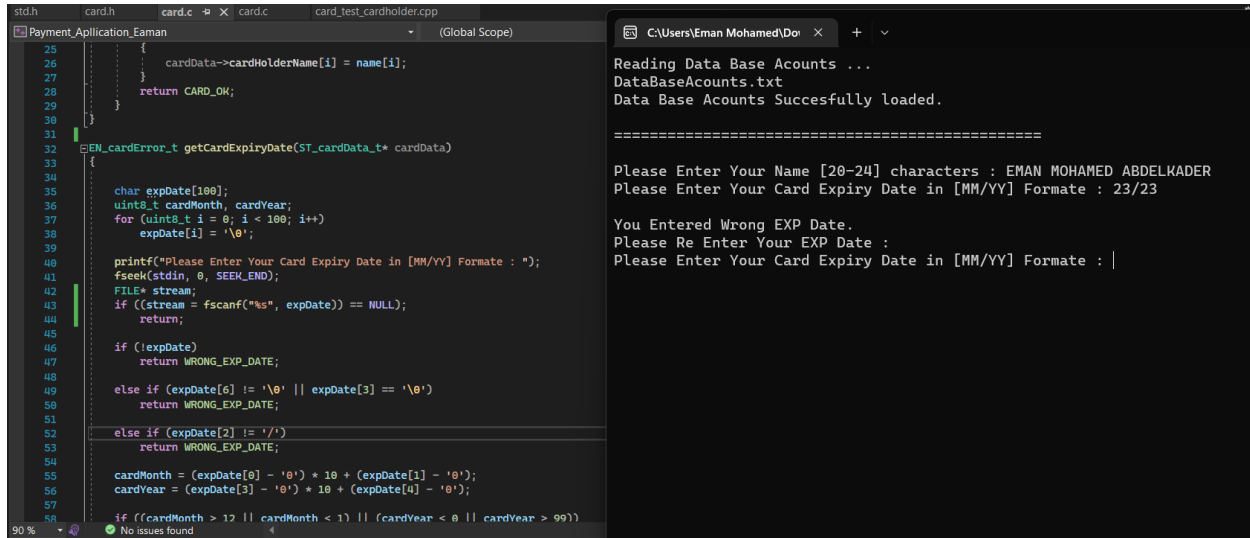
Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER AFAN

You Entered Wrong Name.
Please Re Enter Your Name :
Please Enter Your Name [20-24] characters : EMAN MOHAMED

You Entered Wrong Name.
Please Re Enter Your Name :
Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate :

characters exceed 24

Test_Expiry_Date



```
std.h  card.h  card.c  card_test_cardholder.cpp
Payment_Application_Eaman (Global Scope)
25 {
26     cardData->cardHolderName[i] = name[i];
27 }
28 return CARD_OK;
29 }
30 }
31
32 EN_cardError_t getCardExpiryDate(ST_cardData_t* cardData)
33 {
34     char expDate[100];
35     uint8_t cardMonth, cardYear;
36     for (uint8_t i = 0; i < 100; i++)
37         expDate[i] = '\0';
38
39     printf("Please Enter Your Card Expiry Date in [MM/YY] Formate : *");
40     fseek(stdin, 0, SEEK_END);
41     FILE* stream;
42     if ((stream = fscanf("%s", expDate)) == NULL);
43     return;
44
45     if (!expDate)
46         return WRONG_EXP_DATE;
47
48     else if (expDate[6] != '\0' || expDate[3] == '\0')
49         return WRONG_EXP_DATE;
50
51     else if (expDate[2] != '/')
52         return WRONG_EXP_DATE;
53
54     cardMonth = (expDate[0] - '0') * 10 + (expDate[1] - '0');
55     cardYear = (expDate[3] - '0') * 10 + (expDate[4] - '0');
56
57     if ((cardMonth > 12 || cardMonth < 1) || (cardYear < 0 || cardYear > 99))
58         return WRONG_EXP_DATE;
59
60     cardData->cardExpirationDate[i] = expDate[i];
61
62     return CARD_OK;
63 }
```

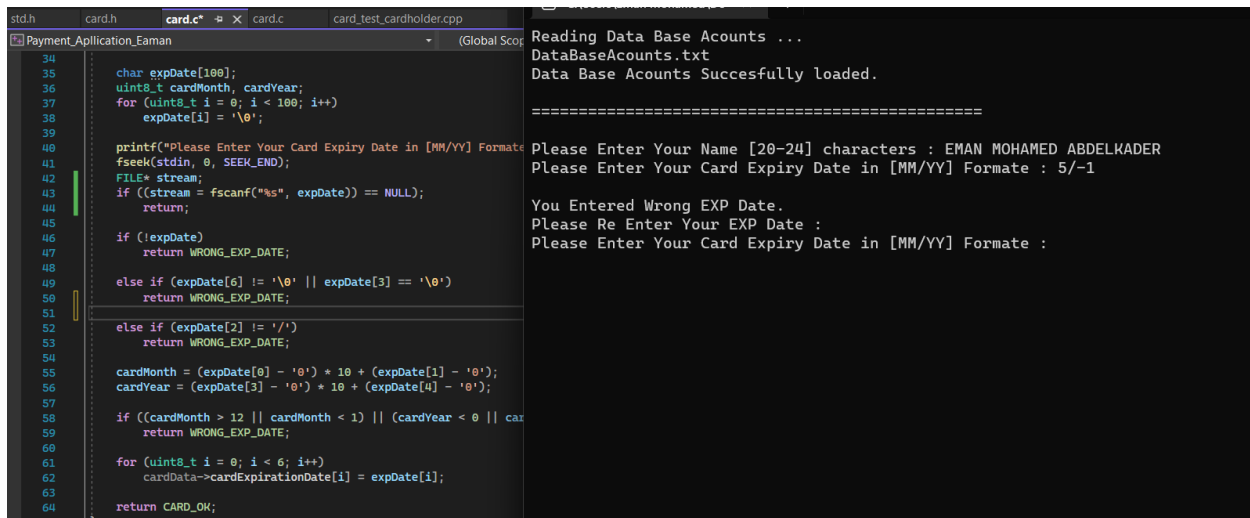
```
C:\Users\Eman Mohamed\Do...
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate : 23/23

You Entered Wrong EXP Date.
Please Re Enter Your EXP Date :
Please Enter Your Card Expiry Date in [MM/YY] Formate : |
```

Invalid month



```
std.h  card.h  card.c  card_test_cardholder.cpp
Payment_Application_Eaman (Global Scope)
34 char expDate[100];
35 uint8_t cardMonth, cardYear;
36 for (uint8_t i = 0; i < 100; i++)
37     expDate[i] = '\0';
38
39 printf("Please Enter Your Card Expiry Date in [MM/YY] Formate : *");
40 fseek(stdin, 0, SEEK_END);
41 FILE* stream;
42 if ((stream = fscanf("%s", expDate)) == NULL);
43 return;
44
45 if (!expDate)
46     return WRONG_EXP_DATE;
47
48 else if (expDate[6] != '\0' || expDate[3] == '\0')
49     return WRONG_EXP_DATE;
50
51 else if (expDate[2] != '/')
52     return WRONG_EXP_DATE;
53
54 cardMonth = (expDate[0] - '0') * 10 + (expDate[1] - '0');
55 cardYear = (expDate[3] - '0') * 10 + (expDate[4] - '0');
56
57 if ((cardMonth > 12 || cardMonth < 1) || (cardYear < 0 || cardYear > 99))
58     return WRONG_EXP_DATE;
59
60 for (uint8_t i = 0; i < 6; i++)
61     cardData->cardExpirationDate[i] = expDate[i];
62
63 return CARD_OK;
64 }
```

```
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate : 5/-1

You Entered Wrong EXP Date.
Please Re Enter Your EXP Date :
Please Enter Your Card Expiry Date in [MM/YY] Formate :
```

Invalid year

Test_PAN_number

```
std.h  card.h  card.c  card_test_cardholder.cpp
Payment_Application_Eaman
34  char expDate[100];
35  uint8_t cardMonth, cardYear;
36  for (uint8_t i = 0; i < 100; i++)
37  {
38      expDate[i] = '\0';
39  }
40
41  printf("Please Enter Your Card Expiry Date in [MM/YY]
42  fseek(stdin, 0, SEEK_END);
43  FILE* stream;
44  if ((stream = fscanf("%s", expDate)) == NULL);
45  return;
46
47  if (!expDate)
48      return WRONG_EXP_DATE;
49
50  else if (expDate[6] != '\0' || expDate[3] == '\0')
51      return WRONG_EXP_DATE;
52
53  else if (expDate[2] != '/')
54      return WRONG_EXP_DATE;
55
56  cardMonth = (expDate[0] - '0') * 10 + (expDate[1] -
57  cardYear = (expDate[3] - '0') * 10 + (expDate[4] -
58
59  if ((cardMonth > 12 || cardMonth < 1) || (cardYear
60      return WRONG_EXP_DATE;
61
62  for (uint8_t i = 0; i < 6; i++)
63      cardData->cardExpirationDate[i] = expDate[i];
64
65  return CARD_OK;
66
67
```

```
C:\Users\Eman Mohamed\Do...
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate : 11/23
Please Enter Your PAN Number [16-19] characters : 123456785

You Entered Wrong PAN Number.
Please Re Enter Your PAN Number :
Please Enter Your PAN Number [16-19] characters :
```

less than 16 numbers

```
std.h  card.h  card.c  card_test_cardholder.cpp
Payment_Application_Eaman  (Global Scope)
70  for (uint8_t i = 0; i < 30; i++)
71  {
72      panNumber[i] = '\0';
73  }
74
75  printf("Please Enter Your PAN Number [16-19] characters : ");
76
77  char pan;
78  uint8_t i = 0;
79  fseek(stdin, 0, SEEK_END);
80  while ((pan = getchar()) != '\n')
81  {
82      panNumber[i] = pan;
83      i++;
84  }
85
86  int len = strlen(panNumber);
87  if (!panNumber)
88      return WRONG_PAN;
89
90  if (len > 19 || len < 16)
91      return WRONG_PAN;
92
93  else
94  {
95      for (uint8_t i = 0; i <= len; i++)
96          cardData->primaryAccountNumber[i] = panNumber[i];
97      return CARD_OK;
98  }
99
```

```
C:\Users\Eman Mohamed\Do...
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

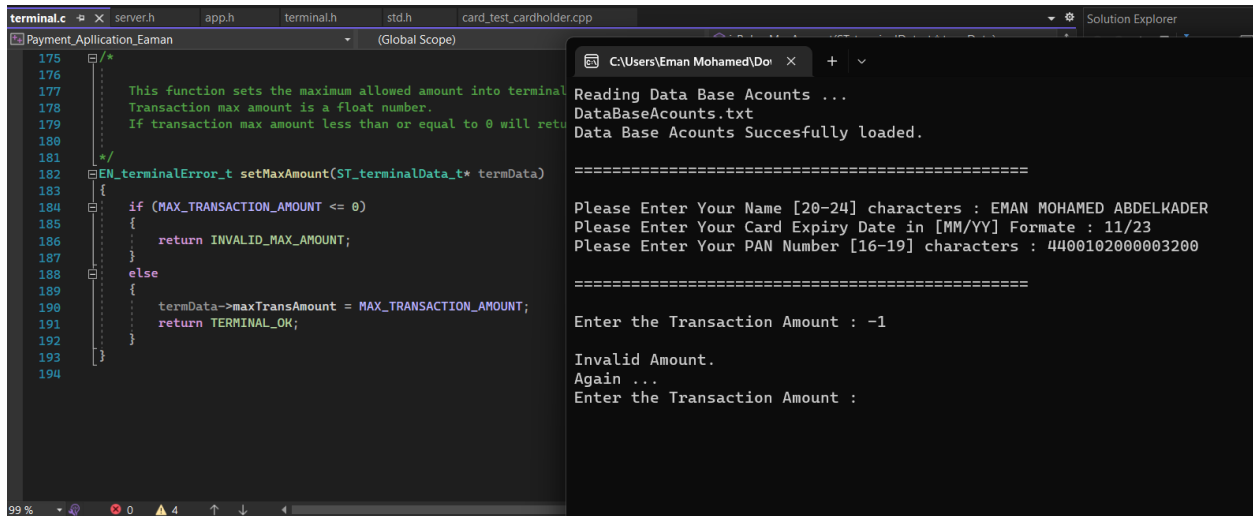
=====

Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate : 11/23
Please Enter Your PAN Number [16-19] characters : 4400102000003200

=====

Enter the Transaction Amount :
```

Test_Transaction_Amount



The screenshot shows the Visual Studio IDE with the `card_test_cardholder.cpp` file open. The code defines a function `setMaxAmount` that takes a `ST_terminalData_t` structure and sets the `maxTransAmount` field. The function checks if the provided `maxTransAmount` is less than or equal to zero; if so, it returns `INVALID_MAX_AMOUNT`. Otherwise, it sets the `maxTransAmount` to the provided value and returns `TERMINAL_OK`.

```
175 /*
176  * This function sets the maximum allowed amount into terminalData
177  * Transaction max amount is a float number.
178  * If transaction max amount less than or equal to 0 will return INVALID_MAX_AMOUNT
179  */
180
181
182 EN_terminalError_t setMaxAmount(ST_terminalData_t* termData)
183 {
184     if (MAX_TRANSACTION_AMOUNT <= 0)
185     {
186         return INVALID_MAX_AMOUNT;
187     }
188     else
189     {
190         termData->maxTransAmount = MAX_TRANSACTION_AMOUNT;
191         return TERMINAL_OK;
192     }
193 }
194
```

The output window shows the following text:

```
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

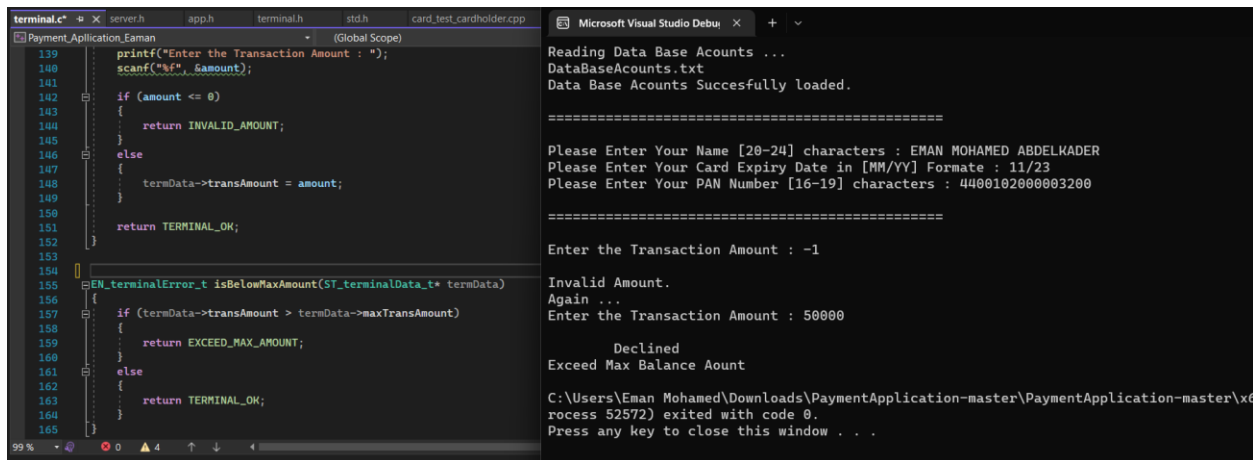
Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate : 11/23
Please Enter Your PAN Number [16-19] characters : 4400102000003200

=====

Enter the Transaction Amount : -1

Invalid Amount.
Again ...
Enter the Transaction Amount :
```

less than 0



The screenshot shows the Visual Studio IDE with the `card_test_cardholder.cpp` file open. The code defines a function `isBelowMaxAmount` that takes a `ST_terminalData_t` structure and checks if the `transAmount` field is greater than the `maxTransAmount` field. If so, it returns `EXCEED_MAX_AMOUNT`. Otherwise, it returns `TERMINAL_OK`.

```
139 printf("Enter the Transaction Amount : ");
140 scanf("%f", &amount);
141
142 if (amount <= 0)
143 {
144     return INVALID_AMOUNT;
145 }
146 else
147 {
148     termData->transAmount = amount;
149 }
150
151 return TERMINAL_OK;
152
153
154 EN_terminalError_t isBelowMaxAmount(ST_terminalData_t* termData)
155 {
156     if (termData->transAmount > termData->maxTransAmount)
157     {
158         return EXCEED_MAX_AMOUNT;
159     }
160     else
161     {
162         return TERMINAL_OK;
163     }
164 }
165
```

The output window shows the following text:

```
Reading Data Base Accounts ...
DataBaseAccounts.txt
Data Base Accounts Succesfully loaded.

=====

Please Enter Your Name [20-24] characters : EMAN MOHAMED ABDELKADER
Please Enter Your Card Expiry Date in [MM/YY] Formate : 11/23
Please Enter Your PAN Number [16-19] characters : 4400102000003200

=====

Enter the Transaction Amount : -1

Invalid Amount.
Again ...
Enter the Transaction Amount : 50000

Declined
Exceed Max Balance Aount

C:\Users\Eman Mohamed\Downloads\PaymentApplication-master\PaymentApplication-master\x64\Process 52572) exited with code 0.
Press any key to close this window . . .
```

Exceed max transaction amount

Explaining Videos:

[https://drive.google.com/drive/folders/1KXfEvA8ELgQ0s0W1BrWdTCg_ex8s1llo?usp=share link](https://drive.google.com/drive/folders/1KXfEvA8ELgQ0s0W1BrWdTCg_ex8s1llo?usp=share_link)