LHospital

A *Turbo* C++ project
A basic management system for a general hospital

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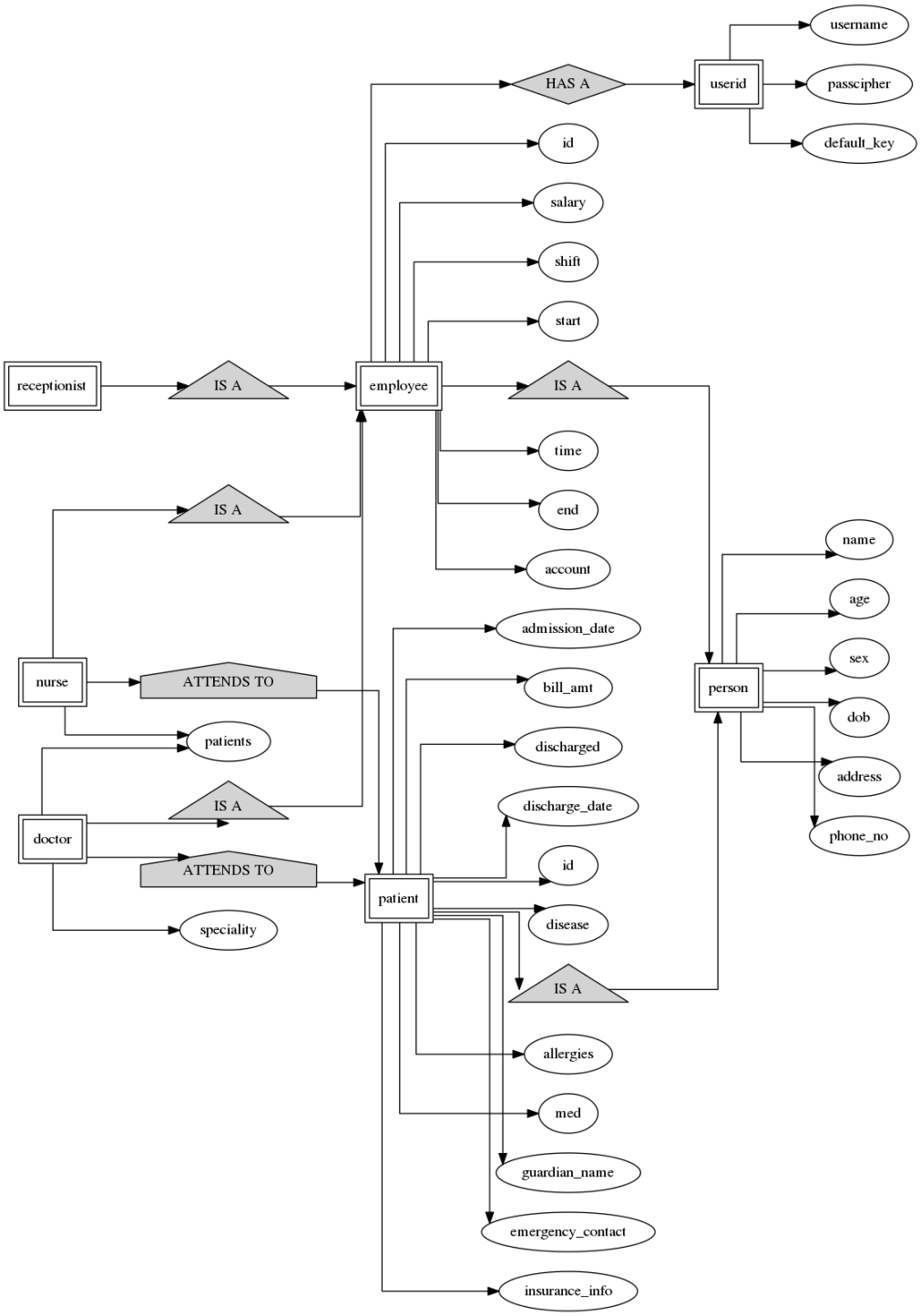
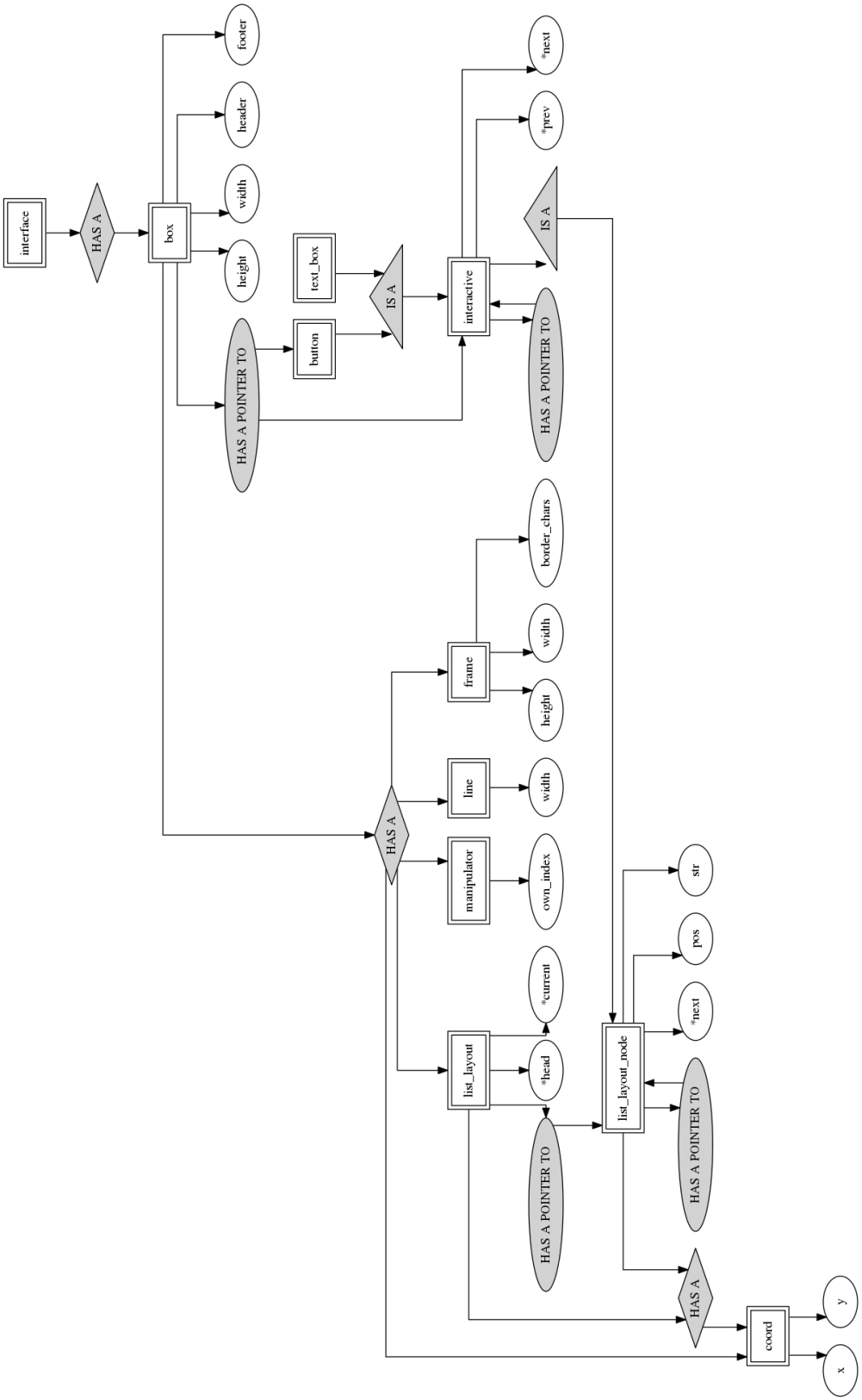
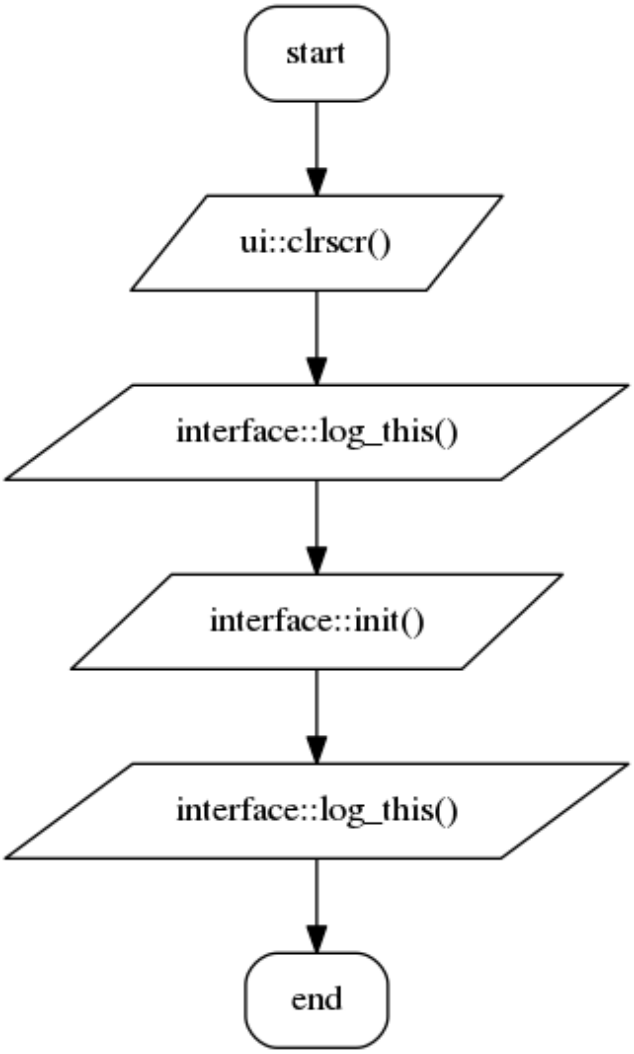


2. User interface



Note: The figure included has been rotated

Flowchart of main()



Source Code

Header files

1. code/iface.hpp

```
/*!
 \file iface.hpp
 \brief Contains prototypes of the functions managing the interface of the
     program
*/

#ifndef INTERFACE_HPP
#define INTERFACE_HPP

#include "ui/ui.hpp"

//!Class containing all the functions that make up the interface of the program
class interface{
    public:
        static void init(); //!>The main interface function of the program; this
            is the functions that runs throughout the program
        static int login_screen();//!>Login screen interface
        static int menu();//!>The first main menu interface(For administrator
            employee only)
        static void patient_management(); //!>Patient management interface(for
            receptionist employees only)
        static void employee_management(); //!>Employee management interface(for
            administrator employees only)
        static void stock_management(); //!>Stock management interface(for
            administrator employees only)

        static void employee_screen(unsigned long); //!>The interface for non-
            administrator employees

        static void error(char*); //!>Prints an error message at the footer of
            interface::window
        static void clear_error(); //!>Clears the error message at the footer of
            interface::window

        static int log_this(char *); //!>Logs a message string into a file log.
            txt

    protected:
        interface(); //!>Objects of this class shouldn't be created
        /*!
        For creating a validation function to use in menus
        to validate the choice input of the menu option to be accessed
        */
        class validate_menu
        {
                static int lowest_choice, greatest_choice; //!>The lower and
                    upper limit of the choices of a menu
                validate_menu(); //!>Objects of this class shouldn't be created
            public:
                static int input(const char *); //!>The validation function that
                    will be passed as an argument to box::operator>>()
```

```
                static void set_menu_limits(int, int); //!>Setter; sets
                    lowest_choice and greatest_choice
        };
        /*!Creates a back_func that can be passed as an argument to box::
            setback_func()*/
        class back_func
        {
                back_func(); //!>Objects of this class shouldn't be created
            public:
                static int backbit; //!>1, if shift + bkspc is pressed, 0
                    otherwise
                static int set_backbit(); //!>Setter, passed as an argument to
                    box::setback_func()
        };
        static box window; //!>The main outer window box
};

//!Class containing all the functions that make up the interface of Employee
    management
class emp_mgmt : public interface
{
    public:
        static void view_emp(); //!>Interface of View Employee
        static int view_emp(unsigned long); //!>Creates the interface that shows
            the details of an employee with a particular ID
        static void add_emp(); //!>Interface of Add Employee
        static void remove_emp(); //!>Interface of Remove Employee
        static void edit_emp(); //!>Interface of Edit Employee
        static void pay_emp(); //!>Interface of Pay Employee
        static void pay_all(); //!>Interface of Pay All Employees
    private:
        emp_mgmt(); //!>Objects of this class shouldn't be created
};

#endif /* INTERFACE_HPP */
```

2. code/EMP.HPP

```
/*!
 \file EMP.HPP
 \brief Contains the definitions of the employee class and its derivatives
*/

#ifndef EMP
#define EMP

#include "base.hpp"

enum emp_type {INVALID, OTHERS, DOCTOR, NURSE, RECEPTIONIST};
//!>Identifiers for indication of different types of employees

//!Class storing details of employees of the hospital
class employee : public person{
        int generate_id(); //!>Generates ID of the employee
        static int generate_id_status; //!>0 if the last id generation was
            unsuccessful
        /*!>Basically ensures that id generation is stopped when an error occurs
            in id generation,
```

```
19          otherwise, the files(max_id.dat, id_list.dat) might start storing
                meaningless data, which
20          will affect future id generation*/
21
22      public:
23          employee(str, int, Date, address, phone, unsigned long, Time, Time, str =
                "", str = ""); //!>Explicit constructor
24          /*!>for all those with user accounts(doctors, nurses, receptionists),
25          last 2 arguments are to be provided as well*/
26          employee(); //!>Default constructor
27
28          //!@{Getters
29          int get_age(); //!>Overridden function
30          /*!>Updates the age of the employee and writes the employee object back
                to file before returning age*/
31          unsigned long get_salary();
32          Time get_shift(int inp1); /*!>\param inp1 times_of type variable that
                indicates starting or ending shift time*/
33          unsigned long get_id();
34          static int get_generate_id_status();
35          transaction * get_last_5_transactions(); //!>Gets the last 5 records
                present in the file TRANS.DAT of the employee's folder
36          //!}@
37
38          //!@{Setters
39          void set_salary(unsigned long);
40          void set_shift(int inp1, Time t1);/*!>\param inp1 times_of type variable
                that indicates starting or ending shift time*/
41          //!}@
42
43          userid account; //!>Facilitates login mechanism of the employee
44      protected:
45          unsigned long id; //!>ID of the employee
46          unsigned long salary; //!>Salary of the employee
47          Time shift_start; //!>Starting shift time of the employee
48          Time shift_end; //!>Ending shift time of the employee
49  };
50
51  //!Class storing details of doctors of the hospital
52  class doctor : public employee{
53      public:
54          doctor(str, int, Date, address, phone, unsigned long, Time, Time, int,
                int, str, str); //!>Explicit constructor
55          doctor(); //!>Default constructor
56
57          //!@{Getters
58          int * get_speciality();
59          long * get_patients();
60          //!}@
61
62          //!@{Setters
63          void set_speciality(int *);
64          void set_patients(long *);
65          //!}@
66
67      private:
68          int speciality[2]; //!>Doctor's specialization
69          long patients[10]; //!>Patients currently under care, can take only 10 at
                once
```

```
70 };
71
72 //!Class storing details of nurses of the hospital
73 class nurse : public employee{
74     public:
75         nurse(str, int, Date, address, phone, unsigned long, Time, Time, str, str
             ); //!>Explicit constructor
76         nurse(); //!>Default constructor
77         long * get_patients(); //!>Getter
78
79         void set_patients(long *); //!>Setter
80     private:
81         long patients[5]; //!>Patients currently under care, can take only 5 at
             once
82 };
83
84 //!Class storing details of receptionists of the hospital
85 class receptionist : public employee
86 {
87     public:
88         receptionist(str, int, Date, address, phone, unsigned long, Time, Time,
             str, str); //!>Explicit constructor
89         receptionist(); //!>Default constructor
90 };
91
92 //!Class that generates objects storing the employee type corresponding to each
     id
93 /*!
94 This class is used to generate objects storing the employee type corresponding to
      each id,
95 and then to store these objects to a file EMPLOYEE/ID_LIST.DAT(The ctor itself
     does all this)
96 This class is used to get the employee type of an employee having a particular id
97 */
98 class id_to_emp
99 {
100         unsigned long id;//!>ID of employee
101         int employee_type;//!>Type of employee
102     public:
103         int status; //!>True whenever the constructor runs successfully and
             succeeds in storing the object to id_list.dat
104         id_to_emp(unsigned long, int); //!>Explicit constructor
105         id_to_emp(); //!>Default constructor
106         static int convert(unsigned long); //!>Converts id to employee type
107 };
108
109 #endif
```

3. code/BASE.HPP

```
1 /*!
2  \file BASE.HPP
3  \brief Contains the declarations of the basic structs, classes, typedefs
4         and enums to be used in the whole program
5 */
6
7 #ifndef BASE
8 #define BASE
9
```

```
10 #include "ui/ui.hpp"
11 #include <fstream.h>
12 #include <string.h>
13 #include <dir.h>
14 #include <stdio.h>
15 #include <math.h>
16 #include <string.h>
17 #include <time.h>
18 #include <stdlib.h>         //for random() and randomize()
19
20 typedef char str[80]; //!>typedef for general strings
21 typedef char phone[11]; //!>typedef for strings storing phone numbers
22
23 enum sex {MALE, FEMALE, TRANS}; //!>Identifiers for different sexes
24 enum date_type {DAY, MONTH, YEAR}; //!>Identifiers for different parts of a date
25 enum time_type {HOUR, MINUTE, SECOND}; //!>Identifiers for different parts of a
       time
26 enum body_parts {BRAIN, HEART, SKIN,
27     LUNG, BONE, EYE,
28     THROAT, TEETH, STOMACH,
29     BLOOD, GUT, GEN}; //!>Identifiers for different parts of the human body
30 /*!>used for recording specialities of doctors(GEN for general problems)*/
31
32 enum address_parts {HOUSE_NO, STREET, CITY, DISTRICT, STATE}; //!>Identifiers for
        different parts of an address
33 enum times_of {START, END}; //!>Identifiers indicating start or end of something
34 /*!>(used in get_shift() and set_shift() to get or set starting or ending shift
       time)*/
35
36 struct Time{
37     unsigned int hour;
38     unsigned int minute;
39     unsigned int second;
40
41     Time();
42     Time(unsigned h, unsigned m, unsigned s);
43 };//!>Structure facilitating implementation of a time variable
44
45 struct Date{
46     unsigned int day;
47     unsigned int month;
48     unsigned int year;
49
50     Date();
51     Date(unsigned d, unsigned m, unsigned y);
52 };//!>Structure facilitating implementation of a date variable
53
54 class system
55 {
56     private:
57         system();
58     public:
59         static Date get_date();
60         static Time get_time();
61 };//!>Contains prototypes of functions that return the system date and time
62
63 struct address{
64     str house_no;
65     str street;
```

```
66      str city;
67      str district;
68      str state;
69
70      address(const char * = "", const char * = "", const char * = "", const char *
            = "", const char * = "");
71  };//!>Structure facilitating implementation of an address variable
72
73  struct disease{
74      str name;
75      int type;           //refers to body part affected (LUNG, HEART, etc)
76      str symptoms[4];    //symptoms reported by patient
77  };//!>Structure facilitating implementation a variable storing details of a
        disease
78
79  struct insurance{
80      str provider;
81      unsigned long amount;
82      Date expiry;
83  };//!>Structure facilitating implementation a variable storing insurance details
        of any person
84
85  struct medicine{
86      int code;
87      float price;
88      str name;
89      float dosage;
90      long stock;
91  };//!>Structure facilitating implementation a variable storing details of a
        medicine
92
93  struct transaction{
94      float amount;
95      str reason;
96      Date _date;
97      Time _time;
98      transaction(float, Date = Date(), Time = Time(), char* = "NA");
99      transaction();
100 };//!>Structure facilitating implementation a variable storing details of a
        transaction
101
102 struct procedure{
103     str name;
104     float cost;
105 };//!>Structure facilitating implementation a variable storing details of a
        medical procedure
106
107 //!Class storing all common data members of a person
108 /*!
109 Parent class to all the persons that this program handles, i.e patients,
110 and all types of employees.
111 */
112 class person{
113     public:
114         person(str, int, Date, address, phone); //!>Explicit constructor
115         person(); //!>Default constructor
116
117         //!@{Getters
118         char* get_name();
```

```
119         int get_age();
120         int get_sex();
121         Date get_dob();
122         address get_address();
123         char* get_phone();
124         //!}@
125 
126         //!@{Setters
127         void set_name(char*);
128         void set_sex(int);
129         void set_dob(Date, Date = system::get_date());
130         void set_address(address);
131         void set_phone(char*);
132         //!}@
133 
134     protected:
135         str name; //!>Name of the person
136         unsigned age; //!>Age of the person
137         unsigned sex; //!>Sex of the person
138         Date dob; //!>Date of birth of the person
139         address adr; //!>Address of the person
140         phone phone_no; //!>Phone number of the person
141 
142     private:
143         void calc_age(Date d = system::get_date()); //!>Calculates age of the
                person using dob
144         /*!>\param d The date with respect to which age is to be calculated(
                default value is set to be the system date)*/
145 };
146 
147 //!Class managing login features of the program
148 /*!
149 This class stores a username and a password in encrypted form, besides
150 the inplementation data. This class uses a vigenere cipher to encrypt the
151 password and store it.
152 */
153 class userid
154 {
155         str username; //!>Username of the login account
156         str passcipher; //!>Encrypted password
157         str default_key;//!>Key for making the vigenere cipher
158         void makecipher(char *); //!>Makes the vigenere cipher
159         void set_key(char *); //!>Sets default_key to a random string
160         char * decipher(); //!>deciphers the cipher 'passcipher'
161 
162     public:
163         userid(char *, char *); //!>Explicit constructor
164         userid(); //!>Default constructor
165         char * get_username(); //!>Getter
166         void set_username(char *); //!>Setter
167         int login(char *); //!>\return 1 if the string input in the function is
                the password, 0 otherwise
168 };
169 
170 //!Defines << operator overloads to facilitate printing of some stuff
171 class enum_to_str
172 {
173         enum_to_str();
174     public:
```

```
175         friend box & operator<<(box &output, sex s);        //!>converts sex
                enumeration constant into a string and prints it to a box
176         friend box & operator<<(box &output, body_parts b); //!>converts
                body_parts enumeration constant into a string and prints it to a box
177         friend box & operator<<(box &output, Time & t);     //!>converts Time
                variable into a string and prints it to a box
178         friend box & operator<<(box &output, Date & d);     //!>converts Date
                variable into a string and prints it to a box
179         friend box & operator<<(box &output, address & a);  //!>converts address
                variable into a string and prints it to a box
180 };
181
182 #endif
```

4. code/PATIENT.HPP

```
1  /*!
2   \file PATIENT.HPP
3   \brief Contains the patient class definition
4  */
5
6  #ifndef PATIENT
7  #define PATIENT
8
9  #include "base.hpp"
10
11 //!Base patient class
12 class patient : public person
13 {
14     protected:
15
16         long id; //!>Unique identification number of patient
17         disease dis; //!>patient's afflictions
18         str allergies[2]; //!>patient's known allergies
19         int med[50][2]; //!>patient's purchased medicines & quantities
20         str guardian_name; //!>Patient's guardian/caretaker
21         str emergency_contact; //!>Patient's emergency contact's name
22         phone emer_contact_no; //!>Emergency contact phone number
23         insurance insur_info; //!>Insurance struct storing patient's insurance
               info
24         Date admission_date; //!>Date patient was admitted
25         unsigned long bill_amt; //!>Net amount to be billed to patient
26         int discharged; //!>Binary; = 0 Admitted | = 1 Discharged
27         Date discharge_date; //!>Date patient was discharged. NULL if still
               admitted
28
29     public:
30
31         patient(str, int, Date, address, phone, disease, str, str, phone,
               insurance, Date = system::get_date()); //!>Explicit constructor
32         //!>If no date is provided, it is assumed that patient was admitted on
               the current system date
33         patient(); //!>Default constructor
34
35         //!@{Getters
36
37         //!Returns unique ID of patient
38         long get_id();
39         //!Returns a disease type object of patient's affliction
```

```
40          disease get_dis();
41          //!Returns patient's guardian's name
42          char* get_guardian_name();
43          //!Returns emergency contact's name
44          char* get_emergency_contact();
45          //!Returns emergency contact's phone no.
46          char* get_emer_contact_no();
47          //!Returns patient's insurance info as a struct
48          insurance get_insur_info();
49          /*!Returns admission date parameters
50                  Uses enum date_type
51                      0 - DAY
52                      1 - MONTH
53                      2 - YEAR*/
54          int get_admission_date(int);
55          //!Returns current amount billed to patient
56          unsigned long get_bill_amt();
57          /*!Returns a record of medicines purchased
58                  get_med(x, y)
59                      0 <= x < 50 Number of medicine purchase in list
60                      0 <= y <= 1 | 0 - Return medicine code
61                                  | 1 - Return medicine quantity */
62          int get_med(int, int);
63          /*!Returns discharge date parameters
64                  Uses enum date_type
65                      0 - DAY
66                      1 - MONTH
67                      2 - YEAR*/
68          int get_discharge_date(int);
69          /*!Returns a transaction element by its number from
70          the patient's list of transactions*/
71          transaction get_transaction(int);
72          //!}@
73
74          //!@{Setters
75          //!Overwrites the current stored affliction for patient
76          void set_dis(disease);
77          //!Overwrites the current stored guardian name
78          void set_guardian_name(char*);
79          //!Overwrites the current stored emergency contact name
80          void set_emergency_contact(char*);
81          //!Overwrites the current stored emeegency contant phone
82          void set_emer_contact_no(char*);
83          //!Overwrites the current stored insurance information
84          void set_insur_info(insurance);
85          //!Overwrites the current stored admission date
86          void set_admission_date(Date);
87          //!Overwrites the current billed amount
88          void set_bill_amt(unsigned long);
89          /*!Overwrites a medicine record for patient
90                  get_med(x, y, z)
91                      0 <= x < 50 Number of medicine purchase in list
92                      y - medicine code
93                      z - medicine quantity */
94          void set_med(int, int, int);
95          //!Overwrites the current stored discharge date
96          void set_discharge_date(Date);
97          //!Sets patient's discharge status to 1 / TRUE
98          void discharge();
```

```
        //!}@
};

#endif
```

5. code/HOSP.HPP

```
/*!
 \file HOSP.HPP
 \brief Contains prototypes of the hospital management functions
*/

#ifndef HOSP
#define HOSP

#include "base.hpp"
#include "patient.hpp"

//!Stores the no. of days in each month of the year(for hospital::
    get_date_difference())
const int monthDays[12] = {31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31};
const int stay_charge = 50;  //!> The charge per day of stay in the hospital($50
    per day)

//!Class containing all the basic hospital management functions used in the
    program
class hospital
{
    public:
        //!@{Hospital finances management functions
        static float get_balance();     //!<Getter function

        //!Deducts the input amount from hospital::balance
        /*!
        \param amt The amount to be deducted from hospital::balance
        \param reason The reason for deduction of money
        \param dt The date of deduction of money
        \param tm The time of deduction of money
        \return A transaction type variable containing details about the amount
            deduction
        */
        static transaction deduct_money(float amt, char* reason, Date dt, Time tm
            );

        //!Adds the input amount to hospital::balance
        /*!
        \param amt The amount to be added to hospital::balance
        \param reason The reason for deposit
        \param dt The date of deposit
        \param tm The time of deposit
        \return A transaction type variable containing details about the deposit
        */
        static transaction add_money(float, char*, Date, Time);

        //!Returns the last 10 transactions of the hospital
        /*!
        Reads the last 10 records from a file transactions.dat
        \return An array of type transaction containing those 10 records
        */
```

```
48          static transaction* get_transaction();
49          //!}@
50
51          //!@{Patient management functions
52
53          //!Gets a patient object from file corresponding to the inputted id
54          /*!
55          Reads a patient object from a file base.dat that is present in
56          a folder with name as the id of the patient. All such folders are
57          present in a folder named PATIENT
58          \param id The id of the patient to be read
59          \return The patient object read from file
60          */
61          static patient get_patient_by_id(long id);
62
63          //!Writes a patient object to file
64          /*!
65          Makes a new folder(if it doesn't exist) in PATIENT, whose name is the
66          id of the patient object that is to be written, and writes the patient
67          object to a file BASE.DAT inside that folder
68          \param a The patient object that is to be written to file
69          */
70          static void write_patient(patient a);
71
72          //!Charges a patient for any service, treatment etc. that the patient
                availed from the hospital
73          /*!
74          Gets the patient object from file using get_patient_by_id(), and adds a
75          transaction type variable to a file TRANS.DAT that is present in the
                folder
76          of the patient(i.e the folder having name as the id of the patient)
77          \param pat_id ID of the patient
78          \param trans The transaction type variable containing details of the
                transaction that is charged to the patient
79          */
80          static void charge_patient(int pat_id, transaction trans);
81
82          //!Discharges a patient from the hospital
83          /*!
84          Calls the patient::discharge() function, sets the patient's discharge
85          date to the current system date, and writes the patient back to file
86          \param temp The object of the patient who is to be discharged
87          */
88          static void discharge_patient(patient temp);
89          static float calc_bill(int); //!>Calculates the cost of the patient's
                stay in the hospital
90          //!}@
91
92          //!@{Functions for medicine records management
93
94          //!Gets a medicine from file corresponding to an input code
95          /*!
96          Reads a medicine type variable from a file STOCK/MED.DAT that has code
                equal to the
97          code inputted to the function
98          \param inp_code The code of the required medicine
99          \return The medicine corresponding to inp_code
100         */
101         static medicine get_med_by_code(int inp_code);
```

```
102
103         //!Writes a medicine to file
104         /*!
105         Writes a medicine type variable back to the file STOCK/MED.DAT which
                stores all
106         medicines, after it has been edited, into its position in the file.
107         */
108         static void write_med(medicine);
109         //!}@
110
111         //!@{Employee management functions
112
113         //!Gets an object of an employee(or its derivative) from file
                corresponding to an input id
114         /*!
115         Reads an object from a file base.dat that is present in
116         a folder with name as the id of the employee. All such folders are
117         present in a folder named EMPLOYEE, or EMPLOYEE/DOCTOR, or
118         EMPLOYEE/NURSE, or EMPLOYEE/RECEPTIONIST
119         This function converts the id inputted to it into the
120         employee type, sets the string of the path to the folder containing
121         the employee object file, and reads the object from the file to a
122         buffer pointed to by a void pointer
123         A void pointer is used in this function to handle the different data
                types
124         i.e. employee, doctor, nurse, receptionist that can be input into the
125         function as the target parameter.
126         \param id The id of the employee to be read
127         \param target void pointer pointing to the buffer that stores the object
128         \return 1 if the function executed without errors, 0 otherwise
129         */
130         static int get_employee_by_id(unsigned long id, void * target);
131
132         //!Writes an object of type employee(or its derivative) to file
133         /*!
134         This function converts the id of the object pointed to by the pointer
135         a into the employee type, sets the string of the path to the folder that
                should
136         contain the employee object file, and then makes a new folder(if it doesn
                't exist)
137         in EMPLOYEE, or EMPLOYEE/DOCTOR, or EMPLOYEE/NURSE, or EMPLOYEE/
                RECEPTIONIST
138         (depending upon the type of the object pointed by the input void pointer)
                , whose
139         name is the id of the employee object that is to be written, and writes
                the
140         employee object to a file BASE.DAT inside that folder.
141         A void pointer is used in this function to handle the different data
                types
142         i.e. employee, doctor, nurse, receptionist that can be input into the
143         function as the parameter a.
144         \param a void pointer pointing to the object that is to be written to
                file
145         \return 1 if the function executed without errors, 0 otherwise
146         */
147         static int write_employee(void * a);
148
149         //!Pays salary to an employee having a particular id
150         /*!
```

```
151         Obtains the employee's object from file using get_employee_by_id(),
152         gets the salary of the employee, deducts the salary from hospital::
                balance
153         using hospital::deduct_money(), and then writes the transaction details
                of
154         this payment to a file TRANS.DAT present in the folder of the employee (i
                .e
155         the folder having name as the id of the employee), that is present in
                folder
156         EMPLOYEE, or EMPLOYEE/DOCTOR, or EMPLOYEE/NURSE, or EMPLOYEE/RECEPTIONIST
                ,
157         depending on the employee type.
158         \param id ID of the employee to whom salary is to be paid
159         \param d1 Date of payment of salary
160         \param t1 Time of payment of salary
161         \return 1 if the function executed without errors, 0 otherwise
162         */
163         static int pay_salary(unsigned long id, Date d1, Time t1);
164
165         //!Pays salary to all employees whose files are on the disk
166         /*!
167         Loops the execution of pay_salary(); the maximum no. of times the loop
                should
168         run is determined by max_id, an unsigned long variable stored in a file
169         EMPLOYEE/MAX_ID.DAT
170         \return 1 if the function executed without errors, 0 otherwise
171         */
172         static int pay_all_salaries();
173         //!}@
174
175         //!@{Internal implementation functions
176         static int get_date_difference(Date, Date); //!>Calculates the no. of
                days between 2 dates
177         static int count_leap_years(Date); //!>Calculates the no. of leap years
                between a certain date and the year 0 AD
178         static int date_validity(const char * inp_date); //!>\return
                date_validity(str_to_date(inp_date))
179         static int date_validity(Date); //!>\return 1 if the date supplied to the
                 function is a valid date, 0 otherwise
180         static int time_validity(const char * inp_time); //!>\return
                time_validity(str_to_time(inp_time))
181         static int time_validity(Time); //!>\return 1 if the time supplied to the
                 function is a valid time, 0 otherwise
182         static Date str_to_date(const char *); //!>converts a string to a Date
                type variable
183         static Time str_to_time(const char *); //!>converts a string to a Time
                type variable
184         static int str_to_sex(char *); //!>converts a string to an enum sex type
                variable
185         //!}@
186
187     private:
188         hospital();//!>Objects of this class shouldn't be created
189
190         //! Reads an object from a file on disk and stores it in a buffer
191         /*!
192         A specific implementation of the fstream::read() function for the
                hospital's
193         purposes.
```

```
194         \param ID ID of the object that is to be read(for error logging purposes
                only)
195         \param dest The path string to the file from which the object is to be
                read
196         \param size Size in bytes of the object that is to be read
197         \param temp Pointer to the buffer at which the read object is to be
                stored
198         */
199         static int read_from(unsigned long ID, char * dest, int size, char *temp)
                ;
200         static double balance; //!>Current balance of the hospital
201 };
202
203 #endif
```

6. code/UI/test.hpp

```
1  #ifndef TEST_HPP
2  #define TEST_HPP
3
4  void test_weird_error();
5
6  int back_func();
7  void test_back();
8
9  void test_all();
10 void test_listlayout();
11 void test_textbox();
12 void test_frame();
13
14 #endif /* TEST_HPP */
```

7. code/UI/ui.hpp

```
1  /*!
2   \file ui.hpp
3   \brief Contains prototypes of UI functions
4  */
5
6  #ifndef UI_HPP
7  #define UI_HPP
8
9  #include <conio.h>
10 #include <stdarg.h>
11 #include <string.h>
12 #include <stdio.h>
13 #include <iostream.h>
14 #include <ctype.h>
15 #include <stdlib.h>
16 #include <limits.h>
17 #include <errno.h>
18 #include <new.h>
19 #include <process.h>
20
21 //! Validator function that's used for validating user input
22 typedef int (*validator_f)(const char *);
23
24 //! For running ui::init() before main (initialising basic stuff)
25 class init_lib_ui
```

```
26 {
27     static int counter; //!< Ensures ui::init() is called only once
28     public:
29         init_lib_ui(); //!< Ctor
30 };
31
32 //! Static object of type init_lib_ui that is initialised
33 //! before main is run and thus, ui::init is called
34 static init_lib_ui init_obj_ui;
35
36 //! Manipulator class to manipulate UI functions
37 /*!
38  Objects of this type would be used instead of an enum
39  to avoid conflicts with int
40  Every manipulator object is identified by its index while
41  static index indicates the index to be assigned to the next
42  manipulator
43 */
44 class manipulator
45 {
46     static int index; //!< index of a new manipulator object
47     int own_index;    //!< index of current manipulator
48
49     public:
50         manipulator(); //!< Ctor; assigns index
51         int operator==(manipulator); //!< Returns 1 if indexes are same
52 };
53
54 //! Class containing basic UI functions and attributes
55 class ui
56 {
57     ui();   //!< Private ctor; object of this class shouldn't be created
58     public:
59
60         //! Specifies the directions for modifying frame, etc.
61         enum dir
62         {
63             left = 1,
64             top = 2,
65             right = 4,
66             bottom = 8,
67             all = 16 //!< When all sides need to be modified
68         };
69         static int scr_height; //!< Height of screen
70         static int scr_width; //!< Width of screen
71         static void init(); //!< Sets all static variables
72         static void clrscr(); //!< Clears the contents off the screen
73         static int tcolor; //!< text color
74         static int bcolor; //!< background color
75         static manipulator endl; //!< End line and move cursor to next line
76         static manipulator centeralign; //!< Center align
77         static manipulator rightalign; //!< Right align
78
79         //! This func is called when new is unable to allocate memory
80         static void my_new_handler();
81 };
82
83 //! Represents a coordinate
84 struct coord
```

```
85 {
86     int x;  //!< x coordinate
87     int y;  //!< y coordinate
88 
89     coord(int = 1,int = 1); //!< Sets the coordinate
90     coord & operator+=(coord);
91     coord & operator-=(coord);
92     coord operator+(coord);
93     coord operator-(coord);
94 };
95 
96 //! Represents the node of a list representing the layout
97 /*!
98  Represents all the information of an element that will be
99  printed on the screen. Also points to the next element of the
100  screen that will be printed next to it
101 */
102 class list_layout_node
103 {
104     list_layout_node *next;     //!< Pointer to next node
105     coord pos;                  //!< Position where to print
106     int tcolor;                 //!< Text colour
107     int bcolor;                 //!< Background colour
108     char str[100];              //!< String to print
109 
110     //! How to print the string; mainly for passwords
111     int print_type;
112 
113     public:
114         list_layout_node();     //!< Ctor
115         ~list_layout_node();    //!< Dtor
116 
117         //!@{ Setter functions
118         void setnext(list_layout_node *);
119         void setpos(coord);
120         void settcolor(int);
121         void setbcolor(int);
122         void setstr(const char *);
123         void setprint_type(int);
124         //!@}
125 
126         //!@{ Getter functions
127         list_layout_node * getnext();
128         coord getpos();
129         int gettcolor();
130         int getbcolor();
131         const char * getstr();
132         int getprint_type();
133         //!@}
134 
135         //! Used to distinguish will be printed i.e.
136         //! as is or hidden (as passwords)
137         enum print_types
138         {
139             DEFAULT,
140             PASSWORD
141         };
142 };
143 
```

```
144 //! A node of the representation of string as a linked list
145 struct string_node
146 {
147     string_node *next;  //!< Pointer to next node
148     string_node *prev;  //!< Pointer to previous node
149     char data;          //!< Character stored in string
150 
151     string_node();      //!< Ctor
152 };
153 
154 //! Represents all interactive information
155 /*!
156  Basically a parent class of all the classes that
157  represent the elements of the layout the user can
158  interact with.
159  Used so that all those elements can be clubbed together
160  and the input be taken.
161 */
162 class interactive : public list_layout_node
163 {
164     interactive *prev;      //!< ptr to previous node
165     interactive *next;      //!< ptr to next node
166     int offset;             //!< offset to y position when printing
167     public:
168         interactive();      //!< Ctor
169         ~interactive();     //!< Dtor
170 
171         //! Empty input function that will be overridden by children
172         /*!
173          \param offset The offset to y position
174          \return Action that was performed by the user
175         */
176         virtual int input(int offset);
177 
178         //! Setter function
179         void setoffset(int);
180 
181         //! Getter function
182         int getoffset();
183 
184         //! Actions that are performed by user; returned from input func.
185         enum actions
186         {
187             GOTONEXT,
188             GOTOPREV,
189             CLICKED,
190             BACK //!< When shift-bckspc is pressed
191         };
192 
193         //! Keys that user can press to navigate the form
194         enum keys
195         {
196             TAB,
197             ENTER,
198             BACKSPACE,
199             SHIFT_BACKSPACE,
200             SHIFT_TAB,
201             HOME,
202             END,
```

```
203             DELETE,
204             UP,
205             DOWN,
206             LEFT,
207             RIGHT
208         };
209 
210         //! Gets key from user and returns code
211         /*
212          \return Keyname corresponding to enum keys
213         */
214         static int getkey();
215 };
216 
217 //! Represents a text box
218 /*!
219  Inherits from interactive as a text box can be interacted
220  with. Gets data from user and stores it as a string that
221  can be further converted to the required data type
222 */
223 class text_box : public interactive
224 {
225     //! Represents if the data entered in the text box
226     //! should be displayed as is or replaced with asterisks
227     int is_password;
228 
229     public:
230         text_box(); //!< Ctor
231 
232         //! Takes input and returns user action
233         /*!
234          /param offset Offset of y coordinate to print
235          /return Action performed by user
236         */
237         int input(int offset = 0);
238 
239         //! Prints string represented by a linked list
240         /*
241          Takes in the head pointer of the linked list
242          string and prints the string by iterating through
243          the list. Has no other side effects.
244          /param head ptr to head of the linked list
245         */
246         void print_str(string_node *head);
247 
248         //! Setter function
249         void setis_password(int);
250 };
251 
252 //! Represents a button that can be clicked
253 /*!
254  Inherits from interactive as a button can be interacted with.
255  A user can click the button while it's input function is
256  running which will return the user action
257 */
258 class button : public interactive
259 {
260     int tcolor_selected; //!< tcolor when selected
261     int bcolor_selected; //!< bcolor when seilected
```

```
262
263     public:
264         button(); //!< Ctor
265
266         //!@{ Setter functions
267         void settcolor_selected(int);
268         void setbcolor_selected(int);
269         //!@}
270
271         //!@{ Getter functions
272         int gettcolor_selected();
273         int getbcolor_selected();
274         //!@}
275
276         //! Input function
277         /*!
278          Effectively allows the button to be clicked
279          /param offset Offset of y coordinate to print
280          /return Action performed by the user
281         */
282         int input(int offset = 0);
283
284         //! Prints the button
285         /*!
286          /param isselected Indicates if button is selected or not
287         */
288         void print(int isselected = 0);
289 };
290
291 //! Represents the layout of the page
292 /*!
293  Incorporates elements like simple nodes as well as other
294  interactive elements. This layout can be contained within
295  a specific height and the overflowing content can reached
296  by scrolling which is also implemented here.
297 */
298 class list_layout
299 {
300     //!@{ Pointers to implement a linked list to elements
301     list_layout_node *head; //!< ptr to head node
302     list_layout_node *current; //!< ptr to current node
303     //!@}
304
305     coord corner_top_left; //!< top left corner of container
306
307     /*!
308      Following are used as temporary placeholders till data
309      is written to the nodes
310     */
311     ///!@{
312     coord pos;
313     int tcolor;
314     int bcolor;
315     int tcolor_selected;
316     int bcolor_selected;
317     int tcolor_input;
318     int bcolor_input;
319     ///!@}
320
```

```
321     //!@{ For scrolling implementation
322     int height; //!< Height of the layout
323     int width; //!< Width of the layout
324     int lines_scrolled; //!< Lines currently scrolled
325     //!@}
326
327     //! For better verbosity at internal level
328     enum print_modes
329     {
330         DISPLAY,
331         HIDE
332     };
333
334     //! Prints the layout
335     /*!
336      Prints the layout by iterating through the internal
337      linked list maintained. Has no other side effects
338      /param print_mode How to print the data
339     */
340     void print(int print_mode = DISPLAY);
341     public:
342         list_layout(); //!< Ctor
343
344         //!@{ Set an element (node)
345         list_layout& operator<<(coord); //!< Set coord of node
346
347         //! Set data held by the node
348         list_layout& operator<<(const char *);
349         //!@}
350
351         //! Set a text box
352         /*!
353          Sets a text box at the position indicated by pos and
354          returns a pointer to it
355          /param pos Position at which to set text box
356          /param is_pass If the text box has a password, set to 1
357          /return pointer to the text box set (casted to interactive *)
358         */
359         interactive * settext_box(coord pos, int is_pass = 0);
360
361         //! Set a button
362         /*!
363          Sets a button at the position indicated by pos and
364          returns a pointer to it
365          /param pos Position at which to set the button
366          /param txt The text the button displays
367         */
368         interactive * setbutton(coord pos, const char *txt);
369
370         //!@{ Setter functions
371         void settcolor(int);
372         void setbcolor(int);
373         void settcolor_selected(int);
374         void setbcolor_selected(int);
375         void settcolor_input(int);
376         void setbcolor_input(int);
377         void setcorner_top_left(coord);
378         void setheight(int);
379         void setwidth(int);
```

```
380         void setlines_scrolled(int);
381         void setpos(coord);
382         //!@}
383 
384         //!@{ Getter functions
385         int getheight();
386         int getwidth();
387         int getlines_scrolled();
388         coord getpos();
389         coord getcorner_top_left();
390         //!@}
391 
392         void display(); //!< Display the layout
393         void hide(); //!< Hide the layout
394         void clear(); //!< Deletes contents of the layout
395 };
396 
397 //! Represents a border
398 /*!
399  Basically represents a border with characters that can be
400  customised to suit the requirements.
401 */
402 class frame
403 {
404     char border_chars[8];   //!< chars used to draw border
405     int tcolor;             //!< text color
406     int bcolor;             //!< background color
407 
408     //! Represents what part of frame is visible.
409     int sides_visibility[8];
410     int frame_visibility;   //!< Frame visible or not
411     coord corner_top_left;  //!< coord of top left corner
412 
413     //!@{These include the border characters too
414     int height;             //!< height
415     int width;              //!< width
416     //!@}
417 
418     //! Internal pmt used by operator<<
419     int state;
420 
421     //! Sets the visibility of the side
422     /*!
423      /param side Specifies the side using ui::dir
424      /param visib Set the visibility of the side
425     */
426     void setside_visibility(int side, int visib);
427 
428     //! Converts the ui::dir code into internally usable code
429     int convert(int);
430 
431     //! Prints the frame
432     /*!
433      /param f_visib If 1, frame is printed; hidden if it's 0
434     */
435     void print(int f_visib = 1);
436 
437     public:
438 
```

```
439         //! Used to set the visibility mode of the frame
440         /*
441          all: ------
442               |    |
443               ------
444          nosides: -------
445
446                    -------
447         */
448         enum visibility_modes
449         {
450             all = 1,
451             nosides = 2
452         };
453
454         //! Ctor
455         /*!
456          /param corner_top_left Top left corner of frame
457          /param width Width of the frame
458          /param height Height of the frame
459         */
460         frame(coord corner_top_left = coord(1,1), int width =
461         ui::scr_width, int height = ui::scr_height - 1);
462
463         void display(); //!< Display the frame
464         void hide();    //!< Hides the frame
465
466         //! Sets the visibility mode of the frame
467         void setvisibility_mode(int);
468
469         //!@{ operator<<
470         frame & operator<<(int); //!<Sets state
471
472         //! Sets border_char according to state
473         frame & operator<<(char);
474         //!@}
475
476         //!@{ Getter functions
477         int getheight();
478         int getwidth();
479         coord getcorner_top_left();
480
481         //! Returns 1 if visible; 0 = not visible
482         int getframe_visibility();
483         int gettcolor();
484         int getbcolor();
485         char getborder_char(int);
486         int getside_visibility(int);
487         //!@}
488
489         //!@{ Setter functions
490         void setheight(int);
491         void setwidth(int);
492         void settcolor(int);
493         void setbcolor(int);
494         void setcorner_top_left(coord);
495         //!@}
496 };
497
```

```
498 //! Info related to a text box
499 /*!
500  Stores information related to a text box
501  Such as what type to convert it's data to
502  and where to store it
503 */
504 struct info_tbox
505 {
506     text_box * tbox;    //!< ptr to text_box whose info is stored
507
508     //! Data type to convert the string stored in text box to
509     int type;
510     void * data_store;  //!< Where to store converted data
511
512     /*!
513      A validation function that's used to validate the
514      string stored in the text box to see if it is of
515      the required type before converting it.
516      /param str The string to validate
517      /param return 1, if string is validate; 0, otherwise
518     */
519     int (*validator)(const char *str);
520
521     //! The data types the string stored in text box represents
522     /*!
523      Whenever a text box is set, the pointer to the place where
524      final data has to be stored is converted to a void* and
525      the data type is stored.
526      So, void* in different cases is:
527
528      data type     | What void* was
529      ------------- | ------------------
530      INT           | int *
531      LONG          | long *
532      UNSIGNED_LONG | unsigned long *
533      STRING        | char *
534      CHAR          | char *
535      DOUBLE        | double *
536      FLOAT         | float *
537      PASSWORD      | char *
538     */
539     enum data_types
540     {
541         INT,
542         LONG,
543         UNSIGNED_LONG,
544         STRING,
545         CHAR,
546         DOUBLE,
547         FLOAT,
548         PASSWORD,
549         OTHER //!< Not supported at the moment
550     };
551
552     info_tbox();    //!< Ctor
553
554     //! Sets data to the data_store
555     /*!
556      Gets the string stored in the text box, validates
```

```
557      it using the validation function and then converts
558      the string to the required data type and stores it in
559      the required space
560      /return 1 on success, 0 on invalid data
561     */
562     int setdata();
563 };
564
565 /*!
566  Contains default validation functions of type
567  int f(char *)
568  that take in a string and return 1 if the string
569  is valid and 0, otherwise
570 */
571 class validation
572 {
573     validation(); //!< Object of this class is not allowed
574     public:
575
576         //!@{ Default validation functions
577         static int vint(const char *);
578         static int vlong(const char *);
579         static int vunsigned_long(const char *);
580         static int vstring(const char *);
581         static int vchar(const char *);
582         static int vdouble(const char *);
583         static int vfloat(const char *);
584         //!@}
585
586         /*!
587          Get the default validator function for the type
588          specified. If func is not NULL, returns default
589          function, else returns v
590         */
591         static validator_f getvalidator(int type,
592                                         validator_f func);
593 };
594
595 /*!
596  Represents a line with the three strings depiciting
597  left, middle and right aligned stuff respectively
598 */
599 struct line
600 {
601     //!@{ Parts of the line
602     char left[100];   //!< left aligned
603     char middle[100]; //!< centre aligned
604     char right[100];  //!< right aligned
605     //!@}
606
607     int width;  //!< width of line
608     int tcolor; //!< text color
609     int bcolor; //!< background color
610     coord corner_top_left; //!< coord of top left corner
611
612     line(); //!< Ctor
613     void display(); //!< Display the line
614     void hide();    //!< Hide the line
615     void clear();   //!< Delete the data stored
```

```
616
617     private:
618         void print(int); //!< Print the line according to arg
619 };
620
621 /*!
622  Default Back function for use in the class box.
623  Can't declare it as member function as member functions
624  are not inherently addresses and setting it as a member function
625  was causing unsolvable problems
626 */
627 int default_back_func();
628
629 //! A box that has a border and a layout
630 /*!
631  Basically incorporates all the elements into a single
632  entity that the user will interact with.
633  Basically looks like
634  ┌──────────────────┐  <── Frame
635  │ ┌──────────────┐ │
636  │ │              │ │  <──────Layout (No border)
637  │ │              │ │
638  │ └──────────────┘ │  <─────Padding (between layout and frame)
639  └──────────────────┘
640 */
641 class box
642 {
643     int height;     //!< Height of the box
644     int width;      //!< Width of the box
645     int padding;    //!< Padding between frame and layout
646
647     /*!
648      Wraps a string with specified number of characters
649      in each line
650      /param str String to wrap. Will be modified
651      /param length Number of chars in a line
652      /param return_one_line Sets string to have only one line
653      /return Number of lines after wrapping
654     */
655     int wrap(char str[], int length, int return_one_line = 0);
656
657     //! Sets the tbox
658     /*!
659      Sets the textbox in the layout and also stores the
660      correpsonding data in a tbox that is stored in the array
661      /param data_type Type of data in text box
662      /param ptr Pointer to the data store to set in tbox
663     */
664     void set_tbox(int data_type, void *ptr);
665
666     //!@{ Lists of interactives and text boxes
667     interactive * list_interactive[30];
668     info_tbox list_tbox[30];
669     int index_interactive; //!< Index of element to set next
670     int index_tbox; //!< Index of element to set next
671     //!@}
672
673     //! Clicking this button exits the loop
674     button * exit_btn;
```

```
675
676     //!@{ Toggles that help setting required info in layout
677     int center_toggle;
678     int default_toggle;
679     int right_toggle;
680     int header_toggle;
681     int footer_toggle;
682     int password_toggle;
683     //!@}
684
685     char default_text[100]; //!< Default text to set in textbox
686
687     /*!
688      A temporary variable that stores validator func till it
689      is stored in the required place.
690     */
691     int (*temp_validator)(const char *);
692
693     //!@{ Header and footer
694     line header;
695     line footer;
696     //!@}
697
698     /*!
699      The function is called when the user performs a back func
700      while interacting with any interactive
701      /return 1, if loop exits on back; 0, if it does nothing
702     */
703     int (*back_func)();
704
705     protected:
706         coord pos_pointer;  //!< Pos of pointer in box
707         list_layout layout; //!< Layout in which data is stored
708         coord corner_top_left; //!< Coord of top left corner
709
710     public:
711
712         //!@{ Manipulators can be used to alter function of <<
713         static manipulator setheader;
714         static manipulator setfooter;
715         static manipulator setpassword;
716         //!@}
717
718         frame f;    //!< Border of the box
719
720         //! Ctor
721         /*!
722          Initialises all the variables of the class
723          /param corner_top_left The top left corner
724          /param width Width of box (includes border)
725          /param height Height of box (includes border)
726         */
727         box(coord corner_top_left = coord(1,1),
728             int width = ui::scr_width,
729             int height= ui::scr_height - 1);
730
731         //!@{ Getter functions
732         coord getcorner_top_left();
733         int getheight();
```

```
734         int getwidth();
735         int getpadding();
736         //!@}
737
738         //!@{ Setter functions
739         void setcorner_top_left(coord);
740         void setheight(int);
741         void setpadding(int);
742         void settcolor(int);
743         void setbcolor(int);
744         void settcolor_selected(int);
745         void setbcolor_selected(int);
746         void settcolor_input(int);
747         void setbcolor_input(int);
748         void setback_func( int(*f)(void) );
749         //!@}
750
751         //!@{ operator<< is used for adding data to the box's
752         //!   layout that will be printed
753         box & operator<<(char *);
754         box & operator<<(char);
755         box & operator<<(int);
756         box & operator<<(long);
757         box & operator<<(unsigned long);
758         box & operator<<(double);
759         box & operator<<(float);
760         box & operator<<(manipulator);
761         //!@}
762
763         //!@{ operator>> is used for basically setting a text
764         //!   box at the place where pos_pointer is currently
765         //!   at
766         box & operator>>(char *&);
767         box & operator>>(char &);
768         box & operator>>(int &);
769         box & operator>>(long &);
770         box & operator>>(unsigned long &);
771         box & operator>>(double &);
772         box & operator>>(float &);
773         box & operator>>(manipulator);
774
775         //! Using this before another >> will set this func
776         //! as the validator of that text box
777         box & operator>>(int (*)(const char *));
778         //!@}
779
780         void setexit_button(char *);
781
782         //!@{ Sets default for the next text box and
783         //!   clears it after the next text box has been
784         //!   set
785         void setdefault(char *);
786         void setdefault(char);
787         void setdefault(int);
788         void setdefault(long);
789         void setdefault(unsigned long);
790         void setdefault(double);
791         void setdefault(float);
792         //!@}
```

```
793
794         /*!
795          Sets the box to loop, effectively enabling
796          all the text boxes and buttons. Also enables
797          scrolling
798         */
799         void loop();
800
801         void display(); //!< Display the box
802         void hide();    //!< Hide the box
803         void clear();   //!< Delete the contents of the box
804
805         //!@{ Functions to set header and footer
806         void setheader_tcolor(int); //!< set header color
807         void setfooter_tcolor(int); //!< set footer color
808         void clear_header(); //!< Delete contents of header
809         void clear_footer(); //!< Delete contents of footer
810         //!@}
811 };
812
813 #endif /* UI_HPP */
```

C++ files (.cpp)

1. code/iface3.cpp

```
#include <fstream.h>
#include "base.hpp"
#include "iface.hpp"
#include "hosp.hpp"
#include "emp.hpp"

void interface::employee_management()
{
    const int menu_corner_top_left_y = 5;
    coord c(ui::scr_width * 0.2, menu_corner_top_left_y);
    int ch;
    while(1)
    {
        interface::clear_error();
        box menu(c, ui::scr_width * 0.6, ui::scr_height - 6 );
        menu.settcolor(GREEN);
        menu << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
        menu.settcolor(ui::tcolor);
        menu << "1. View employee data" << ui::endl
             << "2. Add new employee" << ui::endl
             << "3. Remove existing employee" << ui::endl
             << "4. Edit employee data" << ui::endl
             << "5. Pay salary to individual employee" << ui::endl
             << "6. Pay salary to all employees" << ui::endl
             << "7. Back" << ui::endl
             << ui::endl << "Enter your choice: ";
        menu.settcolor_input(YELLOW);
        validate_menu::set_menu_limits(1, 7);
        menu >> validate_menu::input >> ch;
        menu << ui::endl;
        menu.setexit_button("Submit");
        menu.loop();
        menu.hide();
        switch (ch)
        {
            case 1:
            {
                emp_mgmt::view_emp();
                break;
            }
            case 2:
            {
                emp_mgmt::add_emp();
                break;
            }
            case 3:
            {
                emp_mgmt::remove_emp();
                break;
            }
            case 4:
            {
                emp_mgmt::edit_emp();
                break;
            }
```

```
56              case 5:
57              {
58                  emp_mgmt::pay_emp();
59                  break;
60              }
61              case 6:
62              {
63                  emp_mgmt::pay_all();
64                  break;
65              }
66              case 7:
67              {
68                  return;
69              }
70          }
71      }
72  }
73
74  void interface::employee_screen(unsigned long id)
75  {
76      void * temp = malloc( sizeof(doctor) ); //as doctor has the greatest size
            among employee, doctor, nurse and receptionist classes
77      if(temp == NULL)
78      {
79          interface::log_this("interface::employee_screen() : Not enough memory to
                allocate buffer void * temp = malloc( sizeof(doctor) )");
80          interface::error("Out of memory!! Check log");
81          getch();
82          return;
83      }
84      if(!hospital::get_employee_by_id(id, temp))
85      {
86          interface::error("ID not found or error while reading from file!");
87          getch();
88          free(temp);
89          return;
90      }
91      employee *e = (employee *) temp;
92      const int menu_corner_top_left_y = 5;
93      coord c(ui::scr_width * 0.2, menu_corner_top_left_y);
94      int ch;
95      str heading = "Welcome, ";
96      strcat( heading, e->get_name() );
97      strcat(heading, "!");
98      while(1)
99      {
100         interface::clear_error();
101         box menu(c, ui::scr_width * 0.6, ui::scr_height - 6 );
102         menu.settcolor(GREEN);
103         menu << ui::centeralign << heading << ui::endl << ui::endl;
104         menu.settcolor(ui::tcolor);
105         menu << "1. View profile" << ui::endl
106              << "2. Change login details" << ui::endl
107              << "3. View last 5 transactions" << ui::endl;
108         emp_type type_of_emp = id_to_emp::convert(id);
109         if(type_of_emp == RECEPTIONIST)
110         {
111             menu << "4. Manage patients" << ui::endl
112                  << "5. Exit" << ui::endl;
```

```
113         }
114         else
115         {
116             menu << "4. Exit" << ui::endl;
117         }
118         menu << ui::endl << "Enter your choice: ";
119         menu.settcolor_input(YELLOW);
120         if(type_of_emp == RECEPTIONIST)
121         {
122             validate_menu::set_menu_limits(1, 5);
123         }
124         else
125         {
126             validate_menu::set_menu_limits(1, 4);
127         }
128         menu >> validate_menu::input >> ch;
129         menu << ui::endl;
130         menu.setexit_button("Submit");
131         menu.loop();
132         menu.hide();
133         switch(ch)
134         {
135             case 1:
136             {
137                 if( !emp_mgmt::view_emp(id) )
138                 {
139                     interface::error("Failed to display profile!");
140                     getch();
141                 }
142                 break;
143             }
144             case 2:
145             {
146                 int ch;
147                 while(1)
148                 {
149                     box menu3(c, ui::scr_width * 0.6, ui::scr_height - 6);
150                     menu3.settcolor(GREEN);
151                     menu3 << ui::centeralign << "Change login details" << ui::
                            endl << ui::endl;
152                     menu3.settcolor(WHITE);
153                     menu3 << "1. Change User ID" << ui::endl
154                           << "2. Change Password" << ui::endl
155                           << "3. Back" << ui::endl
156                           << "Enter your choice: ";
157                     menu3.settcolor(ui::tcolor);
158                     menu3.settcolor_input(YELLOW);
159                     validate_menu::set_menu_limits(1, 3);
160                     menu3 >> validate_menu::input >> ch;
161                     menu3 << ui::endl;
162                     menu3.setexit_button("Submit");
163                     menu3.loop();
164                     menu3.hide();
165                     switch(ch)
166                     {
167                         case 1:
168                         {
169                             str new_username;
170                             box menu4( menu3.getcorner_top_left(), menu3.getwidth
```

```
                                    (), menu3.getheight() );
171                                 menu4.settcolor(GREEN);
172                                 menu4 << ui::centeralign << "Change login details" <<
                                        ui::endl << ui::endl;
173                                 menu4.settcolor(WHITE);
174                                 menu4 << "Change User ID" << ui::endl;
175                                 menu4.settcolor(ui::tcolor);
176                                 menu4 << "User ID: ";
177                                 menu4.setdefault( e->account.get_username() );
178                                 menu4.settcolor_input(YELLOW);
179                                 menu4 >> new_username;
180                                 menu4.setexit_button("Submit");
181                                 menu4.setback_func(back_func::set_backbit);
182                                 menu4.loop();
183                                 menu4.hide();
184                                 if(back_func::backbit)
185                                 {
186                                     back_func::backbit = 0;
187                                     break;
188                                 }
189                                 e->account.set_username(new_username);
190                                 const int notice_height = 10;
191                                 box notice( menu4.getcorner_top_left(), menu4.
                                        getwidth(), notice_height );
192                                 notice.settcolor(GREEN);
193                                 notice << ui::centeralign << "Change login details"
                                        << ui::endl << ui::endl;
194                                 if( !hospital::write_employee(temp) )
195                                 {
196                                     notice.settcolor(RED);
197                                     notice << "Failed to write new user ID to file!
                                            Check log" << ui::endl;
198                                 }
199                                 else
200                                 {
201                                     notice.settcolor(GREEN);
202                                     notice << "User ID changed successfully!" << ui::
                                            endl;
203                                 }
204                                 notice.setexit_button("Back");
205                                 notice.loop();
206                                 notice.hide();
207                                 goto loop_exit;
208                             }
209                             case 2:
210                             {
211                                 str curr_pwd, new_pwd;
212                                 for(int i = 0; i < 3; ++i)
213                                 {
214                                     box menu4( menu3.getcorner_top_left(), menu3.
                                            getwidth(), menu3.getheight() );
215                                     menu4.settcolor(GREEN);
216                                     menu4 << ui::centeralign << "Change login details
                                            " << ui::endl << ui::endl;
217                                     menu4.settcolor(WHITE);
218                                     menu4 << "Change Password" << ui::endl;
219                                     menu4.settcolor(ui::tcolor);
220                                     menu4 << "Enter current password: ";
221                                     menu4.settcolor_input(YELLOW);
```

```
222                             menu4 >> box::setpassword >> curr_pwd;
223                             menu4.setexit_button("Submit");
224                             menu4.setback_func(back_func::set_backbit);
225                             menu4.loop();
226                             menu4.hide();
227                             if(back_func::backbit)
228                             {
229                                 break;
230                             }
231                             if( e->account.login(curr_pwd) )
232                             {
233                                 interface::clear_error();
234                                 break;
235                             }
236                             interface::error("Invalid password!! Try again...
                                    ");
237                         }
238                         if(back_func::backbit)
239                         {
240                             back_func::backbit = 0;
241                             break;
242                         }
243                         if(i == 3)
244                         {
245                             const int notice_height = 10;
246                             box notice( menu3.getcorner_top_left(), menu3.
                                    getwidth(), notice_height);
247                             notice.settcolor(GREEN);
248                             notice << ui::centeralign << "Change login
                                    details" << ui::endl << ui::endl;
249                             notice.settcolor(RED);
250                             notice << "Since you entered the wrong password
                                    too many times, you have been logged out. "
251                                    << "Hit the button below to exit the
                                        program." << ui::endl << ui::endl;
252                             notice.setexit_button("Exit");
253                             notice.loop();
254                             notice.hide();
255                             free(temp);
256                             return;
257                         }
258                         box menu5( menu3.getcorner_top_left(), menu3.getwidth
                                (), menu3.getheight() );
259                         menu5.settcolor(GREEN);
260                         menu5 << ui::centeralign << "Change login details" <<
                                 ui::endl << ui::endl;
261                         menu5.settcolor(WHITE);
262                         menu5 << "Change Password" << ui::endl;
263                         menu5.settcolor(ui::tcolor);
264                         menu5 << "Enter new password: ";
265                         menu5.settcolor_input(YELLOW);
266                         menu5 >> box::setpassword >> new_pwd;
267                         menu5.setexit_button("Submit");
268                         menu5.setback_func(back_func::set_backbit);
269                         menu5.loop();
270                         menu5.hide();
271                         if(back_func::backbit)
272                         {
273                             back_func::backbit = 0;
```

```
274                                 break;      //At the "Enter new password" page,
                                        when shift+bkspc is pressed, control will go
                                        back to "Change login details" menu.
275                             }
276                             e->account = userid( e->account.get_username(),
                                    new_pwd );
277                             const int notice2_height = 13;
278                             box notice2( menu3.getcorner_top_left(), menu3.
                                    getwidth(), notice2_height );
279                             notice2.settcolor(GREEN);
280                             notice2 << ui::centeralign << "Change login details"
                                    << ui::endl << ui::endl;
281                             if( !hospital::write_employee(temp) )
282                             {
283                                 notice2.settcolor(RED);
284                                 notice2 << "Failed to write new password to file!
                                         Check log" << ui::endl;
285                             }
286                             else
287                             {
288                                 notice2.settcolor(GREEN);
289                                 notice2 << "Password changed successfully!" << ui
                                        ::endl;
290                             }
291                             notice2.settcolor(ui::tcolor);
292                             notice2 << "Please logout and login again by exiting
                                    the program and restarting it." << ui::endl
293                                     << "Press the button below to exit the
                                         program." << ui::endl;
294                             notice2.setexit_button("Exit");
295                             notice2.loop();
296                             notice2.hide();
297                             free(temp);
298                             return;
299                         }
300                         case 3:
301                         {
302                             goto loop_exit;
303                         }
304                     }
305                 }
306                 loop_exit:
307                 break;
308             }
309             case 3:
310             {
311                 transaction * t = e->get_last_5_transactions();
312                 if( t == NULL )
313                 {
314                     interface::error("Error while reading or writing to file!
                            Check log");
315                     getch();
316                     break;
317                 }
318                 coord c2(1, 4);
319                 box menu2(c2, (ui::scr_width / 2), ui::scr_height - 5);
320                 box sidemenu(( c2 + coord((ui::scr_width / 2) - 1, 0)), (ui::
                        scr_width / 2) + 1, ui::scr_height - 5);
321                 menu2.f << ( ui::top | ui::left ) << (char)204
```

```
322                         << ( ui::bottom | ui::left ) << (char)204
323                         << ( ui::top | ui::right ) << (char)203
324                         << ( ui::bottom | ui::right ) << (char)202;
325                 menu2.f.display();
326                 sidemenu.f << ( ui::top | ui::left ) << (char)203
327                            << ( ui::bottom | ui::left ) << (char)202
328                            << ( ui::top | ui::right ) << (char)185
329                            << ( ui::bottom | ui::right ) << (char)185;
330                 sidemenu.f.display();
331                 menu2.settcolor(GREEN);
332                 menu2 << ui::centeralign << "View last 5 transactions" << ui::
                        endl << ui::endl;
333                 menu2.settcolor(ui::tcolor);
334                 for(int i = 0; i < 5; ++i)
335                 {
336                     if( t[i].amount == 0 && !strcmp(t[i].reason, "NA") &&
337                         t[i]._date.day == 0 && t[i]._date.month == 0 && t[i].
                                _date.year == 0
338                         && t[i]._time.hour == 25 && t[i]._time.minute == 0 && t[i
                                ]._time.second == 0 )
339                     {
340                         break;
341                     }
342                     if(i < 3)
343                     {
344                         menu2 << i + 1 << ". " << t[i]._date << ", " << t[i].
                                _time << ui::endl
345                               << "Amount: " << t[i].amount << ui::endl
346                               << "Reason: " << t[i].reason << ui::endl;
347                     }
348                     else
349                     {
350                         sidemenu << i + 1 << ". " << t[i]._date << ", " << t[i].
                                _time << ui::endl
351                                  << "Amount: " << t[i].amount << ui::endl
352                                  << "Reason: " << t[i].reason << ui::endl;
353                     }
354                 }
355                 free(t);
356                 if(i <= 3)
357                 {
358                     menu2.setexit_button("Back");
359                     menu2.loop();
360                 }
361                 else
362                 {
363                     sidemenu.setexit_button("Back");
364                     sidemenu.loop();
365                 }
366                 menu2.hide();
367                 sidemenu.hide();
368                 window.f.display();
369                 break;
370             }
371             case 4:
372             {
373                 if(type_of_emp == RECEPTIONIST)
374                 {
375                     interface::patient_management();
```

```
376                     break;
377                 }
378                 else
379                 {
380                     free(temp);
381                     return;
382                 }
383             }
384             case 5:
385             {
386                 free(temp);
387                 return;
388             }
389         }
390     }
391  }
392
393 emp_mgmt::emp_mgmt()
394 {}
395
396 void emp_mgmt::view_emp()
397 {
398     const int menu2_height = 10;
399     box menu2( coord(ui::scr_width * 0.2, 5), ui::scr_width * 0.6, menu2_height);
400     menu2.settcolor(GREEN);
401     menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
402     menu2.settcolor(WHITE);
403     menu2 << "View employee data" << ui::endl;
404     menu2.settcolor(ui::tcolor);
405     menu2 << "Enter employee's id: ";
406     unsigned long id;
407     menu2.settcolor_input(YELLOW);
408     menu2 >> id;
409     menu2 << ui::endl;
410     menu2.setexit_button("Submit");
411     menu2.setback_func(back_func::set_backbit);
412     menu2.loop();
413     menu2.hide();
414     if(back_func::backbit)
415     {
416         back_func::backbit = 0;
417         return;
418     }
419     view_emp(id);
420 }
421
422 int emp_mgmt::view_emp(unsigned long id)
423 {
424     void * temp = malloc( sizeof(doctor) ); //as doctor has the greatest size
        among employee, doctor, nurse and receptionist classes
425     if(temp == NULL)
426     {
427         interface::log_this("emp_mgmt::view_emp(int) : Not enough memory to
            allocate buffer void * temp = malloc( sizeof(doctor) )");
428         interface::error("Out of memory!! Check log");
429         getch();
430         return 0;
431     }
432     if(!hospital::get_employee_by_id(id, temp))
```

```
433     {
434         interface::error("ID not found or error while reading from file!");
435         getch();
436         free(temp);
437         return 0;
438     }
439     employee *e = (employee *) temp;
440     box menu3( coord(ui::scr_width * 0.2, 5), ui::scr_width * 0.6, ui::scr_height
            - 6 );
441     menu3.settcolor(GREEN);
442     menu3 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
443     menu3.settcolor(WHITE);
444     menu3 << "Employee Details: " << ui::endl;
445     menu3.settcolor(ui::tcolor);
446     menu3 << "ID: " << e->get_id() << ui::endl;
447     menu3 << "Name: " << e->get_name() << ui::endl;
448     menu3 << "Age: " << e->get_age() << ui::endl;
449     menu3 << "Sex: " << (sex)e->get_sex() << ui::endl;
450     menu3 << "Date of Birth: " << e->get_dob() << ui::endl;
451     menu3 << "Address: " << e->get_address() << ui::endl;
452     menu3 << "Phone no.: " << e->get_phone() << ui::endl;
453     menu3 << "Salary: " << e->get_salary() << ui::endl;
454     menu3 << "Shift timings: Starts - " << e->get_shift(START) << ui::endl;
455     menu3 << "———————————: Ends - " << e->get_shift(END) <<ui::endl;
456     switch( id_to_emp::convert( e->get_id() ) )
457     {
458         case INVALID:   //Test this case, menu3.hide() not working properly
459         {
460             menu3.clear();
461             int menu3_height = 9;
462             menu3.setheight(menu3_height);
463             menu3.settcolor(GREEN);
464             menu3 << ui::centeralign << "Employee Management" << ui::endl << ui::
                    endl;
465             menu3.settcolor(WHITE);
466             menu3 << "Employee Details: " << ui::endl;
467             menu3.settcolor(RED);
468             menu3 << "Invalid ID!!" << id_to_emp::convert( e->get_id() );
469             menu3.settcolor(ui::tcolor);
470             menu3.setexit_button("Back");
471             menu3.loop();
472             menu3.hide();
473             break;
474         }
475         case OTHERS:
476         case RECEPTIONIST:  //there are no extra data members in class
                receptionist
477         {
478             menu3.setexit_button("Back");
479             menu3.loop();  //   menu3.clear();  int w = window.getwidth(), m =
                    menu3.getwidth(); menu3<<w<<' '<<m;  getch();
480             menu3.hide();
481             break;
482         }
483         case DOCTOR:
484         {
485             doctor *d = (doctor *)temp;
486             menu3.hide();
487             menu3.setcorner_top_left( coord( 1, menu3.getcorner_top_left().y ) );
```

```
488             menu3.display();
489             menu3.f << ( ui::top | ui::left ) << (char)204
490                     << ( ui::bottom | ui::left ) << (char)204;
491             menu3.f.display();
492             box sidemenu( menu3.getcorner_top_left() + coord( menu3.getwidth() -
                    1, 0 ), ( ui::scr_width - menu3.getwidth() + 1 ),  menu3.getheight
                    () );
493             sidemenu.f << ( ui::top | ui::left ) << (char)203
494                        << ( ui::bottom | ui::left ) << (char)202
495                        << ( ui::top | ui::right ) << (char)185
496                        << ( ui::bottom | ui::right ) << (char)185;
497             sidemenu.f.display();
498             sidemenu << "Speciality(s)" << ui::endl;
499             for(int i = 0; i < 2 && d->get_speciality()[i] <= GEN; ++i)
500             {
501                 sidemenu << i + 1 << ". " << (body_parts)d->get_speciality()[i]
                        << ui::endl;
502             }
503             if(!i)
504             {
505                 sidemenu << "None" << ui::endl;
506             }
507             sidemenu << "Patients currently under care:" << ui::endl;
508             for(i = 0; d->get_patients()[i] && i < 10; ++i)
509             {
510                 sidemenu << i + 1 << ". " << hospital::get_patient_by_id( d->
                        get_patients()[i] ).get_name() << ui::endl;
511             }
512             if(!i)
513             {
514                 sidemenu << "None" << ui::endl;
515             }
516             sidemenu.setexit_button("Back");
517             sidemenu.loop();
518             menu3.hide();
519             sidemenu.hide();
520             window.f.display();
521             break;
522         }
523         case NURSE:
524         {
525             nurse *n = (nurse *)temp;
526             menu3.hide();
527             menu3.setcorner_top_left( coord( 1, menu3.getcorner_top_left().y ) );
528             menu3.display();
529             menu3.f << ( ui::top | ui::left ) << (char)204
530                     << ( ui::bottom | ui::left ) << (char)204;
531             menu3.f.display();
532             box sidemenu( menu3.getcorner_top_left() + coord( menu3.getwidth() -
                    1, 0 ), ( ui::scr_width - menu3.getwidth() + 1 ),  menu3.getheight
                    () );
533             sidemenu.f << ( ui::top | ui::left ) << (char)203
534                        << ( ui::bottom | ui::left ) << (char)202
535                        << ( ui::top | ui::right ) << (char)185
536                        << ( ui::bottom | ui::right ) << (char)185;
537             sidemenu.f.display();
538             sidemenu << "Patients currently under care:" << ui::endl;
539             for(int i = 0; n->get_patients()[i] && i < 5; ++i)
540             {
```

```
541                 sidemenu << i + 1 << ". " << hospital::get_patient_by_id( n->
                        get_patients()[i] ).get_name() << ui::endl;
542             }
543             if(!i)
544             {
545                 sidemenu << "None" << ui::endl;
546             }
547             sidemenu.setexit_button("Back");
548             sidemenu.loop();
549             menu3.hide();
550             sidemenu.hide();
551             window.f.display();
552             break;
553         }
554     }
555     free(temp);
556     return 1;
557 }
558
559 void emp_mgmt::add_emp()
560 {
561     int ch;
562     str name, dob_str, adr_hno, adr_street, adr_city, adr_dist, adr_state,
            shift_start_str, shift_end_str, uid, pwd;
563     unsigned sex_choice;
564     Date dob;
565     address adr;
566     phone phn_no;
567     unsigned long salary;
568     Time shift_start, shift_end;
569     int speciality[2];
570     const coord menu2_corner_top_left = coord(ui::scr_width * 0.2, 5);
571     const int menu2_width = ui::scr_width * 0.6;
572     menu2:
573     {
574         const int menu2_height = 17;
575         box menu2(menu2_corner_top_left, menu2_width, menu2_height);
576         menu2.settcolor(GREEN);
577         menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
578         menu2.settcolor(WHITE);
579         menu2 << "Add new employee" << ui::endl;
580         menu2.settcolor(ui::tcolor);
581         menu2 << "Step 1: Select employee type" << ui::endl << ui::endl
582               << "1. Doctor" << ui::endl
583               << "2. Nurse" << ui::endl
584               << "3. Receptionist" << ui::endl
585               << "4. Others" << ui::endl << ui::endl
586               << "Enter your choice: ";
587         validate_menu::set_menu_limits(1, 4);
588         menu2.settcolor_input(YELLOW);
589         menu2 >> validate_menu::input >> ch;
590         menu2 << ui::endl;
591         menu2.setexit_button("Submit");
592         menu2.setback_func(back_func::set_backbit);
593         menu2.loop();
594         menu2.hide();
595         if(back_func::backbit)
596         {
```

```
            back_func::backbit = 0;
            return;
        }
    }
    menu3:
    {
        box menu3( menu2_corner_top_left, menu2_width, ui::scr_height - 6 );
        menu3.settcolor(GREEN);
        menu3 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
            ;
        menu3.settcolor(WHITE);
        menu3 << "Add new employee" << ui::endl;
        menu3.settcolor(ui::tcolor);
        menu3 << "Step 2: Add employee details" << ui::endl << ui::endl;
        menu3.settcolor_input(YELLOW);
        menu3 << "Name: ";
        menu3 >> name;
        menu3 << "Sex: 1. Male | 2. Female | 3. Transsexual" << ui::endl
              << "———— Enter your choice: ";
        validate_menu::set_menu_limits(1, 3);
        menu3 >> validate_menu::input >> (int)sex_choice;
        menu3 << "Date of Birth(DD/MM/YYYY): ";
        menu3 >> hospital::date_validity >> dob_str;
        menu3 << "Address: " << ui::endl;
        menu3 << (char)26 << "House no.: ";
        menu3 >> adr_hno;
        menu3 << (char)26 << "Street: ";
        menu3 >> adr_street;
        menu3 << (char)26 << "City: ";
        menu3 >> adr_city;
        menu3 << (char)26 << "District: ";
        menu3 >> adr_dist;
        menu3 << (char)26 << "State: ";
        menu3 >> adr_state;
        menu3 << "Phone no.: ";
        menu3 >> phn_no;
        menu3 << "Salary: ";
        menu3 >> salary;
        menu3 << "Shift timings: Starts - (HH:MM:SS)";
        menu3 >> hospital::time_validity >> shift_start_str;
        menu3 << "———————————: Ends - (HH:MM:SS)";
        menu3 >> hospital::time_validity >> shift_end_str;
        menu3.setexit_button("Submit");
        menu3.setback_func(back_func::set_backbit);
        menu3.loop();
        menu3.hide();
        if(back_func::backbit)
        {
            back_func::backbit = 0;
            goto menu2;
        }
        --sex_choice;
        dob = hospital::str_to_date(dob_str);
        adr = address(adr_hno, adr_street, adr_city, adr_dist, adr_state);
        shift_start = hospital::str_to_time(shift_start_str);
        shift_end = hospital::str_to_time(shift_end_str);
    }
    menu4:

```

```
655     if(ch != 4)
656     {
657         box menu4( menu2_corner_top_left, menu2_width, ui::scr_height - 6 );
658         menu4.settcolor(GREEN);
659         menu4 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
660         menu4.settcolor(WHITE);
661         menu4 << "Add new employee" << ui::endl;
662         menu4.settcolor(ui::tcolor);
663         menu4.settcolor_input(YELLOW);
664         menu4 << "Step 3: Add login details" << ui::endl << ui::endl;
665         menu4 << "User ID: ";
666         menu4 >> uid;
667         menu4 << "Password: ";
668         menu4 >> box::setpassword >> pwd;
669         menu4 << ui::endl;
670         menu4.setexit_button("Submit");
671         menu4.setback_func(back_func::set_backbit);
672         menu4.loop();
673         menu4.hide();
674     }
675     if(back_func::backbit)
676     {
677         back_func::backbit = 0;
678         goto menu3;
679     }
680     if(ch == 1)
681     {
682         coord c(1, 4);
683         box menu5(c, (ui::scr_width / 2), ui::scr_height - 5);
684         box inp_box(( c + coord((ui::scr_width / 2) - 1, 0)), (ui::scr_width / 2)
                 + 1, ui::scr_height - 5);
685         menu5.f << ( ui::top | ui::left ) << (char)204
686                 << ( ui::bottom | ui::left ) << (char)204
687                 << ( ui::top | ui::right ) << (char)203
688                 << ( ui::bottom | ui::right ) << (char)202;
689         menu5.f.display();
690         inp_box.f << ( ui::top | ui::left ) << (char)203
691               << ( ui::bottom | ui::left ) << (char)202
692               << ( ui::top | ui::right ) << (char)185
693               << ( ui::bottom | ui::right ) << (char)185;
694         inp_box.f.display();
695         menu5 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
696         menu5.settcolor(WHITE);
697         menu5 << "Add new employee" << ui::endl;
698         menu5.settcolor(ui::tcolor);
699         menu5 << "Step 4: Add doctor details" << ui::endl << ui::endl;
700         menu5 << "Specialization of doctor (max 2)" << ui::endl
701               << "Choose from the following list: " << ui::endl;
702         for(int i = 0; i <= GEN; ++i)
703         {
704             if(i <= 8)
705             {
706                 menu5 << i << ". " << (body_parts)i << ui::endl;
707             }
708             else
709             {
710                 inp_box << i << ". " << (body_parts)i << ui::endl;
```

```
711             }
712         }
713         inp_box.settcolor_input(YELLOW);
714         inp_box << "Enter the number corresponding to the required entry in the 2
                fields below" << ui::endl;
715         validate_menu::set_menu_limits(BRAIN, GEN);
716         inp_box << (char)26;    inp_box >> validate_menu::input >> speciality[0];
717         inp_box << (char)26;    inp_box >> validate_menu::input >> speciality[1];
718         inp_box << ui::endl;
719         inp_box.setexit_button("Submit");
720         inp_box.setback_func(back_func::set_backbit);
721         inp_box.loop();
722         menu5.hide();
723         inp_box.hide();
724         window.f.display();
725     }
726     if(back_func::backbit)
727     {
728         back_func::backbit = 0;
729         goto menu4;
730     }
731     void * temp = NULL;
732     unsigned long id;
733     switch (ch)
734     {
735         case 1:
736         {
737             doctor x(name, sex_choice, dob, adr, phn_no, salary, shift_start,
                    shift_end, speciality[0], speciality[1], uid, pwd);
738             temp = &x;
739             id = x.get_id();
740             break;
741         }
742         case 2:
743         {
744             nurse x(name, sex_choice, dob, adr, phn_no, salary, shift_start,
                    shift_end, uid, pwd);
745             temp = &x;
746             id = x.get_id();
747             break;
748         }
749         case 3:
750         {
751             receptionist x(name, sex_choice, dob, adr, phn_no, salary,
                    shift_start, shift_end, uid, pwd);
752             temp = &x;
753             id = x.get_id();
754             break;
755         }
756         case 4:
757         {
758             employee x(name, sex_choice, dob, adr, phn_no, salary, shift_start,
                    shift_end);
759             temp = &x;
760             id = x.get_id();
761             break;
762         }
763     }
764     const int notice_height = 12;
```

```
765     box notice( menu2_corner_top_left, menu2_width, notice_height );
766     notice.settcolor(GREEN);
767     notice << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
768     if(!hospital::write_employee(temp))
769     {
770         notice.settcolor(RED);
771         notice << "Employee addition unsuccessful!!";
772         notice.setexit_button("Exit");
773         notice.loop();
774         notice.hide();
775         return;
776     }
777     notice << "Employee added successfully!!" << ui::endl;
778     notice.settcolor(WHITE);
779     notice << "Hit the button below to display the details you entered: " << ui::
            endl;
780     notice.settcolor(ui::tcolor);
781     notice << ui::endl;
782     notice.setexit_button("View employee...");
783     notice.loop();
784     notice.hide();
785     view_emp(id);
786 }
787
788 void emp_mgmt::remove_emp()
789 {
790     const coord menu2_corner_top_left = coord(ui::scr_width * 0.2, 5);
791     const int menu2_width = ui::scr_width * 0.6;
792     unsigned long id;
793     char ch;
794     menu2:
795     {
796         const int menu2_height = 10;
797         box menu2(menu2_corner_top_left, menu2_width, menu2_height);
798         menu2.settcolor(GREEN);
799         menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
800         menu2.settcolor(WHITE);
801         menu2 << "Remove existing employee" << ui::endl;
802         menu2.settcolor(ui::tcolor);
803         menu2 << "Enter employee's id: ";
804         menu2.settcolor_input(YELLOW);
805         menu2 >> id;
806         menu2 << ui::endl;
807         menu2.setexit_button("Submit");
808         menu2.setback_func(back_func::set_backbit);
809         menu2.loop();
810         menu2.hide();
811     }
812     if(back_func::backbit)
813     {
814         back_func::backbit = 0;
815         return;
816     }
817     notice:
818     {
819         const int notice_height = 14;
820         box notice(menu2_corner_top_left, menu2_width, notice_height);
821         notice.settcolor(GREEN);
```

```
822         notice << ui::centeralign << "Employee Management" << ui::endl << ui::
                endl;
823         notice.settcolor(WHITE);
824         notice << "Hit the button below to display the details of the employee
                you want to remove: " << ui::endl;
825         notice.settcolor(ui::tcolor);
826         notice << ui::endl;
827         notice.setexit_button("View employee...");
828         notice.setback_func(back_func::set_backbit);
829         notice.loop();
830         notice.hide();
831     }
832     if(back_func::backbit)
833     {
834         back_func::backbit = 0;
835         goto menu2;
836     }
837     if( !view_emp(id) )
838     {
839         return;
840     }
841     notice2:
842     {
843         const int notice2_height = 14;
844         box notice2( menu2_corner_top_left, menu2_width, notice2_height );
845         notice2.settcolor(GREEN);
846         notice2 << ui::centeralign << "Employee Management" << ui::endl << ui::
                endl;
847         notice2.settcolor(WHITE);
848         notice2 << "Are you sure you want to remove this employee?(y/n): " << ui
                ::endl;
849         notice2.settcolor_input(YELLOW);
850         notice2 >> ch;
851         notice2.settcolor(ui::tcolor);
852         notice2 << ui::endl;
853         notice2.setexit_button("Submit");
854         notice2.setback_func(back_func::set_backbit);
855         notice2.loop();
856         notice2.hide();
857     }
858     if(back_func::backbit)
859     {
860         back_func::backbit = 0;
861         goto notice;
862     }
863     if(ch == 'n' || ch == 'N')
864     {
865         return;
866     }
867     const int notice3_height = 14;
868     box notice3( menu2_corner_top_left, menu2_width, notice3_height );
869     notice3.settcolor(GREEN);
870     notice3 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
871     notice3.settcolor(RED);
872     str path;
873     switch(id_to_emp::convert(id))
874     {
875         case INVALID:
876             interface::log_this("emp_mgmt::remove_emp() : No file with zero id
```

```
                exists\nFunction aborted");
877             notice3 << "Invalid ID supplied!! Check log" << ui::endl;
878             notice3.setexit_button("Back");
879             notice3.loop();
880             notice3.hide();
881             return;
882         case OTHERS:
883             sprintf(path, "employee/%lu", id);
884             break;
885         case DOCTOR:
886             mkdir("employee/doctor");
887             sprintf(path, "employee/doctor/%lu", id);
888             break;
889         case NURSE:
890             mkdir("employee/nurse");
891             sprintf(path, "employee/nurse/%lu", id);
892             break;
893         case RECEPTIONIST:
894             mkdir("employee/receptionist");
895             sprintf(path, "employee/receptionist/%lu", id);
896             break;
897     }
898     int remove_status;
899     str file;
900     strcpy(file, path);
901     strcat(file, "/base.dat");
902     if( remove(file) == -1)
903     {
904         str log_str;
905         sprintf(log_str, "emp_mgmt::remove_emp() : Failed to delete base.dat file
                of id %lu\nFunction aborted", id);
906         interface::log_this(log_str);
907         notice3 << "Failed to delete file of employee!!" << ui::endl;
908         notice3.setexit_button("Back");
909         notice3.loop();
910         notice3.hide();
911         return;
912     }
913     if( rmdir(path) == -1)
914     {
915         str log_str;
916         sprintf(log_str, "emp_mgmt::remove_emp() : Failed to delete folder of id
                %lu", id);
917         interface::log_this(log_str);
918     }
919     notice3.settcolor(GREEN);
920     notice3 << "Employee deletion successful!!" << ui::endl;
921     notice3.setexit_button("Back");
922     notice3.loop();
923     notice3.hide();
924 }
925
926 void emp_mgmt::edit_emp()
927 {
928     void * temp = malloc( sizeof(doctor) ); //as doctor has the greatest size
            among employee, doctor, nurse and receptionist classes
929     if(temp == NULL)
930     {
931         interface::log_this("emp_mgmt::edit_emp() : Not enough memory to allocate
```

```
            buffer void * temp = malloc( sizeof(doctor) )");
932         interface::error("Out of memory!! Check log");
933         getch();
934         return;
935     }
936     str name, dob_str, adr_hno, adr_street, adr_city, adr_dist, adr_state,
            shift_start_str, shift_end_str, uid, pwd, default_dob_str,
            default_shift_str;
937     unsigned sex_choice;
938     Date dob;
939     address adr;
940     phone phn_no;
941     unsigned long salary, id;
942     Time shift_start, shift_end;
943     const coord menu2_corner_top_left(ui::scr_width * 0.2, 5);
944     const int menu2_width = ui::scr_width * 0.6;
945     menu2:
946     {
947         const int menu2_height = 10;
948         box menu2(menu2_corner_top_left, menu2_width, menu2_height);
949         menu2.settcolor(GREEN);
950         menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
951         menu2.settcolor(WHITE);
952         menu2 << "Edit employee data" << ui::endl;
953         menu2.settcolor(ui::tcolor);
954         menu2 << "Step 1: Enter employee's id: ";
955         menu2.settcolor_input(YELLOW);
956         menu2 >> id;
957         menu2 << ui::endl;
958         menu2.setexit_button("Submit");
959         menu2.setback_func(back_func::set_backbit);
960         menu2.loop();
961         menu2.hide();
962     }
963     if(back_func::backbit)
964     {
965         back_func::backbit = 0;
966         free(temp);
967         return;
968     }
969     if(!hospital::get_employee_by_id(id, temp))
970     {
971         interface::error("ID not found or error while reading from file!");
972         getch();
973         free(temp);
974         return;
975     }
976     notice:
977     {
978         const int notice_height = 14;
979         box notice(menu2_corner_top_left, menu2_width, notice_height);
980         notice.settcolor(GREEN);
981         notice << ui::centeralign << "Employee Management" << ui::endl << ui::
                endl;
982         notice.settcolor(WHITE);
983         notice << "Details of the employee will now be shown with the existing
                data filled. "
984             << "Change the data fields that you require to change, and leave
```

```
                    the other data fields as they are. "
985             << "When you are finished, press Submit to submit the new details.
                    " << ui::endl;
986         notice.settcolor(ui::tcolor);
987         notice << ui::endl;
988         notice.setexit_button("View employee...");
989         notice.setback_func(back_func::set_backbit);
990         notice.loop();
991         notice.hide();
992     }
993     if(back_func::backbit)
994     {
995         back_func::backbit = 0;
996         goto menu2;
997     }
998     employee *e = (employee *) temp;
999     menu3:
1000    {
1001        const int menu3_height = 18;
1002        box menu3( menu2_corner_top_left, menu2_width, menu3_height );
1003        menu3.settcolor(GREEN);
1004        menu3 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
1005        menu3.settcolor(WHITE);
1006        menu3 << "Edit employee data" << ui::endl;
1007        menu3.settcolor(ui::tcolor);
1008        menu3 << "Step 2: Edit employee details" << ui::endl << ui::endl;
1009
1010        menu3.settcolor_input(YELLOW);
1011        menu3 << "Name: ";
1012        menu3.setdefault( e->get_name() );
1013        menu3 >> name;
1014        menu3 << "Sex: 1. Male | 2. Female | 3. Transsexual" << ui::endl
1015              << "---- Enter your choice: ";
1016        validate_menu::set_menu_limits(1, 3);
1017        menu3.setdefault( e->get_sex() + 1 );
1018        menu3 >> validate_menu::input >> (int)sex_choice;
1019        menu3 << "Date of Birth(DD/MM/YYYY): ";
1020        sprintf(default_dob_str, "%u/%u/%u", e->get_dob().day, e->get_dob().month
                , e->get_dob().year);
1021        menu3.setdefault( default_dob_str );
1022        menu3 >> hospital::date_validity >> dob_str;
1023        menu3 << "Address: " << ui::endl;
1024        menu3 << (char)26 << "House no.: ";
1025        menu3.setdefault( e->get_address().house_no );
1026        menu3 >> adr_hno;
1027        menu3 << (char)26 << "Street: ";
1028        menu3.setdefault( e->get_address().street );
1029        menu3 >> adr_street;
1030        menu3 << (char)26 << "City: ";
1031        menu3.setdefault( e->get_address().city );
1032        menu3 >> adr_city;
1033        menu3 << (char)26 << "District: ";
1034        menu3.setdefault( e->get_address().district );
1035        menu3 >> adr_dist;
1036        menu3 << (char)26 << "State: ";
1037        menu3.setdefault( e->get_address().state );
1038        menu3 >> adr_state;
1039        menu3 << "Phone no.: ";
```

```
1040        menu3.setdefault( e->get_phone() );
1041        menu3 >> phn_no;
1042        menu3 << "Salary: ";
1043        menu3.setdefault( e->get_salary() );
1044        menu3 >> salary;
1045        menu3 << "Shift timings: Starts - (HH:MM:SS)";
1046        sprintf(default_shift_str, "%u:%u:%u", e->get_shift(START).hour, e->
                get_shift(START).minute, e->get_shift(START).second );
1047        menu3.setdefault( default_shift_str );
1048        menu3 >> hospital::time_validity >> shift_start_str;
1049        menu3 << "---------------: Ends - (HH:MM:SS)";
1050        sprintf(default_shift_str, "%u:%u:%u", e->get_shift(END).hour, e->
                get_shift(END).minute, e->get_shift(END).second );
1051        menu3.setdefault( default_shift_str );
1052        menu3 >> hospital::time_validity >> shift_end_str;
1053        menu3.setexit_button("Submit");
1054        menu3.setback_func(back_func::set_backbit);
1055        menu3.loop();
1056        menu3.hide();
1057    }
1058    if(back_func::backbit)
1059    {
1060        back_func::backbit = 0;
1061        goto notice;
1062    }
1063    --sex_choice;
1064    dob = hospital::str_to_date(dob_str);
1065    adr = address(adr_hno, adr_street, adr_city, adr_dist, adr_state);
1066    shift_start = hospital::str_to_time(shift_start_str);
1067    shift_end = hospital::str_to_time(shift_end_str);
1068    e->set_name(name);
1069    e->set_sex(sex_choice);
1070    e->set_dob(dob);
1071    e->set_address(adr);
1072    e->set_phone(phn_no);
1073    e->set_salary(salary);
1074    e->set_shift(START, shift_start);
1075    e->set_shift(END, shift_end);
1076    if(id_to_emp::convert(id) == DOCTOR)
1077    {
1078        coord c(1, 4);
1079        doctor *d = (doctor *)temp;
1080        box menu4(c, (ui::scr_width / 2), ui::scr_height - 5);
1081        box inp_box(( c + coord((ui::scr_width / 2) - 1, 0)), (ui::scr_width / 2)
                + 1, ui::scr_height - 5);
1082        menu4.f << ( ui::top | ui::left ) << (char)204
1083                << ( ui::bottom | ui::left ) << (char)204
1084                << ( ui::top | ui::right ) << (char)203
1085                << ( ui::bottom | ui::right ) << (char)202;
1086        menu4.f.display();
1087        inp_box.f << ( ui::top | ui::left ) << (char)203
1088              << ( ui::bottom | ui::left ) << (char)202
1089              << ( ui::top | ui::right ) << (char)185
1090              << ( ui::bottom | ui::right ) << (char)185;
1091        inp_box.f.display();
1092        menu4 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
1093        menu4.settcolor(WHITE);
1094        menu4 << "Edit employee data" << ui::endl;
```

```
1095        menu4.settcolor(ui::tcolor);
1096        menu4 << "Step 3: Edit doctor details" << ui::endl << ui::endl;
1097        int speciality[2];
1098        menu4 << "Specialization of doctor (max 2)" << ui::endl
1099              << "Choose from the following list: " << ui::endl;
1100        for(int i = 0; i <= GEN; ++i)
1101        {
1102            if(i <= 8)
1103            {
1104                menu4 << i << ". " << (body_parts)i << ui::endl;
1105            }
1106            else
1107            {
1108                inp_box << i << ". " << (body_parts)i << ui::endl;
1109            }
1110        }
1111        inp_box.settcolor_input(YELLOW);
1112        inp_box << "Enter the number corresponding to the required entry in the 2
                fields below" << ui::endl;
1113        validate_menu::set_menu_limits(BRAIN, GEN);
1114        inp_box << (char)26;    inp_box.setdefault(d->get_speciality()[0]);
               inp_box >> validate_menu::input >> speciality[0];
1115        inp_box << (char)26;    inp_box.setdefault(d->get_speciality()[1]);
               inp_box >> validate_menu::input >> speciality[1];
1116        inp_box << ui::endl;
1117        inp_box.setexit_button("Submit");
1118        inp_box.setback_func(back_func::set_backbit);
1119        inp_box.loop();
1120        menu4.hide();
1121        inp_box.hide();
1122        window.f.display();
1123        d->set_speciality(speciality);
1124    }
1125    if(back_func::backbit)
1126    {
1127        back_func::backbit = 0;
1128        goto menu3;
1129    }
1130    const int notice2_height = 12;
1131    box notice2(menu2_corner_top_left, menu2_width, notice2_height);
1132    notice2.settcolor(GREEN);
1133    notice2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
1134    if(!hospital::write_employee(temp))
1135    {
1136        notice2.settcolor(RED);
1137        notice2 << "Employee edit unsuccessful!!";
1138        notice2.setexit_button("Exit");
1139        notice2.loop();
1140        notice2.hide();
1141        free(temp);
1142        return;
1143    }
1144    notice2 << "Employee edited successfully!!" << ui::endl;
1145    notice2.settcolor(WHITE);
1146    notice2 << "Hit the button below to display the details you entered: " << ui
           ::endl;
1147    notice2.settcolor(ui::tcolor);
1148    notice2 << ui::endl;
1149    notice2.setexit_button("View employee...");
```

```
1150     notice2.loop();
1151     notice2.hide();
1152     view_emp(id);
1153     free(temp);
1154 }
1155 
1156 void emp_mgmt::pay_emp()
1157 {
1158     unsigned long id;
1159     char ch;
1160     const coord menu2_corner_top_left = coord(ui::scr_width * 0.2, 5);
1161     const int menu2_width = ui::scr_width * 0.6;
1162     const int menu2_height = 10;
1163     menu2:
1164     {
1165         box menu2(menu2_corner_top_left, menu2_width, menu2_height);
1166         menu2.settcolor(GREEN);
1167         menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
                ;
1168         menu2.settcolor(WHITE);
1169         menu2 << "Pay salary to individual employee" << ui::endl;
1170         menu2.settcolor(ui::tcolor);
1171         menu2 << "Enter employee's id: ";
1172         menu2.settcolor_input(YELLOW);
1173         menu2 >> id;
1174         menu2 << ui::endl;
1175         menu2.setexit_button("Submit");
1176         menu2.setback_func(back_func::set_backbit);
1177         menu2.loop();
1178         menu2.hide();
1179     }
1180     if(back_func::backbit)
1181     {
1182         back_func::backbit = 0;
1183         return;
1184     }
1185     notice:
1186     {
1187         const int notice_height = 14;
1188         box notice(menu2_corner_top_left, menu2_width, notice_height);
1189         notice.settcolor(GREEN);
1190         notice << ui::centeralign << "Employee Management" << ui::endl << ui::
                endl;
1191         notice.settcolor(WHITE);
1192         notice << "Hit the button below to display the details of the employee
                you want to pay salary to: " << ui::endl;
1193         notice.settcolor(ui::tcolor);
1194         notice << ui::endl;
1195         notice.setexit_button("View employee...");
1196         notice.setback_func(back_func::set_backbit);
1197         notice.loop();
1198         notice.hide();
1199     }
1200     if(back_func::backbit)
1201     {
1202         back_func::backbit = 0;
1203         goto menu2;
1204     }
1205     if( !view_emp(id) )
```

```
1206     {
1207         return;
1208     }
1209     {
1210         const int notice2_height = 14;
1211         box notice2( menu2_corner_top_left, menu2_width, notice2_height );
1212         notice2.settcolor(GREEN);
1213         notice2 << ui::centeralign << "Employee Management" << ui::endl << ui::
                endl;
1214         notice2.settcolor(WHITE);
1215         notice2 << "Are you sure you want to pay salary to this employee?(y/n): "
                 << ui::endl;
1216         notice2.settcolor_input(YELLOW);
1217         notice2 >> ch;
1218         notice2.settcolor(ui::tcolor);
1219         notice2 << ui::endl;
1220         notice2.setexit_button("Submit");
1221         notice2.setback_func(back_func::set_backbit);
1222         notice2.loop();
1223         notice2.hide();
1224     }
1225     if(back_func::backbit)
1226     {
1227         back_func::backbit = 0;
1228         goto notice;
1229     }
1230     if(ch == 'n' || ch == 'N')
1231     {
1232         return;
1233     }
1234     const int notice3_height = 14;
1235     box notice3( menu2_corner_top_left, menu2_width, notice3_height );
1236     notice3.settcolor(GREEN);
1237     notice3 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
1238     notice3.settcolor(RED);
1239     if( !hospital::pay_salary(id, system::get_date(), system::get_time()) )
1240     {
1241         notice3 << "Failed to pay salary to the employee! Check log";
1242         notice3.setexit_button("Back");
1243         notice3.loop();
1244         notice3.hide();
1245         return;
1246     }
1247     notice3.settcolor(GREEN);
1248     notice3 << "Pay salary successful!!" << ui::endl;
1249     notice3.setexit_button("Back");
1250     notice3.loop();
1251     notice3.hide();
1252 }
1253
1254 void emp_mgmt::pay_all()
1255 {
1256     char ch;
1257     const int menu2_height = 11;
1258     box menu2(coord(ui::scr_width * 0.2, 5), ui::scr_width * 0.6, menu2_height);
1259     menu2.settcolor(GREEN);
1260     menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
1261     menu2.settcolor(WHITE);
1262     menu2 << "Pay salary to all employees" << ui::endl;
```

```
1263     menu2.settcolor(ui::tcolor);
1264     menu2 << "Are you sure you want to pay salary to all employees?(y/n): ";
1265     menu2.settcolor_input(YELLOW);
1266     menu2 >> ch;
1267     menu2 << ui::endl;
1268     menu2.setexit_button("Submit");
1269     menu2.loop();
1270     menu2.hide();
1271     if(ch == 'n' || ch == 'N')
1272     {
1273         return;
1274     }
1275     const int notice_height = 10;
1276     box notice( menu2.getcorner_top_left(), menu2.getwidth(), notice_height );
         notice.hide();
1277     box notice2( notice.getcorner_top_left(), notice.getwidth(), notice.getheight
         () );
1278     notice2.settcolor(GREEN);
1279     notice2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
1280     notice2.hide(); notice.display();
1281     notice.settcolor(GREEN);
1282     notice << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
1283     notice.settcolor(ui::tcolor);
1284     notice << "Pay all salaries in progress..." << ui::endl;
1285     if( !hospital::pay_all_salaries() )
1286     {
1287         notice.hide();
1288         notice2.settcolor(RED);
1289         notice2 << "Failed to pay salary to all employees! Check log";
1290         notice2.setexit_button("Back");
1291         notice2.loop();
1292         notice2.hide();
1293         return;
1294     }
1295     notice.hide();  notice2.display();
1296     notice2 << "Pay all salaries successful!!" << ui::endl;
1297     notice2.setexit_button("Back");
1298     notice2.loop();
1299     notice2.hide();
1300 }
```

2. code/BASE.CPP

```
1  #include "base.hpp"
2
3  ////////////////////////////////////////////
4  //// Function definitions for class person
5
6  person::person(str inp1, int inp2, Date inp3, address inp4, phone inp5)
7  {
8      strcpy(name, inp1);
9      sex = inp2;
10     dob = inp3;
11     adr = inp4;
12     strcpy(phone_no, inp5);
13     calc_age();
14 }
15
```

```
16 person::person()
17 {
18     strcpy(name, "");
19     dob = Date();
20     strcpy(phone_no, "");
21 }
22
23 char* person::get_name()
24 {
25     return name;
26 }
27
28 int person::get_age()
29 {
30     return age;
31 }
32
33 int person::get_sex()
34 {
35     return sex;
36 }
37
38 Date person::get_dob()
39 {
40     return dob;
41 }
42
43 address person::get_address()
44 {
45     return adr;
46 }
47
48 char* person::get_phone()
49 {
50     return phone_no;
51 }
52
53 void person::calc_age(Date dnow)
54 {
55     if(dnow.month > dob.month || dnow.month == dob.month && dnow.day >= dob.day)
56     {
57         age = dnow.year - dob.year;
58     }
59     else
60     {
61         age = dnow.year - dob.year - 1;
62     }
63 }
64
65 void person::set_name(char* a)
66 {
67     strcpy(name, a);
68 }
69
70 void person::set_sex(int a)
71 {
72     sex = a;
73 }
74
```

```
75  void person::set_dob(Date bday, Date dnow)
76  {
77      dob = bday;
78      calc_age(dnow);
79  }
80
81  void person::set_address(address a)
82  {
83      adr = a;
84  }
85
86  void person::set_phone(char* a)
87  {
88      strcpy(phone_no, a);
89  }
90
91  Time::Time()
92  {
93      hour = 25;
94      minute = 0;
95      second = 0;
96  }
97
98  Time::Time(unsigned h, unsigned m, unsigned s)
99  {
100     hour = h;
101     minute = m;
102     second = s;
103 }
104
105 Date::Date()
106 {
107     day = 0;
108     month = 0;
109     year = 0;
110 };
111
112 Date::Date(unsigned d, unsigned m, unsigned y)
113 {
114     if( d<=31 && m <=12)
115     {
116         day = d;
117         month = m;
118         year = y;
119     }
120     else
121     {
122         day = 0;
123         month = 0;
124         year = 0;
125     }
126 }
127
128 Date system::get_date()
129 {
130     time_t t = time(0);
131     struct tm *now = localtime(&t);
132     Date dnow(now->tm_mday, (now->tm_mon + 1) ,(now->tm_year + 1900));
133     return dnow;
```

```
134 }
135
136 Time system::get_time()
137 {
138     time_t t = time(0);
139     struct tm *now = localtime(&t);
140     Time tnow(now->tm_hour, now->tm_min ,now->tm_sec);
141     return tnow;
142 }
143
144 address::address(const char *hno, const char *strt, const char *cty, const char *
        dist, const char *stat)
145 {
146     strcpy(house_no, hno);
147     strcpy(street, strt);
148     strcpy(city, cty);
149     strcpy(district, dist);
150     strcpy(state, stat);
151 }
152
153 userid::userid(str name ,str plaintext) //plaintext is the unencrypted password
154 {
155     strcpy(username, name);
156     set_key(plaintext);
157     makecipher(plaintext);
158 }
159
160 userid::userid()
161 {
162     strcpy(username, "");
163     strcpy(passcipher, "");
164 }
165
166 void userid::makecipher(str plaintext)
167 {
168     int len = strlen(plaintext);
169     int keylen = strlen(default_key);
170     for(int i = 0; i < len; ++i)
171     {
172         int plntext_i = (int)plaintext[i] + 127;
173         int key_i = (int)default_key[i % keylen] + 127;
174         passcipher[i] = (char) ( ( (plntext_i + key_i) % 256 ) - 127);
175     }
176     passcipher[i] = '\0';
177 }
178
179 void userid::set_key(char * plaintext)
180 {
181     randomize();
182     int len = strlen(plaintext);
183     int keylen = random(len/2 + 1) + len/2; //so that the key is not too short
184     for (int i = 0; i <=keylen; ++i)
185     {
186         default_key[i] = (char)( random(256) - 127 );
187     }
188     default_key[i] = '\0';
189 }
190
191 char * userid::decipher()
```

```
192 {
193     str decryptedpass;
194     int len = strlen(passcipher);
195     int keylen = strlen(default_key);
196     for(int i = 0; i < len; ++i)
197     {
198         int cipher_i = (int)passcipher[i] + 127;
199         int key_i = (int)default_key[i % keylen] + 127;
200         decryptedpass[i] = (char) ( ( (cipher_i - key_i + 256) % 256 ) - 127);
201     }
202     decryptedpass[i] = '\0';
203     return decryptedpass;
204 }
205
206 char * userid::get_username()
207 {
208     return username;
209 }
210
211 void userid::set_username(char * inp)
212 {
213     strcpy(username, inp);
214 }
215
216 int userid::login(char * password)
217 {
218     if(!strcmp(password, decipher()))
219         return 1;
220     else
221         return 0;
222 }
223
224 transaction::transaction(float a, Date d, Time t, char * b)
225 {
226     amount = a;
227     strcpy(reason, b);
228     _date = d;
229     _time = t;
230 }
231
232 transaction::transaction()
233 {
234     amount = 0;
235     strcpy(reason, "NA");
236     _date = Date();
237     _time = Time();
238 }
239
240 box & operator<<(box &output, sex s)
241 {
242     switch(s)
243     {
244         case MALE:
245             return output << "Male";
246         case FEMALE:
247             return output << "Female";
248         case TRANS:
249             return output << "Transsexual";
250         default:
```

```
251             return output << "Invalid";
252     }
253 }
254
255 box & operator<<(box &output, body_parts b)
256 {
257     switch(b)
258     {
259         case BRAIN:
260             return output << "Brain";
261         case HEART:
262             return output << "Heart";
263         case SKIN:
264             return output << "Skin";
265         case LUNG:
266             return output << "Lung";
267         case BONE:
268             return output << "Bone";
269         case EYE:
270             return output << "Eye";
271         case THROAT:
272             return output << "Throat";
273         case TEETH:
274             return output << "Teeth";
275         case STOMACH:
276             return output << "Stomach";
277         case BLOOD:
278             return output << "Blood";
279         case GUT:
280             return output << "Gastrointestinal tract";
281         case GEN:
282             return output << "General ailments";
283         default:
284             return output << "Invalid";
285     }
286 }
287
288 box & operator<<(box &output, Time & t)
289 {
290     return output << (unsigned long)t.hour << ':' << (unsigned long)t.minute << '
        :' << (unsigned long)t.second;
291 }
292
293 box & operator<<(box &output, Date & d)
294 {
295     return output << (unsigned long)d.day << '/' << (unsigned long)d.month << '/'
         << (unsigned long)d.year;
296 }
297
298 box & operator<<(box &output, address & a)
299 {
300     return output << a.house_no << ", " << a.street << ", "
301            << a.city << ", " << a.district << ", " << a.state;
302 }
```

3. code/HOSP.CPP

```
1 #include "hosp.hpp"
```

```
2  #include "iface.hpp"
3  #include "emp.hpp"
4  #include <fstream.h>
5
6  ////////////////////////////////////////////
7  ////////////////////////////////////////////// Function definitions for class
       hospital
8
9  float hospital::get_balance(){
10     return balance;
11 }
12
13 transaction hospital::deduct_money(float amt, char* reason, Date d, Time t){
14     hospital::balance -= amt;
15
16     ofstream hosp_finances ("transactions.dat", ios::out | ios::binary | ios::app
           );
17
18     transaction temp = transaction( (-1)*amt, d, t, reason);
19
20     hosp_finances.write( (char*) (&temp) , sizeof(transaction) );
21
22     hosp_finances.close();
23
24     return temp;
25 }
26
27 transaction hospital::add_money(float amt, char* reason, Date d, Time t){
28     hospital::balance += amt;
29
30     ofstream hosp_finances ("transactions.dat", ios::out | ios::binary | ios::app
           );
31
32     transaction temp = transaction( (-1)*amt,d, t, reason);
33
34     hosp_finances.write( (char*) (&temp) , sizeof(transaction) );
35
36     hosp_finances.close();
37
38     return temp;
39 }
40
41 transaction* hospital::get_transaction(){
42     transaction a[10];
43
44     ifstream hosp_finances ("transactions.dat", ios::in | ios::binary);
45
46     hosp_finances.seekg( (-1) * sizeof(transaction) , hosp_finances.end );
47
48     for(int i = 0; i < 10; i++){
49         hosp_finances.read( (char *) &a[i] , sizeof(transaction) );
50         hosp_finances.seekg( hosp_finances.tellg() - ( 2 * sizeof(transaction) )
               );
51     }
52
53     return a;
54 }
55
56 patient hospital::get_patient_by_id(long id){
```

```
57      patient a;
58
59      str temp;
60
61      sprintf(temp, "patient/%lu/base.dat", id);
62
63      int i = hospital::read_from(id, (char *) &a, sizeof(patient), temp);
64
65      if(!i){
66          interface::error("File read error!!");
67          getch();
68      }
69
70      return a;
71
72  }
73
74  void hospital::write_patient(patient a){
75      str temp, temp2;
76      sprintf(temp, "patient/%lu/base.dat", a.get_id());
77      sprintf(temp2, "patient/%lu", a.get_id());
78      mkdir("patient");
79      mkdir(temp2);
80      ofstream patient_file ( temp , ios::out | ios::binary );
81
82      if(patient_file){
83          patient_file.write( (char*) &a , sizeof(patient) );
84      }
85      else{
86          interface::error("Patient file access failure!!");
87      }
88      if(patient_file.fail()){
89          interface::error("Patient file write failure!!");
90      }
91      patient_file.close();
92  }
93
94  void hospital::charge_patient(int pat_id, transaction trans){
95      patient temp_pat = hospital::get_patient_by_id(pat_id);
96
97      str temp;
98      sprintf(temp, "patient/%d/trans.dat", temp_pat.get_id());
99      ofstream patient_file ( temp , ios::out | ios::binary | ios::app );
100     patient_file.write( (char*) &trans , sizeof(transaction) );
101     patient_file.close();
102
103     hospital::write_patient(temp_pat);
104 }
105
106 void hospital::discharge_patient(patient temp){
107     temp.discharge();
108     temp.set_discharge_date( system::get_date() );
109     hospital::write_patient(temp);
110 }
111
112 float hospital::calc_bill(int stay){
113     return stay * ::stay_charge;
114 }
115
```

```
116 medicine hospital::get_med_by_code(int inp_code){
117     fstream meds ("stock/med.dat", ios::in | ios::binary);
118 
119     medicine temp;
120 
121     if(inp_code < 1 || inp_code > 100){
122         temp.code = 0;
123         temp.price = 0;
124         temp.dosage = 0;
125         temp.stock = 0;
126         strcpy(temp.name, "Shell Medicine");
127 
128         interface::error("Invalid medicine code!!");
129 
130         return temp;
131     }
132 
133     for(int i = 0; i<100; i++){
134         meds.read((char*) &temp, sizeof(medicine));
135         if(temp.code == inp_code){
136             break;
137         }
138     }
139 
140     return temp;
141 }
142 
143 void hospital::write_med(medicine inp_med){
144     fstream med_file ("stock/med.dat", ios::in | ios::out | ios::binary);
145     med_file.seekg(0);
146 
147     int success = 0;
148 
149     while (!success){
150         medicine a;
151         med_file.read( (char*) &a, sizeof(medicine) );
152         if(a.code==inp_med.code){
153             med_file.seekg( med_file.tellg() - sizeof(medicine) );
154             med_file.write( (char*) &a, sizeof(medicine) );
155             success++;
156         }
157     }
158 
159 }
160 
161 int hospital::get_employee_by_id(unsigned long ID, void * target)
162 {
163     if(target == NULL)
164     {
165         interface::log_this("hospital::get_employee_by_id() : NULL pointer
                supplied to function\nFunction aborted");
166         return 0;
167     }
168     str temp;
169     int size_of_target;
170     switch(id_to_emp::convert(ID))
171     {
172         case INVALID:
173             interface::log_this("hospital::get_employee_by_id() : Invalid id
```

```
                supplied to function\nFunction aborted");
174             return 0;
175         case OTHERS:
176             sprintf(temp, "employee/%lu/base.dat", ID);
177             size_of_target = sizeof(employee);
178             break;
179         case DOCTOR:
180             sprintf(temp, "employee/doctor/%lu/base.dat", ID);
181             size_of_target = sizeof(doctor);
182             break;
183         case NURSE:
184             sprintf(temp, "employee/nurse/%lu/base.dat", ID);
185             size_of_target = sizeof(nurse);
186             break;
187         case RECEPTIONIST:
188             sprintf(temp, "employee/receptionist/%lu/base.dat", ID);
189             size_of_target = sizeof(receptionist);
190             break;
191     }
192     int i = hospital::read_from( ID, (char*) target, size_of_target, temp );
193     if(!i)
194     {
195         target = NULL;
196         return 0;
197     }
198     return 1;
199 }
200
201 int hospital::write_employee(void * a)
202 {
203     if(a == NULL)
204     {
205         interface::log_this("hospital::write_employee() : NULL pointer supplied
                to function\nFunction aborted");
206         return 0;
207     }
208     mkdir("employee");
209     str temp;
210     int size_of_target;
211     employee *x = (employee *) a;
212     const unsigned long ID = x->get_id();
213     switch(id_to_emp::convert(ID))
214     {
215         case INVALID:
216             interface::log_this("hospital::write_employee() : Object with ID zero
                    cannot be written to file\nFunction aborted");
217             return 0;
218         case OTHERS:
219             sprintf(temp, "employee/%lu", ID);
220             size_of_target = sizeof(employee);
221             break;
222         case DOCTOR:
223             mkdir("employee/doctor");
224             sprintf(temp, "employee/doctor/%lu", ID);
225             size_of_target = sizeof(doctor);
226             break;
227         case NURSE:
228             mkdir("employee/nurse");
229             sprintf(temp, "employee/nurse/%lu", ID);
```

```
230             size_of_target = sizeof(nurse);
231             break;
232         case RECEPTIONIST:
233             mkdir("employee/receptionist");
234             sprintf(temp, "employee/receptionist/%lu", ID);
235             size_of_target = sizeof(receptionist);
236             break;
237     }
238     mkdir(temp);
239     strcat(temp, "/base.dat");
240     ofstream fout ( temp , ios::out | ios::binary);
241     if(!fout)
242     {
243         interface::log_this("hospital::write_employee() : Employee data file
                could not be created or accessed\nFunction aborted");
244         return 0;
245     }
246     fout.write( (char *) a , size_of_target );
247     if(fout.fail())
248     {
249         interface::log_this("hospital::write_employee() : Error while writing to
                file (fout.fail())\nFunction aborted");
250         return 0;
251     }
252     return 1;
253 }
254
255 int hospital::pay_salary(unsigned long id, Date d1, Time t1)
256 {
257     void * e = malloc( sizeof(doctor) );
258     if(e == NULL)
259     {
260         interface::log_this("hospital::pay_salary() : Not enough memory to
                allocate buffer void * temp = malloc( sizeof(doctor) )");
261         interface::error("Out of memory!! Check log");
262         getch();
263         return 0;
264     }
265     str temp;
266     switch(id_to_emp::convert(id))
267     {
268         case INVALID:
269             interface::log_this("hospital::pay_salary() : Invalid id supplied to
                    function\nFunction aborted");
270             return 0;
271         case OTHERS:
272             sprintf(temp, "employee/%lu/trans.dat", id);
273             break;
274         case DOCTOR:
275             sprintf(temp, "employee/doctor/%lu/trans.dat", id);
276             break;
277         case NURSE:
278             sprintf(temp, "employee/nurse/%lu/trans.dat", id);
279             break;
280         case RECEPTIONIST:
281             sprintf(temp, "employee/receptionist/%lu/trans.dat", id);
282             break;
283     }
284     if(!hospital::get_employee_by_id(id, e))
```

```
285     {
286         interface::log_this("hospital::pay_salary() : Employee not found or error
                while reading file\nFunction aborted");
287         free(e);
288         return 0;
289     }
290     unsigned long inp1;
291     char inp2[100] = "Salary paid to ";
292     employee * emp = (employee *)e;
293     inp1 = emp->get_salary();
294     strcat(inp2, emp->get_name());
295     transaction t = hospital::deduct_money(inp1, inp2, d1, t1);
296     free(e);
297
298     ofstream fout ( temp ,ios::binary | ios::app );
299     if(!fout)
300     {
301         interface::log_this("hospital::pay_salary() : Employee data file could
                not be created or accessed\nFunction aborted");
302         return 0;
303     }
304     fout.write((char *) &t, sizeof(transaction));
305     if(fout.fail())
306     {
307         interface::log_this("hospital::pay_salary() : Error while writing to file
                (fout.fail())\nFunction aborted");
308         return 0;
309     }
310     return 1;
311 }
312
313 int hospital::pay_all_salaries()
314 {
315     Date d1 = system::get_date();
316     Time t1 = system::get_time();
317     unsigned long max_id;
318     ifstream fin;
319     fin.open("employee/max_id.dat", ios::binary);
320     if(!fin)
321     {
322         interface::log_this("hospital::pay_all_salaries() : No employees found or
                cannot access file max_id.dat\nFunction aborted");
323         return 0;
324     }
325     else
326     {
327         fin.read((char *) &max_id, sizeof(unsigned long));
328         if(fin.fail())
329         {
330             interface::log_this("hospital::pay_all_salaries() : Error while
                    reading file max_id.dat(fin.fail())\nFunction aborted");
331             return 0;
332         }
333         if(!employee::get_generate_id_status())
334         {   //if generate_id_status is zero, then no id is generated after max_id
                + 1
335             //Thus, the following loop should run max_id + 1 times
336             ++max_id;
337         }
```

```
338         for(unsigned long i = 1; i <= max_id; ++i)
339         {
340             int a = hospital::pay_salary(i, d1, t1);
341             if(!a)
342             {
343                 str log_msg;
344                 sprintf(log_msg, "hospital::pay_all_salaries() : Failed to pay
                        salary of id %lu...\nSkipped", i);
345                 interface::log_this(log_msg);
346             }
347         }
348     }
349     return 1;
350 }
351
352 int hospital::get_date_difference(Date dt1, Date dt2)
353 {
354
355     long int n1 = dt1.year*365 + dt1.day;
356
357     for (int i=0; i<dt1.month - 1; i++){
358         n1 += monthDays[i];
359     }
360     n1 += hospital::count_leap_years(dt1);
361
362     long int n2 = dt2.year*365 + dt2.day;
363
364     for (i=0; i<dt2.month - 1; i++){
365             n2 += monthDays[i];
366     }
367     n2 += count_leap_years(dt2);
368
369     return (n2 - n1);
370 }
371
372 int hospital::count_leap_years(Date d)
373 {
374     int years = d.year;
375
376     if (d.month <= 2){
377         years--;        // checking whether to count the current year
378     }
379
380     return (years / 4) - (years / 100) + (years / 400);
381 }
382
383 int hospital::date_validity(const char * inp_date){
384     return hospital::date_validity(hospital::str_to_date(inp_date));
385 }
386
387 int hospital::date_validity(Date inp_date){
388      if(inp_date.year % 4 == 0 && inp_date.month == 2 &&
389         inp_date.day == 29){
390             return 1;
391     }
392     if (
393         inp_date.month > 12 ||
394         inp_date.day > monthDays[inp_date.month - 1])
395     {
```

```
396         return 0;
397     }
398     else{
399         return 1;
400     }
401 }
402
403 int hospital::time_validity(const char * inp_time)
404 {
405     return time_validity( str_to_time(inp_time) );
406 }
407
408 int hospital::time_validity(Time t)
409 {
410     if( t.hour > 24 || t.minute > 59 || t.second > 59)
411     {
412         return 0;
413     }
414     return 1;
415 }
416
417 Date hospital::str_to_date(const char * inp_date){
418     int counter = 0;
419     int count = 0;
420     int input[3];
421     input[0] = input[1] = input[2] = 0;
422     while(counter < 3){
423         char ch[12];
424         ch[0] = '/';
425         for(int i = 1; i < 7; i++){
426             ch[i] = inp_date[count];
427             count++;
428             if(ch[i] == '/' || ch[i] == '\\' || ch[i] == 0 || ch[i] == '-'){
429                 if(ch[i] == 0 && count < 11){
430                     interface::error("Invalid date!");
431                     return Date (99, 99, 9999);
432                 }
433                 ch[i] = '/';
434                 int temp = i-1, temp2 = 0;
435                 while(ch[temp] != '/'){
436                     input[counter] += ( pow(10, temp2) * ((int)ch[temp] - (int)'0
                        ') );
437                     temp--;
438                     temp2++;
439                 }
440                 counter++;
441             }
442         }
443     }
444
445     return Date(input[0], input[1], input[2]);
446 }
447
448 Time hospital::str_to_time(const char * inp_time)
449 {
450 ///////In this function invalid time(25:00:00) is returned if time is in
        incorrect format//////////
451     char inp[3][3] = {"25", "0", "0"};
452     int inp_x = 0, inp_y = 0;
```

```
453     Time null(25, 0, 0);
454     if( strlen(inp_time) > 8 || strlen(inp_time) < 5 || inp_time[strlen(inp_time)
            - 1] == ':')
455     {
456         return null;
457     }
458     for(int i = 0; i < strlen(inp_time); ++i)
459     {
460         if(inp_time[i] == ':' && inp_y != 0)
461         {
462             inp[inp_x][inp_y] = '\0';
463             ++inp_x;
464             inp_y = 0;
465             continue;
466         }
467         else if( (inp_y == 0 && inp_time[i] == ':') || inp_y > 1
468                 || (inp_time[i] < '0' || inp_time[i] > '9') )
469         {
470             return null;
471         }
472         inp[inp_x][inp_y] = inp_time[i];
473         ++inp_y;
474     }
475     char *endptr;
476     null.hour = (unsigned int) strtol(inp[0], &endptr, 10);
477     null.minute = (unsigned int) strtol(inp[1], &endptr, 10);
478     null.second = (unsigned int) strtol(inp[2], &endptr, 10);
479     return null;
480 }
481
482 int hospital::str_to_sex(char* s){
483     if( strcmp(s, "M")  )   { return 0; }
484     else if(    strcmp(s, "F")  )   { return 1; }
485     else { return 2; }
486 }
487
488 int hospital::read_from(unsigned long ID, char * dest, int size, char * temp)
489 {
490     ifstream fin ( temp , ios::in | ios::binary );
491     if(!fin)
492     {
493         char errmsg[200];
494         sprintf(errmsg, "hospital::read_from() : Employee with id %lu not found\
                nFunction aborted", ID);
495         interface::log_this(errmsg);
496         return 0;
497     }
498     fin.read( dest, size );
499     if(fin.fail())
500     {
501         interface::log_this("hospital::read_from() : Error while reading from
                file (fin.fail())\nFunction aborted");
502         return 0;
503     }
504     fin.close();
505     return 1;
506 }
507
508 ////////////////////////////////////////////////////////
```

```
509 ////////////////////////////////////////////////////////////
510 ////////////////////////////////////////////////////////////
511
512 double hospital::balance = 10000000.0;
```

4. code/MIAN.CPP

```
1  #include "iface.hpp"
2  #include <conio.h>
3  #include "hosp.hpp"
4  #include "emp.hpp"
5
6  void main()
7  {
8      clrscr();
9  /*///////////////Administrator object creator//////////
10     address yay("", "", "", "", "");
11     employee x("Administrator", 3, Date(), yay, "", 0, Time(), Time(), "admin", "
           password");
12     hospital::write_employee(&x);
13 ////////////////////////////////////////////////////*/
14
15     interface::log_this("Program initiated\n\n");
16
17     interface::init();
18
19     interface::log_this("Program terminated\n\n");
20 }
```

5. code/iface.cpp

```
1  #include <fstream.h>
2  #include "base.hpp"
3  #include "iface.hpp"
4  #include "hosp.hpp"
5  #include "emp.hpp"
6
7  ////////////////////////////////////////
8  //////// Function definitions for interface
9
10 void interface::stock_management(){
11     coord c(ui::scr_width / 3, ui::scr_height / 3);
12     box menu (c, ui::scr_width / 3, ui::scr_height / 2.2);
13
14     int ch = 0;
15
16     menu << "1. Sale"
17             << ui::endl << "2. Purchase"
18             << ui::endl << "3. Stock check"
19             << ui::endl << "4. Go to main menu"
20             << ui::endl << ui::endl << "Choice : ";
21     menu.setdefault(1);
22     menu.settcolor_input(YELLOW);
23     validate_menu::set_menu_limits(1, 4);
24     menu >> validate_menu::input >> ch;
25
26     menu << ui::endl;
```

```
27      menu.setexit_button("Submit");
28
29      menu.loop();
30      menu.hide();
31
32      interface::clear_error();
33
34      switch(ch){
35          case 1:
36          {
37
38              medicine temp;
39              temp.code = 0;
40
41              while(temp.code == 0){
42                  coord c(ui::scr_width / 3, ui::scr_height / 3);
43                  box sale_menu (c, ui::scr_width / 3, ui::scr_height / 3);
44                  sale_menu.settcolor_input(YELLOW);
45                  sale_menu << ui::centeralign << "Medicine Sale" << ui::endl;
46                  sale_menu << "Code : ";
47                  sale_menu.setdefault(42);
48                  sale_menu >> temp.code;
49                  sale_menu << ui::endl;
50                  sale_menu.setexit_button("Submit");
51                  sale_menu.loop();
52                  sale_menu.hide();
53
54                  temp = hospital::get_med_by_code(temp.code);
55              }
56
57              int quantity = -2;
58              patient temp_patient;
59              long pat_id;
60
61              while(quantity < 0 || quantity > 100){
62                  coord c(ui::scr_width / 3, ui::scr_height / 3);
63                  box sale_menu (c, ui::scr_width / 3, ui::scr_height / 2);
64                  sale_menu.settcolor_input(YELLOW);
65                  sale_menu << ui::centeralign << "Medicine Sale" << ui::endl;
66                  sale_menu << "Name : " << temp.name
67                                << ui::endl << "Price : $" << temp.price
68                                << ui::endl << ui::endl
69                                << "Patient ID : ";
70                  sale_menu.setdefault(786);
71                  sale_menu >> pat_id;
72                  sale_menu << ui::endl << "Quantity : ";
73                  sale_menu.setdefault(1);
74                  sale_menu >> quantity;
75                  sale_menu.setexit_button("Submit");
76                  sale_menu.loop();
77                  sale_menu.hide();
78
79                  temp_patient = hospital::get_patient_by_id(pat_id);
80                  if(temp_patient.get_id() == 0){
81                      quantity = -1;
82                      interface::error("Invalid patient ID!!");
83                      continue;
84                  }
85                  interface::error("Invalid quantity!!");
```

```
86              }
87
88              interface::clear_error();
89
90              temp.stock -= quantity;
91
92              for(int i = 0; i < 50; i++){
93                  if(temp_patient.get_med(i, 0) == temp.code ||
94                          temp_patient.get_med(i,0) == 0){
95                              temp_patient.set_med(i, temp.code, temp_patient.
                                    get_med(i, 1) + quantity);
96                          }
97              }
98
99              hospital::write_patient(temp_patient);
100             hospital::write_med(temp);
101
102             break;
103         }
104
105         case 2:
106         {
107             medicine temp;
108             temp.code = 0;
109
110             while(temp.code == 0){
111                 coord c(ui::scr_width / 3, ui::scr_height / 3);
112                 box purchase_menu (c, ui::scr_width / 3, ui::scr_height / 3);
113                 purchase_menu.settcolor_input(YELLOW);
114                 purchase_menu << ui::centeralign << "Medicine Purchase" << ui::
                        endl;
115                 purchase_menu << "Code : ";
116                 purchase_menu.setdefault(42);
117                 purchase_menu >> temp.code;
118                 purchase_menu << ui::endl;
119                 purchase_menu.setexit_button("Submit");
120                 purchase_menu.loop();
121                 purchase_menu.hide();
122
123                 temp = hospital::get_med_by_code(temp.code);
124             }
125
126             int quantity = -2;
127
128             while(quantity < 0 || quantity > 5000){
129                 coord c(ui::scr_width / 3, ui::scr_height / 3);
130                 box purchase_menu (c, ui::scr_width / 3, ui::scr_height / 2);
131                 purchase_menu.settcolor_input(YELLOW);
132                 purchase_menu << ui::centeralign << "Medicine Purchase" << ui::
                        endl;
133                 purchase_menu << "Name : " << temp.name
134                             << ui::endl << "Price : $" << temp.price
135                             << ui::endl << ui::endl << "Quantity : ";
136                 purchase_menu.setdefault(1);
137                 purchase_menu >> quantity;
138                 purchase_menu.setexit_button("Submit");
139                 purchase_menu.loop();
140                 purchase_menu.hide();
141
```

```
142                 interface::error("Invalid quantity!!");
143             }
144 
145             interface::clear_error();
146 
147             temp.stock += quantity;
148             hospital::deduct_money(temp.price * quantity, "Medicine purchase",
                    system::get_date(), system::get_time());
149             hospital::write_med(temp);
150 
151             break;
152         }
153 
154         case 3:
155         {
156             medicine temp;
157             temp.code = 0;
158 
159             while(temp.code == 0){
160                 coord c(ui::scr_width / 3, ui::scr_height / 3);
161                 box stock_menu (c, ui::scr_width / 3, ui::scr_height / 3);
162                 stock_menu.settcolor_input(YELLOW);
163                 stock_menu << ui::centeralign << "Stock check" << ui::endl;
164                 stock_menu << "Code : ";
165                 stock_menu.setdefault(42);
166                 stock_menu >> temp.code;
167                 stock_menu << ui::endl;
168                 stock_menu.setexit_button("Submit");
169                 stock_menu.loop();
170                 stock_menu.hide();
171 
172                 temp = hospital::get_med_by_code(temp.code);
173             }
174 
175             coord c(ui::scr_width / 3, ui::scr_height / 3);
176             box stock_menu (c, ui::scr_width / 3, ui::scr_height / 2);
177             stock_menu.settcolor_input(YELLOW);
178             stock_menu << ui::centeralign << "Medicine Details" << ui::endl;
179             stock_menu << "Name : " << temp.name
180                        << ui::endl << "Price : $" << temp.price
181                        << ui::endl << "Dosage : " << temp.dosage << " ml"
182                        << ui::endl << "Quantity in stock : " << temp.stock
183                        << ui::endl;
184             stock_menu.setexit_button("Okay");
185             stock_menu.loop();
186             stock_menu.hide();
187 
188             break;
189         }
190     }
191 
192 }
193 
194 int interface::validate_menu::input(const char * ch)
195 {
196     char *endptr;
197     int a = (int) strtol(ch, &endptr, 10);
198     if(!validation::vint(ch) || a < lowest_choice || a > greatest_choice)
199     {
```

```
200         return 0;
201     }
202     else
203     {
204         return 1;
205     }
206 }
207
208 void interface::validate_menu::set_menu_limits(int a, int b)
209 {
210     lowest_choice = a;
211     greatest_choice = b;
212 }
213
214 int interface::validate_menu::lowest_choice = 0;
215 int interface::validate_menu::greatest_choice = 0;
216
217 int interface::back_func::set_backbit()
218 {
219     backbit = 1;
220     return 1;
221 }
222
223 int interface::back_func::backbit = 0;
224
225 void interface::error(char* err){
226     window.clear_footer();
227     window.setfooter_tcolor(RED);
228     window << box::setfooter << ui::centeralign
229         << err;
230 }
231
232 void interface::clear_error(){
233     window.clear_footer();
234     window.setfooter_tcolor(GREEN);
235     window << box::setfooter << ui::centeralign
236         << "Everything looks OK";
237 }
238
239 int interface::log_this(char * message)
240 {
241     Date dnow = system::get_date();
242     Time tnow = system::get_time();
243     char text[300];
244     sprintf(text, "$ [%u-%u-%u %u:%u:%u +0530]: ", dnow.day, dnow.month, dnow.
            year, tnow.hour, tnow.minute, tnow.second);
245     strcat(text, message);
246     ofstream fout;
247     fout.open("log.txt", ios::out | ios::app);
248     if(!fout)
249         return 0;
250     fout << text << endl;
251     if(fout.fail())
252         return 0;
253     fout.close();
254     return 1;
255 }
256
257 interface::interface(){}
```

```

box interface::window;
```

6. code/iface2.cpp

```
#include <fstream.h>
#include "base.hpp"
#include "iface.hpp"
#include "hosp.hpp"
#include "emp.hpp"

void interface::init(){
    window.hide();
    window.display();
    window.settcolor(WHITE);
    window << ui::centeralign << "LHOSPITAL";
    window.settcolor(ui::tcolor);
    window.setfooter_tcolor(GREEN);

    Date current_date = system::get_date();
    Time current_time = system::get_time();

    str curr_date, curr_time;
    sprintf(curr_date, "%d/%d/%d", current_date.day, current_date.month,
        current_date.year);
    sprintf(curr_time, "%d:%d", current_time.hour, current_time.minute);

    window << box::setheader << curr_date << box::setheader << ui::rightalign
           << curr_time << box::setfooter << ui::centeralign
           << "Everything looks OK";
    int id;
    do
    {
        id = interface::login_screen();
        if(id && id_to_emp::convert(id) != OTHERS || id == 1)   //so that general
             employees (except administrator) do
        {                                                       // not
            accidentally login(as they have been assigned
            interface::clear_error();                           // username and
                password as "", "")
            break;
        }
    }while(1);
    if(id == 1) //if user logging in is administrator
    {
        int choice = 0;

        while(1){
            choice = interface::menu();

            switch(choice){
                case 1:
                    interface::employee_management();
                    break;
                case 2:
                    interface::stock_management();
                    break;
                case 3:
```

```
50                      return;
51              }
52          }
53      }
54      else
55      {
56          switch(id_to_emp::convert(id))
57          {
58              case INVALID:
59                  interface::error("You have an invalid id generated. Create a new
                        account");
60                  break;
61              case DOCTOR:
62              case NURSE:
63              case RECEPTIONIST:
64                  interface::employee_screen(id);
65                  break;
66          }
67      }
68  }
69
70  int interface::login_screen()
71  {
72      const int login_screen_height = 9;
73      coord c(ui::scr_width / 3, ui::scr_height / 3);
74      box login_box (c, ui::scr_width / 3, login_screen_height);
75
76      str uid, pwd;
77
78      login_box.settcolor_input(YELLOW);
79      login_box << "User ID : ";
80      login_box >> uid;
81      login_box << ui::endl << "Password : ";
82      login_box >> box::setpassword >> pwd;
83      login_box << ui::endl;
84      login_box.setexit_button("Login");
85      login_box.loop();
86      login_box.hide();
87      unsigned long max_id;
88      ifstream fin;
89      fin.open("employee/max_id.dat", ios::binary);
90      if(!fin)
91          max_id = 1;
92      else
93      {
94          fin.read((char *) &max_id, sizeof(unsigned long));
95          if(fin.fail())
96          {
97              interface::error("ERROR WHILE READING FROM FILE!!! ");
98              getch();
99              return 0;
100         }
101     }
102     fin.close();
103     void * x = malloc( sizeof(doctor) );
104     for(unsigned long id = 1; id <= max_id; ++id)
105     {
106         if(x == NULL)
107         {
```

```
108             interface::log_this("interface::login_screen() : Not enough memory to
                    allocate buffer void * temp = malloc( sizeof(doctor) )");
109             interface::error("Out of memory!! Check log");
110             getch();
111             return 0;
112         }
113         if(!hospital::get_employee_by_id(id, x))
114         {
115             char log_msg[300];
116             sprintf(log_msg, "interface::login_screen() : Error in reading file
                    of id %lu (hospital::get_employee_by_id(id, x) returned 0), could
                    be due to invalid login details entered", id);
117             interface::log_this(log_msg);
118         }
119         employee * e = (employee *)x;
120         if(!strcmp(e->account.get_username(), uid) && e->account.login(pwd))
121         {
122             interface::clear_error();
123             free(x);
124             return id;
125         }
126     }
127     interface::error("Invalid login details!!");
128     free(x);
129     return 0;
130 }
131
132 int interface::menu(){
133     coord c(ui::scr_width / 3, ui::scr_height / 3);
134     box menu (c, ui::scr_width / 3, ui::scr_height / 2.2 + 1);
135
136     int ch;
137     menu << ui::endl << "1. Employee management"
138          << ui::endl << "2. Stock management"
139          << ui::endl << "3. Exit"
140          << ui::endl << ui::endl << "Choice : ";
141     menu.settcolor_input(YELLOW);
142     validate_menu::set_menu_limits(1, 3);
143     menu >> validate_menu::input >> ch;
144
145     menu << ui::endl;
146     menu.setexit_button("Submit");
147
148     menu.loop();
149     menu.hide();
150
151     return ch;
152 }
153
154 void interface::patient_management(){
155     int ch = 0;
156
157     coord c(ui::scr_width / 3, ui::scr_height / 3);
158     box menu (c, ui::scr_width / 3, ui::scr_height / 2.2);
159
160     menu << "1. Patient admission"
161             << ui::endl << "2. Patient discharge"
162             << ui::endl << "3. Edit patient details"
163             << ui::endl << "4. Go to main menu"
```

```
164             << ui::endl << ui::endl << "Choice : ";
165     menu.setdefault(1);
166     menu.settcolor_input(YELLOW);
167     validate_menu::set_menu_limits(1,4);
168     menu >> validate_menu::input >> ch;
169 
170         menu << ui::endl;
171         menu.setexit_button("Submit");
172 
173         menu.loop();
174         menu.hide();
175 
176     switch(ch){
177         case 1:
178         {
179             coord c(ui::scr_width / 4, ui::scr_height / 4);
180             box form (c, ui::scr_width / 2, ui::scr_height / 1.5);
181             form.settcolor_input(YELLOW);
182 
183             str inp_name, inp_sex_str, inp_dob_str
184                 , inp_phone, inp_guard_name, inp_emer_contact
185                 , inp_emer_phone, inp_insur_expiry, inp_admdate_str;
186 
187             address inp_adr;
188             disease inp_dis;
189             insurance inp_insur;
190 
191             form << "Enter data for the patient :" << ui::endl
192                     << ui::endl << "Name : ";
193             form >> inp_name;
194 
195             form << ui::endl << "Sex : ";
196             form >> inp_sex_str;
197             form << ui::endl << "Key - M/F/T = Male/Female/Trans"
198                     << ui::endl << "Date of Birth : ";
199 
200             form.setdefault("25/12/1991");
201             form >> inp_dob_str;
202 
203 
204             form << ui::endl << "Address"
205                     << ui::endl << ui::endl
206                     << "\tHouse # : ";
207             form.setdefault("221B");
208             form >> inp_adr.house_no;
209 
210             form << ui::endl << "\tStreet : ";
211             form.setdefault("Baker Street");
212             form >> inp_adr.street;
213 
214             form << ui::endl << "\tDistrict : ";
215             form.setdefault("Idk");
216             form >> inp_adr.district;
217 
218             form << ui::endl << "\tState : ";
219             form.setdefault("London(?)");
220             form >> inp_adr.state;
221 
222 
```

```
223             form << ui::endl << ui::endl
224                     << "Phone : ";
225             form.setdefault("1234567890");
226             form >> inp_phone;
227
228
229             form << ui::endl << "Disease"
230                     << ui::endl << ui::endl
231                     << "\tName : ";
232             form.setdefault("Melanoma");
233             form >> inp_dis.name;
234
235             form << ui::endl << "Type : ";
236             form.setdefault(0);
237             form >> inp_dis.type;
238
239             form << ui::endl << "\tType key : " << ui::endl
240                     << "\t0 - Brain\t1 - Heart" << ui::endl
241                     << "\t2 - Skin\t3 - Lung" << ui::endl
242                     << "\t4 - Bone\t5 - Eye" << ui::endl
243                     << "\t6 - Throat\t7 - Teeth" << ui::endl
244                     << "\t8 - Stomach\t9 - Blood" << ui::endl
245                     << "\t10 - General/full body condition"
246                     << ui::endl << "\tSymptoms"
247                     << ui::endl << "\tSymptom 1 : ";
248
249             form >> inp_dis.symptoms[0];
250
251             form << ui::endl << "\tSymptom 2 : ";
252             form >> inp_dis.symptoms[1];
253
254             form << ui::endl << "\tSymptom 3 : ";
255             form >> inp_dis.symptoms[2];
256
257             form << ui::endl << "\tSymptom 4 : ";
258             form >> inp_dis.symptoms[3];
259
260
261             form << ui::endl << ui::endl
262                     << "Guardian name : ";
263             form.setdefault("Dr. John Watson");
264             form >> inp_guard_name;
265
266             form << ui::endl << "Emergency Contact : ";
267             form.setdefault("Irene Adler");
268             form >> inp_emer_contact;
269
270             form << ui::endl << "Emer. Cont. Phone : ";
271             form.setdefault("1234567890");
272             form >> inp_emer_phone;
273
274
275             form << ui::endl << "Insurance"
276                     << ui::endl << ui::endl
277                     << "\tProvider : ";
278             form.setdefault("LIC");
279             form >> inp_insur.provider;
280
281             form << ui::endl << "\tAmount ($) : ";
```

```
282             form.setdefault(30000);
283             form >> inp_insur.amount;
284 
285             form << ui::endl << "\tExpiry";
286             form.setdefault("25/12/2022");
287             form >> inp_insur_expiry;
288 
289 
290             form << ui::endl << ui::endl
291                     << "Admission Date : ";
292             char dnow[11];
293             form.setdefault("01/01/2018");
294             form >> inp_admdate_str;
295 
296             form << ui::endl << ui::endl;
297             form.setexit_button("Submit");
298 
299             form.loop();
300 
301             form.hide();
302 
303             inp_insur.expiry = hospital::str_to_date(inp_insur_expiry);
304 
305             patient temp_pat = patient(inp_name, hospital::str_to_sex(inp_sex_str
                    )
306                                        , hospital::str_to_date(inp_dob_str),
                                            inp_adr
307                                        , inp_phone, inp_dis, inp_guard_name
308                                        , inp_emer_contact, inp_emer_phone
309                                        , inp_insur, hospital::str_to_date(
                                            inp_admdate_str));
310 
311             hospital::write_patient(temp_pat);
312 
313             coord d(ui::scr_width / 3, ui::scr_height / 3);
314             box message (d, ui::scr_width / 3, ui::scr_height / 3);
315 
316             message << ui::centeralign << "Patient has been admitted with ID #"
317                     << temp_pat.get_id() << ui::endl << ui::endl;
318 
319             message.setexit_button("Okay");
320             message.loop();
321             message.hide();
322 
323             break;
324         }
325 
326         case 2:
327         {
328             patient temp_patient;
329 
330             while(1){
331                 coord c(ui::scr_width / 3, ui::scr_height / 3);
332                 box login_box (c, ui::scr_width / 3, ui::scr_height / 2.5);
333 
334                 long inp_pat_id;
335 
336                 login_box << ui::endl << "Patient Discharge"
337                             << ui::endl << "Enter patient ID : ";
```

```
338                 login_box.setdefault(1);
339                 login_box >> inp_pat_id;
340 
341                 login_box << ui::endl;
342                 login_box.setexit_button("Submit");
343 
344                 login_box.loop();
345 
346                 login_box.hide();
347 
348                 temp_patient = hospital::get_patient_by_id(inp_pat_id);
349 
350                 if(temp_patient.get_id() == inp_pat_id){
351                     break;
352                     interface::clear_error();
353                 }
354                 else{
355                     interface::error("Invalid Patient ID!!");
356                     continue;
357                 }
358             }
359 
360             coord c(ui::scr_width / 3, ui::scr_height / 3);
361             box bill (c, ui::scr_width / 3, ui::scr_height / 2);
362 
363             str tt;
364             sprintf(tt, "%d/%d/%d", temp_patient.get_admission_date(DAY),
365                                                         temp_patient.
                                                            get_admission_date
                                                            (MONTH),
366                                                         temp_patient.
                                                            get_admission_date
                                                            (YEAR));
367 
368                                                         interface::log_this(
                                                            tt);
369 
370             int stay_len = abs( hospital::get_date_difference(
371                                                     system::get_date(),
372                                                     Date(
373                                                         temp_patient.
                                                            get_admission_date
                                                            (DAY),
374                                                         temp_patient.
                                                            get_admission_date
                                                            (MONTH),
375                                                         temp_patient.
                                                            get_admission_date
                                                            (YEAR)
376                                                     )
377                                 ) );
378 
379             bill << ui::endl << "Bill for " << temp_patient.get_name()
380                     << ui::endl << "1. Stay for "
381                     << stay_len << " days"  << ui::endl;
382 
383             float total_bill;
384             bill.settcolor(GREEN);
385             bill << "$" << ( total_bill += hospital::calc_bill(stay_len) );
```

```
386
387             for(int i = 0; i < 50; i++){
388                     transaction temp_trans = temp_patient.get_transaction(i);
389
390                     if( temp_trans.amount == 0 ){
391                         break;
392                     }
393
394                     bill << i+2 << ". " << temp_trans.reason << ui::endl;
395                     bill.settcolor(GREEN);
396                     bill << "\t$" << temp_trans.amount << ui::endl;
397                     bill.settcolor(ui::tcolor);
398
399                     total_bill += temp_trans.amount;
400             }
401
402             bill.settcolor(CYAN);
403             bill << ui::endl << "Final bill : $" << total_bill;
404             bill.settcolor(ui::tcolor);
405             bill.setexit_button("Pay Bill");
406             bill.loop();
407             bill.hide();
408
409             hospital::discharge_patient(temp_patient);
410
411             break;
412         }
413
414         case 3:
415         {
416             int choice = 0;
417
418             patient temp_patient;
419
420             while(1){
421                 coord c(ui::scr_width / 3, ui::scr_height / 3);
422                 box login_box (c, ui::scr_width / 3, ui::scr_height / 2.5);
423                 login_box.settcolor_input(YELLOW);
424
425                 long inp_pat_id;
426
427                 login_box << ui::endl << "Patient Data Alteration"
428                             << ui::endl << "Enter patient ID : ";
429                 login_box.setdefault(1);
430                 login_box >> inp_pat_id;
431
432                 login_box << ui::endl;
433                 login_box.setexit_button("Submit");
434
435                 login_box.loop();
436
437                 login_box.hide();
438
439                 temp_patient = hospital::get_patient_by_id(inp_pat_id);
440
441                 if(temp_patient.get_id() == inp_pat_id){
442                     break;
443                     interface::clear_error();
444                 }
```

```
445                 else{
446                     interface::error("Invalid Patient ID!!");
447                     continue;
448                 }
449             }
450 
451             while(choice < 1 || choice > 5){
452                 coord c(ui::scr_width / 3, ui::scr_height / 3);
453                 box menu (c, ui::scr_width / 3, ui::scr_height / 1.5);
454 
455                 menu << "Choose item to edit:"
456                         << ui::endl << "1. Disease/condition"
457                         << ui::endl << "2. Guardian name"
458                         << ui::endl << "3. Emergency contact"
459                         << ui::endl << "4. Emergency contact no."
460                         << ui::endl << "5. Insurance information"
461                         << ui::endl << ui::endl << "Choice : ";
462                 menu.setdefault(1);
463                 menu.settcolor_input(YELLOW);
464                 menu >> choice;
465 
466                 menu << ui::endl;
467                 menu.setexit_button("Submit");
468 
469                 menu.loop();
470                 menu.hide();
471             }
472             switch(choice){
473                 case 1:
474                 {
475                     coord c(ui::scr_width / 3, ui::scr_height / 3);
476                     box edit_screen (c, ui::scr_width / 3, ui::scr_height / 2);
477                     edit_screen.settcolor_input(YELLOW);
478 
479                     edit_screen <<  "Enter disease/condition for " <<
                            temp_patient.get_name()
480                                 << ui::endl << "Disease : ";
481                     disease temp = temp_patient.get_dis();
482                     edit_screen.setdefault(temp.name);
483                     edit_screen >> temp.name;
484                     edit_screen << ui::endl << "Type : ";
485                     edit_screen.setdefault(temp.type);
486                     edit_screen >> temp.type;
487                     edit_screen << ui::endl << "Type key : " << ui::endl
488                                 << "0 - Brain\t1 - Heart" << ui::endl
489                                 << "2 - Skin\t3 - Lung" << ui::endl
490                                 << "4 - Bone\t5 - Eye" << ui::endl
491                                 << "6 - Throat\t7 - Teeth" << ui::endl
492                                 << "8 - Stomach\t9 - Blood" << ui::endl
493                                 << "10 - General/full body condition"
494                                 << ui::endl << ui::endl
495                                 << "Symptoms" << ui::endl
496                                 << "Symptom 1 : ";
497                     edit_screen.setdefault(temp.symptoms[0]);
498                     edit_screen >> temp.symptoms[0];
499                     edit_screen << ui::endl << "Symptom 2 : ";
500                     edit_screen.setdefault(temp.symptoms[1]);
501                     edit_screen >> temp.symptoms[1];
502                     edit_screen << ui::endl << "Symptom 3 : ";
```

```
503                     edit_screen.setdefault(temp.symptoms[2]);
504                     edit_screen >> temp.symptoms[2];
505                     edit_screen << ui::endl << "Symptom 4 : ";
506                     edit_screen.setdefault(temp.symptoms[3]);
507                     edit_screen >> temp.symptoms[3];
508
509                     edit_screen << ui::endl << ui::endl;
510                     edit_screen.setexit_button("Submit");
511
512                     edit_screen.loop();
513
514                     edit_screen.hide();
515
516                     temp_patient.set_dis(temp);
517                     hospital::write_patient(temp_patient);
518
519                     break;
520                 }
521
522                 case 2:
523                 {
524                     coord c(ui::scr_width / 3, ui::scr_height / 3);
525                     box edit_screen (c, ui::scr_width / 3, ui::scr_height / 2);
526                     edit_screen.settcolor_input(YELLOW);
527
528                     edit_screen <<  "Enter name of guardian for " << temp_patient
                            .get_name()
529                                 << ui::endl << "Guardian Name : ";
530                     str temp;
531                     edit_screen.setdefault(temp_patient.get_guardian_name());
532                     edit_screen >> temp;
533
534                     edit_screen << ui::endl << ui::endl;
535                     edit_screen.setexit_button("Submit");
536
537                     edit_screen.loop();
538
539                     edit_screen.hide();
540
541                     temp_patient.set_guardian_name(temp);
542                     hospital::write_patient(temp_patient);
543
544                     break;
545                 }
546
547                 case 3:
548                 {
549                     coord c(ui::scr_width / 3, ui::scr_height / 3);
550                     box edit_screen (c, ui::scr_width / 3, ui::scr_height / 2);
551                     edit_screen.settcolor_input(YELLOW);
552
553                     edit_screen <<  "Enter emergency contact no. for " <<
                            temp_patient.get_name()
554                                 << ui::endl << "Contact no. : ";
555                     str temp;
556                     edit_screen.setdefault(temp_patient.get_emergency_contact());
557                     edit_screen >> temp;
558
559                     edit_screen << ui::endl << ui::endl;
```

```
560                     edit_screen.setexit_button("Submit");
561
562                     edit_screen.loop();
563
564                     edit_screen.hide();
565
566                     temp_patient.set_emergency_contact(temp);
567                     hospital::write_patient(temp_patient);
568
569                     break;
570                 }
571
572                 case 4:
573                 {
574                     coord c(ui::scr_width / 3, ui::scr_height / 3);
575                     box edit_screen (c, ui::scr_width / 3, ui::scr_height / 2);
576                     edit_screen.settcolor_input(YELLOW);
577
578                     edit_screen <<  "Enter emergency contact no. for " <<
                            temp_patient.get_name()
579                                 << ui::endl << "Contact no. : ";
580                     phone temp;
581                     edit_screen.setdefault(temp_patient.get_emer_contact_no());
582                     edit_screen >> temp;
583
584                     edit_screen << ui::endl << ui::endl;
585                     edit_screen.setexit_button("Submit");
586
587                     edit_screen.loop();
588
589                     edit_screen.hide();
590
591                     temp_patient.set_emer_contact_no(temp);
592                     hospital::write_patient(temp_patient);
593
594                     break;
595                 }
596
597                 case 5:
598                 {
599                     coord c(ui::scr_width / 3, ui::scr_height / 3);
600                     box edit_screen (c, ui::scr_width / 3, ui::scr_height / 2);
601                     edit_screen.settcolor_input(YELLOW);
602
603                     edit_screen <<  "Enter insurance information for " <<
                            temp_patient.get_name()
604                                 << ui::endl << "Provider : ";
605                     insurance temp = temp_patient.get_insur_info();
606                     edit_screen.setdefault(temp.provider);
607                     edit_screen >> temp.provider;
608                     edit_screen << ui::endl << "Amount (in $) :";
609                     edit_screen.setdefault(temp.amount);
610                     edit_screen >> temp.amount;
611                     edit_screen << ui::endl << "Expiry date (DD/MM/YYYY):";
612                     char temp_date[11];
613                     edit_screen >> hospital::date_validity >> temp_date;
614
615                     edit_screen << ui::endl << ui::endl;
616                     edit_screen.setexit_button("Submit");
```

```
617
618                     edit_screen.loop();
619
620                     edit_screen.hide();
621
622                     temp.expiry = hospital::str_to_date(temp_date);
623                     temp_patient.set_insur_info(temp);
624                     hospital::write_patient(temp_patient);
625
626                     break;
627                 }
628
629             }
630
631             break;
632         }
633         case 4:
634         {
635             break;
636         }
637     }
638 }
```

7. code/EMP.CPP

```
1  #include "hosp.hpp"
2  #include "iface.hpp"
3  #include "emp.hpp"
4  #include "base.hpp"
5  #include <fstream.h>
6
7  ////////////////////////////////
8  /// Function definitions for class employee
9
10 int employee::generate_id()
11 {
12     mkdir("employee");
13     unsigned long max_id;
14     ifstream fin;
15     fin.open("employee/max_id.dat", ios::binary);
16     if(!fin)
17     {
18         interface::log_this("employee::generate_id() : File max_id.dat not found
               or error while loading file\nmax_id will be set to zero");
19         max_id = 0;
20     }
21     else
22     {
23         fin.read((char *) &max_id, sizeof(unsigned long));
24         if(fin.fail())
25         {
26             interface::log_this("employee::generate_id() : Error while reading
                   from file max_id.dat (fin.fail())\nFunction aborted");
27             id = 0;
28             return 0;
29         }
30     }
31     fin.close();
```

```
32      ++max_id;
33      id = max_id;
34      ofstream fout;
35      fout.open("employee/max_id.dat", ios::binary);
36      fout.write((char *) &max_id, sizeof(unsigned long));
37      if(fout.fail())
38      {
39          interface::log_this("employee::generate_id() : Error while writing to
                file max_id.dat (fout.fail())\nFunction aborted");
40          return 0;
41      }
42      else
43          return 1;
44  }
45
46  int employee::generate_id_status = 1;
47
48  employee::employee(str inp1, int inp2, Date inp3, address inp4, phone inp5,
        unsigned long inp6, Time inp7, Time inp8, str inp9, str inp10) : person(inp1,
        inp2, inp3, inp4, inp5), account(inp9, inp10)
49  {
50      if(!generate_id_status)
51      {
52          interface::error("ID cannot be generated for this employee. Check log");
53          interface::log_this("employee::employee() : ID generation using
                generate_id() unsuccessful as generate_id_status is set to zero.\nThis
                 is because some error was encountered during the last ID generation")
                ;
54      }
55      else
56      {
57          employee::generate_id_status = generate_id();
58          id_to_emp i1(id, OTHERS);
59          if(!i1.status)
60          {
61              interface::error("ID not generated properly for this employee. Check
                    log");
62              interface::log_this("employee::employee() : i1.status was set to zero
                    , i.e id_list.dat doesn't have a record of the employee's id");
63          }
64          salary = inp6;
65          shift_start = inp7;
66          shift_end = inp8;
67      }
68  }
69
70  employee::employee() : person()
71  {
72      id = 0;
73  }
74
75  int employee::get_age()
76  {
77      ////////////////Updating age to present age//////////
78      set_dob(dob);       //This function is used here to invoke calc_age() in it
            only(because calc_age is directly not accessible)
79      void * temp = malloc( sizeof(doctor) );
80      if(temp != NULL && hospital::get_employee_by_id(id, temp))          //if
            employee's file exists on disk
```

```
81      {
82          hospital::write_employee( this );               //overwrite that file
83      }
84      free(temp);
85      return age;
86  }
87
88  unsigned long employee::get_salary(){
89      return salary;
90  }
91
92  void employee::set_salary(unsigned long inp)
93  {
94      salary = inp;
95  }
96
97  Time employee::get_shift(int inp){
98      switch(inp){
99          case START:
100             return shift_start;
101         case END:
102             return shift_end;
103         default:
104             return Time(0,0,0);
105     }
106 }
107
108 void employee::set_shift(int inp1, Time inp2)
109 {
110     switch (inp1)
111     {
112         case START:
113             shift_start = inp2;
114             return;
115         case END:
116             shift_end = inp2;
117             return;
118         default:
119             return;
120     }
121 }
122
123 unsigned long employee::get_id()
124 {
125     return id;
126 }
127
128 transaction * employee::get_last_5_transactions()
129 {
130     transaction * t = (transaction *)malloc(5 * sizeof(transaction));
131     if(t == NULL)
132     {
133         interface::log_this("employee::get_last_5_transactions() :Not enough
                memory to allocate buffer void * temp = malloc( sizeof(doctor) )\
                nFunction aborted");
134         return NULL;
135     }
136     for(int i = 0; i < 5; ++i)
137     {
```

```
138         t[i] = transaction();
139     }
140     str temp;
141     switch( id_to_emp::convert(id) )
142     {
143         case INVALID:
144         {
145             char log_msg[300];
146             sprintf(log_msg, "employee::get_last_5_transactions() : The object
                    has invalid id (%lu)\nFunction aborted", id);
147             interface::log_this(log_msg);
148             free(t);
149             return NULL;
150         }
151         case DOCTOR:
152         {
153             sprintf(temp, "employee/doctor/%lu/trans.dat", id);
154             break;
155         }
156         case NURSE:
157         {
158             sprintf(temp, "employee/nurse/%lu/trans.dat", id);
159             break;
160         }
161         case RECEPTIONIST:
162         {
163             sprintf(temp, "employee/receptionist/%lu/trans.dat", id);
164             break;
165         }
166         case OTHERS:
167         {
168             sprintf(temp, "employee/%lu/trans.dat", id);
169             break;
170         }
171     }
172     ifstream fin ( temp ,ios::binary | ios::in | ios::nocreate | ios::ate);
173     if(!fin)
174     {
175         char log_msg[300];
176         sprintf(log_msg, "employee::get_last_5_transactions() : Failed to open
                file trans.dat for id %lu\nFunction aborted", id);
177         interface::log_this(log_msg);
178         free(t);
179         return NULL;
180     }
181     int max_i, size_of_file = fin.tellg();
182     if( size_of_file >= ( 5 * sizeof(transaction) ) )
183     {
184         const int a = (-5) * sizeof(transaction);
185         fin.seekg(a, ios::end);
186         max_i = 5;
187     }
188     else
189     {
190         fin.seekg(0, ios::beg);
191         max_i = (int)( size_of_file / sizeof(transaction) );
192     }
193     for(i = 0; i < max_i && !fin.eof(); ++i)
194     {
```

```
195         fin.read((char *) (t+i), sizeof(transaction));
196         if(fin.fail())
197         {
198             char log_msg[300];
199             sprintf(log_msg, "employee::get_last_5_transactions() : Failed to
                    read file trans.dat for id %lu(loop failed at i = %i)\nFunction
                    aborted", id, i);
200             interface::log_this(log_msg);
201             free(t);
202             return NULL;
203         }
204     }
205     fin.close();
206     return t;
207 }
208
209 int employee::get_generate_id_status()
210 {
211     return generate_id_status;
212 }
213
214 ////////////////////////////////////////
215 //// Doctor, Nurse and Receptionist class member defs
216
217 doctor::doctor(str inp1, int inp2, Date inp3, address inp4, phone inp5, unsigned
        long inp6, Time inp7, Time inp8, int inp10, int inp11, str inp12, str inp13) :
         employee(inp1, inp2, inp3, inp4, inp5, inp6, inp7, inp8, inp12, inp13)
218 {
219     id_to_emp i1(get_id(), DOCTOR);
220     if(!i1.status)
221     {
222         interface::error("ID not generated properly for this employee. Check log"
                );
223         interface::log_this("doctor::doctor() : i1.status was set to zero, i.e
                id_list.dat doesn't have a record of the employee's id");
224     }
225     speciality[0] = inp10;
226     speciality[1] = inp11;
227
228     for(int i = 0; i < 10; i++){
229         patients[i] = 0;
230     }
231 }
232
233 doctor::doctor() : employee()
234 {
235     speciality[0] = speciality[1] = GEN + 1;    //storing an invalid value in
            speciality
236     for(int i = 0; i < 10; ++i)
237     {
238         patients[i] = 0;
239     }
240 }
241
242 int * doctor::get_speciality()
243 {
244     return speciality;
245 }
246
```

```
247 long * doctor::get_patients()
248 {
249     return patients;
250 }
251
252 void doctor::set_speciality(int inp[2])
253 {
254     speciality[0] = inp[0];
255     speciality[1] = inp[1];
256 }
257
258 void doctor::set_patients(long inp[10])
259 {
260     for(int i = 0; i < 10; ++i)
261     {
262         patients[i] = inp[i];
263     }
264 }
265
266 nurse::nurse(str inp1, int inp2, Date inp3, address inp4, phone inp5, unsigned
        long inp6, Time inp7, Time inp8, str inp10, str inp11) : employee(inp1, inp2,
        inp3, inp4, inp5, inp6, inp7, inp8, inp10, inp11)
267 {
268     id_to_emp i1(get_id(), NURSE);
269     if(!i1.status)
270     {
271         interface::error("ID not generated properly for this employee. Check log"
                );
272         interface::log_this("nurse::nurse() : i1.status was set to zero, i.e
                id_list.dat doesn't have a record of the employee's id");
273     }
274     for(int i = 0; i < 5; i++){
275         patients[i] = 0;
276     }
277 }
278
279 nurse::nurse() : employee()
280 {
281     for(int i = 0; i < 5; ++i)
282     {
283         patients[i] = 0;
284     }
285 }
286
287 long * nurse::get_patients()
288 {
289     return patients;
290 }
291
292 void nurse::set_patients(long inp[5])
293 {
294     for(int i = 0; i < 5; ++i)
295     {
296         patients[i] = inp[i];
297     }
298 }
299
300 receptionist::receptionist(str inp1, int inp2, Date inp3, address inp4, phone
        inp5, unsigned long inp6, Time inp7, Time inp8, str inp10, str inp11) :
```

```
    employee(inp1, inp2, inp3, inp4, inp5, inp6, inp7, inp8, inp10, inp11)
{
    id_to_emp i1(get_id(), RECEPTIONIST);
    if(!i1.status)
    {
        interface::error("ID not generated properly for this employee. Check log");
        interface::log_this("receptionist::receptionist() : i1.status was set to zero, i.e id_list.dat doesn't have a record of the employee's id");
    }
}

receptionist::receptionist() : employee()
{}


////////////////////////////////
/// Function definitions for class id_to_emp

id_to_emp::id_to_emp(unsigned long inp1, int inp2)
{
    status = 0;
    id = inp1;
    if(!id)
    {
        employee_type = INVALID;
    }
    else
    {
        employee_type = inp2;
    }
    mkdir("employee");
    ofstream fout;
    fout.open("employee/id_list.dat", ios::binary | ios::ate);
    if(!fout)
    {
        interface::log_this("id_to_emp::id_to_emp() : File id_list.dat couldn't be opened...\nFunction aborted");
    }
    else
    {
        fout.seekp(id * sizeof(id_to_emp), ios::beg);
        fout.write((char *) this, sizeof(id_to_emp));
        if(fout.fail())
        {
            interface::log_this("id_to_emp::id_to_emp() : Error while writing to file id_list.dat (fout.fail())\nFunction aborted");
        }
        else
        {
            status = 1;
        }
    }
}

id_to_emp::id_to_emp()
{
    id = employee_type = status = 0;
}
```

```
355
356 int id_to_emp::convert(unsigned long ID)
357 {
358     id_to_emp a;
359     ifstream fin;
360     fin.open("employee/id_list.dat", ios::binary);
361     if(!fin)
362     {
363         interface::log_this("id_to_emp::convert() : File id_list.dat not found!!"
                );
364         return INVALID;
365     }
366     fin.seekg( (ID * sizeof(id_to_emp)) );
367     fin.read((char *) &a, sizeof(id_to_emp));
368     if(fin.fail())
369     {
370         interface::log_this("id_to_emp::convert() : Error while reading from file
                 id_list.dat (fin.fail())");
371         return INVALID;
372     }
373     fin.close();
374     if(a.id != ID)
375     {
376         interface::log_this("id_to_emp::convert() : (For dev only)Error in the
                code... Recheck it!!");
377         return INVALID;
378     }
379     return a.employee_type;
380 }
```

8. code/PATIENT.CPP

```
1  #include "patient.hpp"
2  #include <fstream.h>
3
4  ///////FUNCTION DEFINITIONS FOR CLASS PATIENT/////////
5
6  patient::patient(str inp1, int inp2 , Date inp3, address inp4, phone inp5,
       disease inp6, str inp7, str inp8, phone inp9, insurance inp10, Date inp11) :
       person(inp1, inp2, inp3, inp4, inp5)    //if date_of_admission is the current
       system date, last argument is not needed
7  {
8      fstream pat ("patient/max_id.dat", ios::in | ios::binary | ios::out);
9      long max_id;
10     pat.read( (char*) &max_id, sizeof(long) );
11     max_id++;
12
13     id = max_id;
14
15     pat.seekp(0);
16     pat.write( (char*) &max_id, sizeof(long) );
17     pat.close();
18
19     dis = inp6;
20     strcpy(guardian_name, inp7);
21     strcpy(emergency_contact, inp8);
22     strcpy(emer_contact_no, inp9);
23     insur_info = inp10;
```

```
24
25      admission_date = inp11;
26      Date dnow = system::get_date();
27
28      if( admission_date.day != dnow.day ||
29          admission_date.month != dnow.month ||
30          admission_date.year != dnow.year        )
31      {
32          set_dob(inp3, inp11);
33      }
34      for(int i = 0; i < 50; i++){
35          med[i][0] = med[i][1] = 0;
36      }
37
38      bill_amt = 0;   //bill_amt will be set by doctor after treatment
39      discharged = 0;
40  }
41
42  patient::patient()
43  {
44      id = 0;
45  }
46
47  long patient::get_id()
48  {
49      return id;
50  }
51
52  disease patient::get_dis()
53  {
54      return dis;
55  }
56
57  char* patient::get_guardian_name()
58  {
59      return guardian_name;
60  }
61
62  char* patient::get_emergency_contact()
63  {
64      return emergency_contact;
65  }
66
67  char* patient::get_emer_contact_no()
68  {
69      return emer_contact_no;
70  }
71
72  insurance patient::get_insur_info()
73  {
74      return insur_info;
75  }
76
77  int patient::get_admission_date(int inp)
78  {
79      switch(inp)
80      {
81          case DAY:
82              return admission_date.day;
```

```
83          case MONTH:
84              return admission_date.month;
85          case YEAR:
86              return admission_date.year;
87          default:
88              return 0;
89      }
90  }
91
92  int patient::get_discharge_date(int inp)
93  {
94      switch(inp)
95      {
96          case DAY:
97              return discharge_date.day;
98          case MONTH:
99              return discharge_date.month;
100         case YEAR:
101             return discharge_date.year;
102         default:
103             return 0;
104     }
105 }
106
107 unsigned long patient::get_bill_amt()
108 {
109     return bill_amt;
110 }
111
112 int patient::get_med(int a, int b){
113     return med[a][b];
114 }
115
116 transaction patient::get_transaction(int trans_num){
117     str temp;
118     transaction trans;
119     sprintf(temp, "patient/%d/trans.dat", this->id);
120     ifstream patient_file ( temp , ios::out | ios::binary | ios::app );
121
122     int i = 0;
123     while ( i<=trans_num && patient_file ){
124         patient_file.read( (char*) &trans , sizeof(transaction) );
125         i++;
126     }
127     if( i!= trans_num ){
128         trans = transaction(0);
129     }
130     patient_file.close();
131     return trans;
132 }
133
134 void patient::set_dis(disease a)
135 {
136     dis = a;
137 }
138
139 void patient::set_guardian_name(char *a)
140 {
141     strcpy(guardian_name, a);
```

```
}

void patient::set_emergency_contact(char *a)
{
    strcpy(emergency_contact, a);
}

void patient::set_emer_contact_no(char *a)
{
    strcpy(emer_contact_no, a);
}

void patient::set_insur_info(insurance a)
{
    insur_info = a;
}

void patient::set_admission_date(Date a)
{
    admission_date = a;
    set_dob(dob, admission_date);
}

void patient::set_bill_amt(unsigned long a)
{
    bill_amt = a;
}

void patient::set_med(int a, int b, int c){
    med[a][0] = b;
    med[a][1] = c;
}

void patient::set_discharge_date(Date inp){
    discharge_date = inp;
}

void patient::discharge(){
    discharged = 1;
}
```

9. code/PROC.CPP

```
#include <iostream.h>
#include <fstream.h>

typedef char str[100];

struct procedure{
    str name;
    float cost;
};

void main(){
    ofstream proc ("proc.dat" , ios::out | ios::binary | ios::app);
    procedure a;
    cin.ignore(1000, '\n');
    cout << "\nName:";
```

```
16      cin.getline(a.name, 100, '\n');
17      cout << "\nCost:";
18      cin >> a.cost;
19      cout << endl << "Procedure : " << a.name << "  $" << a.cost << ".\nEnter next
            procedure:";
20      proc.write( (char*) &a , sizeof(a) );
21  }
```

10. code/UI/test.cpp

```
1   //No need to use ui::init() explicitly
2
3   #include "ui/ui.hpp"
4   #include "ui/test.hpp"
5
6   void test_weird_error()
7   {
8       int shit = 14;
9       box menu2(coord(2, 4), 40, 10 );
10      menu2 << "Enter your shit: ";
11      menu2 >> shit;
12      menu2.setexit_button("Submit my shit");
13      menu2.loop();
14
15      menu2.clear();
16      menu2 << "Your shit's coming up!" << ui::endl; getch();
17      menu2 << "Here's your shit: ";
18      menu2 << shit;
19      menu2 << ". Deal with it!" << ui::endl;
20
21      getch();
22  }
23
24  int exit_func()
25  {
26      char c = getch();
27      int x = wherex(), y = wherey();
28
29      gotoxy(1, ui::scr_height - 1);
30      if(c != '1')
31      {
32          cprintf("Returning 0"); getch();
33          gotoxy(x, y);
34          return 0;
35      }
36      else
37      {
38          cprintf("Returning 1"); getch();
39          gotoxy(x, y);
40          return 1;
41      }
42  }
43
44  void test_back()
45  {
46      box window;
47
48      int a, b;
```

```
49      window << "Here's some sample text" << ui::endl;
50      window << "Enter some fake data I don't care about" << ui::endl;
51
52      window << "Fake #1: "; window >> a;
53      window << "Fake #2: "; window >> b;
54      window.setexit_button("A fake button");
55
56      window.setback_func(exit_func);
57
58      window.loop();
59  }
60
61  void test_all()
62  {
63      ui::clrscr();
64      box menu2(coord(2, 4), 40, 10 );
65
66      menu2.settcolor(GREEN);
67      menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
68      menu2.settcolor(WHITE);
69      int menu2_height;
70      menu2_height = 10;
71  //  menu2.setheight(menu2_height);
72      menu2 << "View employee data" << ui::endl;
73      menu2.settcolor(ui::tcolor);
74  //  menu2 << "Enter employee's id: ";
75      unsigned long id;
76      menu2 >> id;
77      menu2 << ui::endl;
78      menu2.setexit_button("Submit");
79      menu2.loop();
80
81      menu2.clear();
82      menu2.setheight(15);
83      menu2.settcolor(GREEN);
84      menu2 << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
85      menu2.settcolor(WHITE);
86      menu2 << "Employee Details: " << ui::endl;
87      menu2.settcolor(ui::tcolor);
88          getch();
89          menu2.hide();
90          getch();
91          menu2.display();
92          getch();
93      menu2 << "ID: " << 1 << ui::endl;
94          getch();
95          menu2.hide();
96          getch();
97          menu2.display();
98          getch();
99
100     char name[40], pwd[40];
101     int age;
102     long phn;
103     float amt;
104     char date[30];
105
106     box window;
107     window.settcolor(CYAN);
```

```
108     window << ui::centeralign << "LHOSPITAL";
109     window << ui::endl << ui::endl;
110     window.settcolor(ui::tcolor);
111     window.setfooter_tcolor(GREEN);
112 
113     window << box::setheader << "28/10/2017"
114            << box::setheader << ui::rightalign << "11:45 PM"
115            << box::setfooter << ui::centeralign
116            << "Everything looks OK";
117 
118     window << "Fill the following form: " << ui::endl;
119 
120     coord c(ui::scr_width/4, ui::scr_height/3);
121     box b(c, ui::scr_width / 3, 10);
122 
123     b.settcolor_input(YELLOW);
124     b << "Enter details: " << ui::endl
125       << "Name: "; b >> name;
126     b << "Age: "; b >> age;
127     b << "Phone num: "; b >> phn;
128     b << "Date: ";
129     b.setdefault("27/10/2017");
130     b >> date;
131     b << "Amount: "; b >> amt;
132     b << "Password: "; b >> box::setpassword >> pwd;
133 
134     b.f.setvisibility_mode(frame::nosides);
135 
136     b.f.display();
137     b.setexit_button("Submit");
138     b.loop();
139 
140     b.hide();
141 
142     window << "You entered the following data: " << ui::endl
143       << "Name: " << name << ui::endl
144       << "Age: " << age << ui::endl
145       << "Phone num: " << phn << ui::endl
146       << "Date: " << date << ui::endl
147       << "Amount: " << amt << ui::endl
148       << "Password: " << pwd << ui::endl;
149 }
150 
151 
152 void test_listlayout()
153 {
154     list_layout l;
155     l.setpos(coord(2,1));
156     l.setheight(6);
157 
158     interactive *list[10];
159 
160     //Setting the text boxes
161     for(int i = 0; i < 9; i++)
162     {
163         char s[] = {'A'+i, ':', ' ', '\0'};
164         l.settcolor(LIGHTGRAY);
165         l << coord(2, i + 1) << s;
166         l.settcolor(RED);
```

```
167         list[i] = l.settext_box(coord(5, i + 1));
168     }
169 
170     l.settcolor(LIGHTGRAY);
171     list[9] = l.setbutton(coord(3, i + 1), "Submit");
172 
173     //Rudimentary scrolling
174     i = 100;
175     int j = 0;
176 
177     int lines_scrolled = l.getlines_scrolled(),
178         height = l.getheight();
179 
180     coord pos_topleft(2,1);
181     int y = pos_topleft.y;
182     while(i--)
183     {
184         coord c = list[j]->getpos();
185         if(c.y - lines_scrolled > height)
186         {
187             lines_scrolled = c.y - height;
188         }
189         else if(c.y - lines_scrolled < y)
190         {
191             lines_scrolled = c.y - y;
192         }
193 
194         l.setlines_scrolled(lines_scrolled);
195         int response = list[j]->input(-lines_scrolled);
196 
197         if(response == interactive::GOTONEXT)
198         {
199             if(j < 9) j++; else j = 0;
200         }
201         else if(response == interactive::GOTOPREV)
202         {
203             if(j > 0) j--; else j = 9;
204         }
205         else if(response == interactive::CLICKED)
206         {
207             coord init_pos(wherex(), wherey());
208             gotoxy(1, ui::scr_height-1);
209             cprintf("%s%d", "Clicked ", i);
210             gotoxy(init_pos.x, init_pos.y);
211         }
212     }
213 }
214 
215 void test_textbox()
216 {
217     text_box t;
218     t.setpos(coord(1,1));
219     for(int i = 0; i < 5; i++)
220     {
221         int a = t.input();
222 
223         int x = wherex(), y = wherey();
224         gotoxy(1, ui::scr_height-1);
225         if(a == interactive::GOTONEXT)
```

```
226         {
227             cout << "GOTONEXT";
228         }
229         else if(a == interactive::GOTOPREV)
230         {
231             cout << "GOTOPREV";
232         }
233         else
234         {
235             cout << "UNDEFINED";
236         }
237 
238         gotoxy(x, y);
239     }
240 }
241 
242 void test_frame()
243 {
244     frame f;
245     f.display();
246 
247     getch();
248 
249     f << ui::top << 't'
250       << ui::left << 'l'
251       << ui::bottom << 'b'
252       << ui::right << 'r';
253 
254     f.settcolor(LIGHTBLUE);
255 
256     f.display();
257 
258     getch();
259 
260     f << (ui::top | ui::left) << (char) 201
261       << (ui::bottom | ui::left) << (char) 200
262       << (ui::top | ui::right) << (char) 187
263       << (ui::bottom | ui::right) << (char) 188
264       << ui::top << (char) 205
265       << ui::bottom << (char) 205
266       << ui::left << (char) 186
267       << ui::right << (char) 186;
268 
269     f.settcolor(ui::tcolor);
270 
271     f.display();
272 
273     getch();
274 
275     f.setheight(ui::scr_height/2);
276     getch();
277 
278     f.setwidth(ui::scr_width/3);
279     getch();
280 
281     f.setcorner_top_left(coord( (ui::scr_width-f.getwidth()) / 2, (ui::scr_height
        -f.getheight()) / 2));
282     getch();
283 
```

```
284     f.setvisibility_mode(frame::nosides);
285 }
```

11. code/UI/interact.cpp

```
1   #include "ui/ui.hpp"
2
3   string_node::string_node()
4   {
5       next = NULL;
6       prev = NULL;
7       data = '\0';
8   }
9
10  interactive::interactive()
11  {
12      prev = NULL;
13      next = NULL;
14  }
15
16  interactive::~interactive()
17  {
18      delete next;
19      next = NULL;
20      prev = NULL;
21  }
22
23  int interactive::input(int)
24  {
25      return -1;
26  }
27
28  void interactive::setoffset(int o)
29  {
30      offset = o;
31  }
32
33  int interactive::getoffset()
34  {
35      return offset;
36  }
37
38  int interactive::getkey()
39  {
40      char ch = getch();
41      switch(ch)
42      {
43          case 9:     return TAB;
44          case 13:    return ENTER;
45          case 8:
46          {
47              unsigned char far *key_state_byte
48                  = (unsigned char far*) 0x00400017;
49              int key_state = (int) *key_state_byte;
50
51              if(key_state & 2) return SHIFT_BACKSPACE;
52              else              return BACKSPACE;
53          }
```

```
        case 0:     break;
        default:    return ch;
    }

    ch = getch();

    unsigned char far *key_state_byte
    = (unsigned char far*) 0x00400017;
    int key_state = (int) *key_state_byte;

    switch(ch)
    {
        case 72:    return UP;
        case 80:    return DOWN;
        case 75:    return LEFT;
        case 77:    return RIGHT;
        case 15:    if (key_state & 2) return SHIFT_TAB;
        //           ^^ Checks if shift was pressed
        case 83:    return DELETE;
        case 71:    return HOME;
        case 79:    return END;
    }

    return -1;
}
```

12. code/UI/uibase.cpp

```
#include "ui/ui.hpp"
#include "iface.hpp"

int init_lib_ui::counter = 0;

init_lib_ui::init_lib_ui()
{
    if(counter++ == 0)
    {
        ui::init();
    }
}

int manipulator::index = 0;

manipulator::manipulator()
{
    own_index = index;
    index++;
}

int manipulator::operator==(manipulator m)
{
    return own_index == m.own_index;
}

int ui::scr_height = 0,
    ui::scr_width = 0,
    ui::tcolor = LIGHTGRAY,
    ui::bcolor = BLACK;
```

```
31 manipulator ui::endl,
32             ui::centeralign,
33             ui::rightalign;
34
35 void ui::init()
36 {
37     set_new_handler(ui::my_new_handler);
38
39     ui::clrscr();
40
41     textcolor(ui::tcolor);
42     textbackground(ui::bcolor);
43
44     struct text_info info;
45     gettextinfo(&info);
46
47     //height and width of screen
48     scr_width = (int) info.screenwidth;
49     scr_height = (int) info.screenheight;
50 }
51
52 void ui::clrscr()
53 {
54     ::clrscr();
55 }
56
57 void ui::my_new_handler()
58 {
59     interface::log_this("Error in allocating memory. Exiting...");
60     exit(1);
61 }
62
63 coord::coord(int X, int Y)
64 {
65     x = X;
66     y = Y;
67 }
68
69 coord & coord::operator+=(coord b)
70 {
71     x += b.x;
72     y += b.y;
73
74     return *this;
75 }
76
77 coord & coord::operator-=(coord b)
78 {
79     x -= b.x;
80     y -= b.y;
81
82     return *this;
83 }
84
85 coord coord::operator+(coord b)
86 {
87     coord temp = *this;
88     return temp += b ;
89 }
```

```
90
91  coord coord::operator-(coord b)
92  {
93      coord temp = *this;
94      return temp -= b;
95  }
```

13. code/UI/frame.cpp

```
1   #include "ui/ui.hpp"
2
3   int frame::convert(int param)
4   {
5       if(param & ui::top)
6       {
7           if(param & ui::left)
8           {
9               return 0;
10          }
11          else if(param & ui::right)
12          {
13              return 1;
14          }
15          else
16          {
17              return 2;
18          }
19      }
20      else if(param & ui::bottom)
21      {
22          if(param & ui::left)
23          {
24              return 3;
25          }
26          else if(param & ui::right)
27          {
28              return 4;
29          }
30          else
31          {
32              return 5;
33          }
34      }
35      else if(param & ui::left)
36      {
37          return 6;
38      }
39      else if(param & ui::right)
40      {
41          return 7;
42      }
43
44      return -1;
45  }
46
47  void frame::setside_visibility(int side, int visib)
48  {
49      if( visib != 0 && visib != 1)
```

```
50          return;     //No effect for invalid visibility
51
52      if(side & ui::all)
53      {
54          for(int i = 0; i < 8; i++)
55              sides_visibility[i] = visib;
56          return;
57      }
58
59      int a = frame::convert(side);
60      if(a == -1) return; //-1 indicates invalid side
61
62      sides_visibility[a] = visib;
63  }
64
65  int frame::getside_visibility(int side)
66  {
67      int a = convert(side);
68
69      if(a == -1) return -1; //Wrong side selected
70
71      return sides_visibility[a];
72  }
73
74
75  frame::frame(coord topleft, int w, int h)
76  {
77      for(int i = 0; i < 8; i++)
78      {
79          border_chars[i] = '*';
80          sides_visibility[i] = 1;
81      }
82      tcolor = ui::tcolor;
83      bcolor = ui::bcolor;
84      frame_visibility = 0;
85      height = h;
86      width = w;
87      state = 0;
88      corner_top_left = topleft;
89  }
90
91  void frame::display()
92  {
93      print(1);
94  }
95
96  void frame::hide()
97  {
98      print(0);
99  }
100
101 void frame::print(int param)
102 {
103     textcolor(frame::tcolor);
104     textbackground(frame::bcolor);
105
106     char visible_chars[8];
107     frame_visibility = param;
108
```

```
109     int x = corner_top_left.x,
110         y = corner_top_left.y;
111 
112     int arr[] = {
113                 ui::top,
114                 ui::bottom,
115                 ui::left,
116                 ui::right,
117                 ui::top | ui::left,
118                 ui::top | ui::right,
119                 ui::bottom | ui::left,
120                 ui::bottom | ui::right
121             };
122 
123     char &top = visible_chars[0],
124          &bottom = visible_chars[1],
125          &left = visible_chars[2],
126          &right = visible_chars[3],
127          &top_left = visible_chars[4],
128          &top_right = visible_chars[5],
129          &bottom_left = visible_chars[6],
130          &bottom_right = visible_chars[7];
131 
132     for(int i = 0; i < 8; i++)
133     {
134         if(param == 1 && getside_visibility(arr[i]))
135         {
136             visible_chars[i] = getborder_char(arr[i]);
137         }
138         else
139         {
140             visible_chars[i] = ' ';
141         }
142     }
143 
144     gotoxy(x, y);
145 
146     cprintf("%c", top_left);
147 
148     for(i = 1; i < width - 1; i++)
149     {
150         cprintf("%c", top);
151     }
152     cprintf("%c", top_right);
153 
154     for(i = 1; i < height - 1; i++)
155     {
156         gotoxy(x, y + i); cprintf("%c", left);
157         gotoxy(x + width - 1, y + i); cprintf("%c", right);
158     }
159 
160     gotoxy(x, y + height - 1);
161     cprintf("%c", bottom_left);
162     for(i = 1; i < width - 1; i++)
163     {
164         cprintf("%c", bottom);
165     }
166     cprintf("%c", bottom_right);
167 
```

```
168     gotoxy(corner_top_left.x, corner_top_left.y);
169
170     textcolor(ui::tcolor);
171 }
172
173 void frame::setvisibility_mode(int param)
174 {
175     frame::setside_visibility(frame::all, 1);
176     if(param & nosides)
177     {
178         frame::setside_visibility(ui::left, 0);
179         frame::setside_visibility(ui::right, 0);
180     }
181     frame::display();
182 }
183
184 //Operator << is used to set border char
185 frame & frame::operator<<(int side)
186 {
187     int a = frame::convert(side);
188
189     if(a == -1) return *this; //-1 indicates error
190
191     state = a;
192
193     return *this;
194 }
195
196 frame & frame::operator<<(char border_char)
197 {
198     border_chars[frame::state] = border_char;
199     return *this;
200 }
201
202 int frame::getheight()
203 {
204     return height;
205 }
206
207 int frame::getwidth()
208 {
209     return width;
210 }
211
212 coord frame::getcorner_top_left()
213 {
214     return frame::corner_top_left;
215 }
216
217 int frame::getframe_visibility()
218 {
219     return frame_visibility;
220 }
221
222 int frame::gettcolor()
223 {
224     return tcolor;
225 }
226
```

```
227 int frame::getbcolor()
228 {
229     return bcolor;
230 }
231
232 char frame::getborder_char(int side)
233 {
234     int a = convert(side);
235
236     if(a == -1) return '\0'; //Error
237
238     return frame::border_chars[a];
239 }
240
241 void frame::setheight(int h)
242 {
243     if(h > ui::scr_height) return;
244
245     hide();
246     frame::height = h;
247     display();
248 }
249
250 void frame::setwidth(int w)
251 {
252     if(w > ui::scr_width) return;
253
254     hide();
255     frame::width = w;
256     display();
257 }
258
259 void frame::settcolor(int c)
260 {
261     tcolor = c;
262     display();
263 }
264
265 void frame::setbcolor(int b)
266 {
267     bcolor = b;
268     display();
269 }
270
271 void frame::setcorner_top_left(coord c)
272 {
273     hide();
274     frame::corner_top_left = c;
275     display();
276 }
```

14. code/UI/box.cpp

```
1 #include "ui/ui.hpp"
2 #include "iface.hpp"
3
4 line::line()
5 {
```

```
6       strcpy(left, "");
7       strcpy(middle, "");
8       strcpy(right, "");
9       width = ui::scr_width - 2;
10      tcolor = ui::tcolor;
11      bcolor = ui::bcolor;
12      corner_top_left = coord(0,0);
13  }
14
15  void line::display()
16  {
17      print(1);
18  }
19
20  void line::hide()
21  {
22      print(0);
23  }
24
25  void line::clear()
26  {
27      hide();
28      strcpy(left, "");
29      strcpy(middle, "");
30      strcpy(right, "");
31      display();
32  }
33
34  void line::print(int mode)
35  {
36      coord curr_pos = coord(wherex(), wherey()),
37      &ctl = corner_top_left;
38      gotoxy(ctl.x, ctl.y);
39      textcolor(tcolor);
40      textbackground(bcolor);
41
42      if(mode == 1)
43      {
44          cprintf("%s", left);
45      }
46      else
47      {
48          for(int i = 0; i < strlen(left); i++)
49          {
50              cprintf(" ");
51          }
52      }
53
54      gotoxy(ctl.x + (width - strlen(middle)) / 2,
55                  wherey());
56      if(mode == 1)
57      {
58          cprintf("%s", middle);
59      }
60      else
61      {
62          for(int i = 0; i < strlen(middle); i++)
63          {
64              cprintf(" ");
```

```
65          }
66      }
67
68      gotoxy(ctl.x + width - strlen(right), wherey());
69      if(mode == 1)
70      {
71          cprintf("%s", right);
72      }
73      else
74      {
75          for(int i = 0; i < strlen(right); i++)
76          {
77              cprintf(" ");
78          }
79      }
80
81      gotoxy(curr_pos.x, curr_pos.y);
82  }
83
84  int default_back_func()
85  {
86      return 0;
87  }
88
89  int box::wrap(char str[], int length, int return_one_line)
90  {
91      int num_lines = 1;
92      char out_str[300] = "";
93
94      int pos_old_newline = -1,
95          pos_curr_newline = -1;
96
97      int len_str = strlen(str);
98
99      //Iterating upto len_str because the '\0' at the end of the string
100     //would be interpreted as a newline
101     for(int i = 0; i <= len_str; i++)
102     {
103         if(str[i] == '\n' || i == len_str)
104         {
105             pos_old_newline = pos_curr_newline;
106             pos_curr_newline = i;
107
108             if(pos_curr_newline != len_str) num_lines++;
109
110             int chars_read = 0,
111                 read,
112                 written = 0;
113
114             char word[30];
115
116             str[pos_curr_newline] = '\0';
117
118             char *line = str + pos_old_newline + 1;
119             while(sscanf(line + chars_read, "%s%n", word, &read) > 0)
120             {
121                 int word_len = strlen(word);
122                 if(written + word_len  > length)
123                 {
```

```
124                     num_lines++;
125                     sprintf(out_str + strlen(out_str), "\n%s ", word);
126                     written = word_len + 1;
127                 }
128                 else if(written + word_len < length)
129                 {
130                     sprintf(out_str + strlen(out_str), "%s ", word);
131                     written += word_len + 1;
132                 }
133                 else //Not to add the space at the end if the line just completes
134                 {
135                     sprintf(out_str + strlen(out_str), "%s", word);
136                     written += word_len;
137                 }
138 
139                 chars_read += read;
140             }
141 
142             if(pos_curr_newline != len_str)
143                 sprintf(out_str + strlen(out_str), "\n");
144                 str[pos_curr_newline] = '\n';
145         }
146     }
147 
148     //An extra space is at the end of the string which has to be removed
149     //out_str[strlen(out_str) - 1] = '\0';
150     sprintf(str, "%s", out_str);
151 
152     if(!return_one_line)   return num_lines;
153 
154     len_str = strlen(str);
155 
156     for(i = 0; i <= len_str; i++)
157     {
158         if(i == len_str)
159         {
160             break;
161         }
162         else if(str[i] == '\n')
163         {
164             str[i] = '\0';
165             break;
166         }
167     }
168 
169     return num_lines;
170 }
171 
172 void box::set_tbox(int data_type, void *ptr)
173 {
174     text_box *new_tbox;
175 
176     if(data_type == info_tbox::PASSWORD)
177     {
178         new_tbox =
179             (text_box *) layout.settext_box(pos_pointer, 1);
180     }
181     else
182     {
```

```
183         new_tbox =
184             (text_box *) layout.settext_box(pos_pointer);
185     }
186 
187     if(default_toggle)
188     {
189         default_toggle = 0;
190         new_tbox -> setstr(default_text);
191     }
192 
193     pos_pointer.y++;
194     pos_pointer.x = layout.getcorner_top_left().x;
195 
196     list_interactive[index_interactive]
197         = (interactive *) new_tbox;
198     info_tbox &t = list_tbox[index_tbox];
199     index_interactive++;
200     index_tbox++;
201 
202     t.tbox = new_tbox;
203     t.type = data_type;
204     t.data_store = ptr;
205     t.validator = validation::getvalidator(data_type, temp_validator);
206 
207     temp_validator = NULL;
208 }
209 
210 manipulator box::setheader,
211             box::setfooter,
212             box::setpassword;
213 
214 box::box(coord c, int w, int h) : f(c, w, h)
215 {
216     width = w;
217     height = h;
218     padding = 1;
219 
220     corner_top_left = c;
221 
222     f << (ui::top | ui::left) << (char) 201
223       << (ui::bottom | ui::left) << (char) 200
224       << (ui::top | ui::right) << (char) 187
225       << (ui::bottom | ui::right) << (char) 188
226       << ui::top << (char) 205
227       << ui::bottom << (char) 205
228       << ui::left << (char) 186
229       << ui::right << (char) 186;
230 
231     layout.setwidth(w - 2 - 2 * padding);
232     layout.setheight(h - 2 - 2 * padding);
233     //                   ^bcoz of frame
234     layout.setcorner_top_left(c +
235         coord(1 + padding, 1 + padding));
236 
237     pos_pointer = layout.getcorner_top_left();
238 
239     for(int i = 0; i < 30; i++)
240     {
241         list_interactive[i] = NULL;
```

```
242     }
243     exit_btn = NULL;
244     index_interactive = index_tbox = 0;
245     center_toggle = 0;
246     default_toggle = 0;
247     right_toggle = 0;
248     header_toggle = 0;
249     footer_toggle = 0;
250     password_toggle = 0;
251     strcpy(default_text, "");
252     temp_validator = NULL;
253 
254     header.width = footer.width = w - 2;
255     header.corner_top_left = c + coord(1,0);
256     footer.corner_top_left = c + coord(0, h-1);
257 
258     back_func = default_back_func;
259 
260     f.display();
261 }
262 
263 coord box::getcorner_top_left()
264 {
265     return corner_top_left;
266 }
267 
268 int box::getheight()
269 {
270     return height;
271 }
272 
273 int box::getwidth()
274 {
275     return width;
276 }
277 
278 int box::getpadding()
279 {
280     return padding;
281 }
282 
283 void box::setcorner_top_left(coord c)
284 {
285     corner_top_left = c;
286     f.setcorner_top_left(c);
287     c += coord(1 + padding, 1 + padding);
288     layout.setcorner_top_left(c);
289 
290     pos_pointer = c;
291 }
292 
293 void box::setheight(int h)
294 {
295     height = h;
296     f.setheight(h);
297     layout.setheight(h - 2 - 2 * padding);
298 }
299 
300 void box::setpadding(int p)
```

```
301 {
302     hide();
303     padding = p;
304     setheight(height);
305     display();
306 }
307
308 void box::settcolor(int c)
309 {
310     layout.settcolor(c);
311 }
312
313 void box::setbcolor(int c)
314 {
315     layout.setbcolor(c);
316 }
317
318 void box::settcolor_selected(int c)
319 {
320     layout.settcolor_selected(c);
321 }
322
323 void box::setbcolor_selected(int c)
324 {
325     layout.setbcolor_selected(c);
326 }
327
328 void box::settcolor_input(int c)
329 {
330     layout.settcolor_input(c);
331 }
332
333 void box::setbcolor_input(int c)
334 {
335     layout.setbcolor_input(c);
336 }
337
338 void box::setback_func( int(*f)(void) )
339 {
340     back_func = f;
341 }
342
343 box & box::operator<< (char *inp_str)
344 {
345     char string[100];
346     char *str = string;
347     strcpy(string, inp_str);
348
349     coord c = layout.getcorner_top_left();
350
351     if(header_toggle || footer_toggle)
352     {
353         line *lp;
354         if(header_toggle)
355         {
356             header_toggle = 0;
357             lp = &header;
358         }
359         if(footer_toggle)
```

```
360         {
361             footer_toggle = 0;
362             lp = &footer;
363         }
364         line &l = *lp;
365 
366         int len = strlen(string);
367         if(center_toggle)
368         {
369             center_toggle = 0;
370             if(len <= l.width)
371             {
372                 if((l.width - len) / 2 > strlen(l.left))
373                 {
374                     strcpy(l.middle, string);
375                 }
376             }
377         }
378         else if(right_toggle)
379         {
380             right_toggle = 0;
381             if(len <= l.width)
382             {
383                 if(len < (l.width - strlen(l.middle)) / 2)
384                 {
385                     strcpy(l.right, string);
386                 }
387             }
388         }
389         else
390         {
391             if(len < (l.width - strlen(l.middle)) / 2)
392             {
393                 strcpy(l.left, string);
394             }
395         }
396 
397         //Printing the newly set line
398         l.hide();
399         l.display();
400 
401         return *this;
402     }
403 
404     if(center_toggle)
405     {
406         int len = strlen(string);
407         center_toggle = 0;
408         if(len <= layout.getwidth())
409         {
410             int x_center_pos =
411                 c.x + (layout.getwidth() - len) / 2;
412 
413             if(pos_pointer.x > x_center_pos)
414             {
415                 pos_pointer.y++;
416             }
417             pos_pointer.x = x_center_pos;
418             layout << pos_pointer << str;
```

```
419             pos_pointer.x += len;
420             return *this;
421         }
422     }
423     else if(right_toggle)
424     {
425         int len = strlen(string);
426         right_toggle = 0;
427         if(len <= layout.getwidth())
428         {
429             int x_right_pos =
430                 c.x + (layout.getwidth() - len);
431
432             if(pos_pointer.x > x_right_pos)
433             {
434                 pos_pointer.y++;
435             }
436             pos_pointer.x = x_right_pos;
437             layout << pos_pointer << str;
438             pos_pointer.y++;
439             pos_pointer.x = c.x;
440             return *this;
441         }
442     }
443
444     int num_lines;
445
446     if(pos_pointer.x != c.x)
447     {
448         int remaining_space = layout.getwidth() -
449         (pos_pointer.x - layout.getcorner_top_left().x);
450         char s[100];
451         strcpy(s, str);
452         num_lines = wrap(s, remaining_space, 1);
453
454         layout << pos_pointer << s;
455
456         if(num_lines > 1)
457         {
458             pos_pointer.x = c.x;
459             pos_pointer.y++;
460         }
461         else
462         {
463             pos_pointer.x += strlen(s);
464         }
465
466         if (num_lines == 1 ||
467             str[strlen(str) - 1] == '\n')   return *this;
468
469         str += strlen(s); //There's an extra space at the end of s
470     }
471
472     num_lines = wrap(str, layout.getwidth());
473
474     int len_str = strlen(str),
475         pos_curr_newline = -1,
476         chars_to_forward = 0;
477
```

```
478     for(int i = 0; i < len_str; i++)
479     {
480         if(str[i] == '\n')
481         {
482             pos_curr_newline = i;
483 
484             str[pos_curr_newline] = '\0';
485             layout << pos_pointer << str + chars_to_forward;
486             pos_pointer.y++;
487 
488             chars_to_forward +=
489                 strlen(str + chars_to_forward) + 1;
490         }
491     }
492 
493     if(i == len_str - 1)    return *this;
494 
495     layout << pos_pointer << str + chars_to_forward;
496     pos_pointer.x += strlen(str + chars_to_forward);
497 
498     return *this;
499 }
500 
501 box & box::operator<<(char ch)
502 {
503     char str[] = {ch, '\0'};
504     return (*this) << str;
505 }
506 
507 box & box::operator<<(int i)
508 {
509     return (*this) << (long) i;
510 }
511 
512 box & box::operator<<(long l)
513 {
514     char str[100];
515     sprintf(str,"%ld", l);
516     return (*this) << str;
517 }
518 
519 box & box::operator<<(unsigned long ul)
520 {
521     char str[100];
522     sprintf(str, "%lu", ul);
523     return (*this) << str;
524 }
525 
526 box & box::operator<<(double d)
527 {
528     char str[100];
529     sprintf(str, "%g", d);
530     return (*this) << str;
531 }
532 
533 box & box::operator<<(float f)
534 {
535     char str[100];
536     sprintf(str, "%f", f);
```

```
537     return (*this) << str;
538 }
539
540 box & box::operator<<(manipulator m)
541 {
542     if(m == ui::endl)
543     {
544         pos_pointer.y++;
545         pos_pointer.x = layout.getcorner_top_left().x;
546     }
547     else if(m == ui::centeralign)
548     {
549         center_toggle = 1;
550     }
551     else if(m == ui::rightalign)
552     {
553         right_toggle = 1;
554     }
555     else if(m == box::setheader)
556     {
557         header_toggle = 1;
558     }
559     else if(m == box::setfooter)
560     {
561         footer_toggle = 1;
562     }
563     return *this;
564 }
565
566 box & box::operator>>(char *&s)
567 {
568     if(password_toggle)
569     {
570         password_toggle = 0;
571         set_tbox(info_tbox::PASSWORD, (void *) s);
572     }
573     else
574     {
575         set_tbox(info_tbox::STRING, (void *) s);
576     }
577     return *this;
578 }
579
580 box & box::operator>>(char &ch)
581 {
582     set_tbox(info_tbox::CHAR, (void *) &ch);
583     return *this;
584 }
585
586 box & box::operator>>(int &i)
587 {
588     set_tbox(info_tbox::INT, (void *) &i);
589     return *this;
590 }
591
592 box & box::operator>>(long &l)
593 {
594     set_tbox(info_tbox::LONG, (void *) &l);
595     return *this;
```

```
596 }
597
598 box & box::operator>>(unsigned long &ul)
599 {
600     set_tbox(info_tbox::UNSIGNED_LONG, (void *) &ul);
601     return *this;
602 }
603
604 box & box::operator>>(double &d)
605 {
606     set_tbox(info_tbox::DOUBLE, (void *) &d);
607     return *this;
608 }
609
610 box & box::operator>>(float &f)
611 {
612     set_tbox(info_tbox::FLOAT, (void *) &f);
613     return *this;
614 }
615
616 box & box::operator>>(manipulator m)
617 {
618     if(m == box::setpassword)
619     {
620         password_toggle = 1;
621     }
622     return *this;
623 }
624
625 box & box::operator>>(int (*f)(const char *))
626 {
627     temp_validator = f;
628     return *this;
629 }
630
631 void box::setexit_button(char *str)
632 {
633     coord c = layout.getcorner_top_left();
634     if(pos_pointer.x != c.x)
635         pos_pointer.y++;
636
637     pos_pointer.x = c.x + (layout.getwidth() - strlen(str)) / 2;
638
639     button * new_btn =
640         (button *) layout.setbutton(pos_pointer, str);
641
642     pos_pointer.y++;
643     pos_pointer.x = c.x;
644
645     exit_btn = new_btn;
646     list_interactive[index_interactive]
647         = (interactive *) new_btn;
648     index_interactive++;
649 }
650
651 void box::setdefault(char *s)
652 {
653     default_toggle = 1;
654     strcpy(default_text, s);
```

```
655 }
656
657 void box::setdefault(char c)
658 {
659     char s[] = {c, '\0'};
660     setdefault(s);
661 }
662
663 void box::setdefault(int i)
664 {
665     setdefault( (long) i);
666 }
667
668 void box::setdefault(long l)
669 {
670     char s[100];
671     sprintf(s, "%ld", l);
672     setdefault(s);
673 }
674
675 void box::setdefault(unsigned long ul)
676 {
677     char s[100];
678     sprintf(s, "%lu", ul);
679     setdefault(s);
680 }
681
682 void box::setdefault(double d)
683 {
684     char s[100];
685     sprintf(s, "%g", d);
686     setdefault(s);
687 }
688
689 void box::setdefault(float f)
690 {
691     char s[100];
692     sprintf(s, "%f", f);
693     setdefault(s);
694 }
695
696 void box::loop()
697 {
698     int j = 0,
699     lines_scrolled = layout.getlines_scrolled(),
700     height = layout.getheight(),
701     index_last_interactive = index_interactive - 1,
702     &ili = index_last_interactive;
703     int temp_tbox_color, temp_index = -1;
704
705     inf_loop:
706     while(1)
707     {
708         coord c = list_interactive[j]->getpos(),
709               ctl = layout.getcorner_top_left();
710         if(c.y - ctl.y - lines_scrolled + 1 > height)
711         {
712             lines_scrolled = c.y - ctl.y - height + 1;
713         }
```

```
714         else if(c.y - lines_scrolled < ctl.y)
715         {
716             lines_scrolled =
717                 c.y - ctl.y;
718         }
719 
720         layout.setlines_scrolled(lines_scrolled);
721         int response =
722             list_interactive[j]->input(-lines_scrolled);
723 
724         if(response == interactive::GOTONEXT)
725         {
726             if(j < ili) j++; else j = 0;
727         }
728         else if(response == interactive::GOTOPREV)
729         {
730             if(j > 0) j--; else j = ili;
731         }
732         else if(response == interactive::CLICKED)
733         {
734             break;
735         }
736         else if(response == interactive::BACK && back_func())
737         {
738             return;
739         }
740     }
741 
742     interface::clear_error();
743     if(temp_index != -1)
744     {
745         list_tbox[temp_index].tbox->settcolor(temp_tbox_color);
746     }
747     for(int i = 0; i < index_tbox; i++)
748     {
749         if(list_tbox[i].setdata() == 0)
750         {
751             interface::error("INVALID INPUT!");
752             temp_tbox_color = list_tbox[i].tbox->gettcolor();
753             list_tbox[i].tbox->settcolor(RED);
754             temp_index = i;
755             goto inf_loop;
756         }
757     }
758 }
759 
760 void box::display()
761 {
762     layout.display();
763     f.display();
764     header.display();
765     footer.display();
766 }
767 
768 void box::hide()
769 {
770     layout.hide();
771     f.hide();
772     header.hide();
```

```
773     footer.hide();
774 }
775
776 void box::clear()
777 {
778     layout.hide();
779     layout.clear();
780     pos_pointer = layout.getcorner_top_left();
781     index_interactive = index_tbox = 0;
782     exit_btn = NULL;
783     f.display();
784 }
785
786 void box::setheader_tcolor(int c)
787 {
788     header.tcolor = c;
789 }
790
791 void box::setfooter_tcolor(int c)
792 {
793     footer.tcolor = c;
794 }
795
796 void box::clear_header()
797 {
798     header.clear();
799     f.display();
800     footer.display();
801 }
802
803 void box::clear_footer()
804 {
805     footer.clear();
806     f.display();
807     header.display();
808 }
```

15. code/UI/validation.cpp

```
1  #include "ui/ui.hpp"
2
3  int validation::vint(const char *str)
4  {
5      if(!validation::vlong(str)) return 0;
6
7      char *end;
8      long l = strtol(str, &end, 10);
9      if(l > INT_MAX || l < INT_MIN)
10     {
11         return 0;
12     }
13
14     return 1;
15 }
16
17 int validation::vlong(const char *str)
18 {
19     char *end;
```

```
20      long val = strtol(str, &end, 10);
21
22      if (errno == ERANGE || (errno != 0 && val == 0))
23      {
24          //If the converted value would fall
25          //out of the range of the result type.
26          return 0;
27      }
28      if (end == str)
29      {
30         //No digits were found.
31         return 0;
32      }
33
34      //Check if the string was fully processed.
35      return *end == '\0';
36  }
37
38  int validation::vunsigned_long(const char *str)
39  {
40      char *end;
41      unsigned long val = strtoul(str, &end, 10);
42
43      if (errno == ERANGE || (errno != 0 && val == 0))
44      {
45          return 0;
46      }
47      if (end == str || *end != '\0')
48      {
49          return 0;
50      }
51
52      int len = strlen(str);
53      for(int i = 0; i < len && isspace(str[i]); i++);
54
55      if(str[i] == '-')  return 0;
56
57      return 1;
58  }
59
60  int validation::vstring(const char *str)
61  {
62      return 1;
63  }
64
65  int validation::vchar(const char *str)
66  {
67      if(strlen(str) == 1 && isalnum(str[0]))
68      {
69          return 1;
70      }
71      return 0;
72  }
73
74  int validation::vdouble(const char *str)
75  {
76      char *end;
77      double val = strtod(str, &end);
78
```

```
79      if (errno == ERANGE)
80      {
81          //If the converted value would fall
82          //out of the range of the result type.
83          return 0;
84      }
85      if (end == str)
86      {
87         //No digits were found.
88         return 0;
89      }
90
91      return *end == '\0';
92  }
93
94  int validation::vfloat(const char *str)
95  {
96      return validation::vdouble(str);
97  }
98
99  validator_f validation::getvalidator
100                 (int type, validator_f v)
101 {
102     if(v != NULL) return v;
103
104     switch(type)
105     {
106         case info_tbox::INT:
107             return validation::vint;
108         case info_tbox::LONG:
109             return validation::vlong;
110         case info_tbox::UNSIGNED_LONG:
111             return validation::vunsigned_long;
112         case info_tbox::STRING:
113         case info_tbox::PASSWORD:
114             return validation::vstring;
115         case info_tbox::CHAR:
116             return validation::vchar;
117         case info_tbox::DOUBLE:
118             return validation::vdouble;
119         case info_tbox::FLOAT:
120             return validation::vfloat;
121     }
122
123     //TODO: log undefined behaviour
124     return NULL;
125 }
```

16. code/UI/llayout.cpp

```
1   #include "ui/ui.hpp"
2
3   list_layout_node::list_layout_node()
4   {
5       next = NULL;
6       tcolor = ui::tcolor;
7       bcolor = ui::bcolor;
8       strcpy(str, "");
```

```
9       print_type = DEFAULT;
10  }
11
12  list_layout_node::~list_layout_node()
13  {
14      delete next;
15      next = NULL;
16  }
17
18  //Setters
19  void list_layout_node::setnext(list_layout_node *n)
20  {
21      next = n;
22  }
23
24  void list_layout_node::setpos(coord p)
25  {
26      pos = p;
27  }
28
29  void list_layout_node::settcolor(int t)
30  {
31      tcolor = t;
32  }
33
34  void list_layout_node::setbcolor(int b)
35  {
36      bcolor = b;
37  }
38
39  void list_layout_node::setstr(const char * s)
40  {
41      strcpy(str, s);
42  }
43
44  void list_layout_node::setprint_type(int p)
45  {
46      print_type = p;
47  }
48
49  //Getters
50  list_layout_node * list_layout_node::getnext()
51  {
52      return next;
53  }
54
55  coord list_layout_node::getpos()
56  {
57      return pos;
58  }
59
60  int list_layout_node::gettcolor()
61  {
62      return tcolor;
63  }
64
65  int list_layout_node::getbcolor()
66  {
67      return bcolor;
```

```
68  }
69
70  const char * list_layout_node::getstr()
71  {
72      return str;
73  }
74
75  int list_layout_node::getprint_type()
76  {
77      return print_type;
78  }
79
80  void list_layout::print(int print_mode)
81  {
82      coord init_pos(wherex(), wherey());
83      for(list_layout_node *curr = head; curr; curr = curr->getnext())
84      {
85          coord c = curr->getpos();
86          int new_y = c.y - lines_scrolled;
87
88          coord ctl = getcorner_top_left();
89          if(new_y < ctl.y || new_y > ctl.y + height - 1) continue;
90
91          gotoxy(c.x, new_y);
92          textcolor(curr->gettcolor());
93          textbackground(curr->getbcolor());
94          if(print_mode == DISPLAY)
95          {
96              if(curr->getprint_type() ==
97                   list_layout_node::PASSWORD)
98              {
99                  int len = strlen(curr->getstr());
100                 for(int i = 0; i < len; i++)
101                 {
102                     cprintf("*");
103                 }
104             }
105             else if(current->getprint_type() ==
106                           list_layout_node::DEFAULT)
107             {
108                 cprintf("%s", curr->getstr());
109             }
110         }
111         else if(print_mode == HIDE)
112         {
113             int len = strlen(curr->getstr());
114             for(int i = 0; i < len; i++)
115             {
116                 cprintf(" ");
117             }
118         }
119     }
120     gotoxy(init_pos.x, init_pos.y);
121 }
122
123 list_layout::list_layout()
124 {
125     head = NULL,
126     current = NULL;
```

```
127
128     tcolor = ui::tcolor;
129     bcolor = ui::bcolor;
130     tcolor_selected = ui::bcolor;
131     bcolor_selected = ui::tcolor;
132     tcolor_input = tcolor;
133     bcolor_input = bcolor;
134
135     height = ui::scr_height - 1;
136     width = ui::scr_width;
137     lines_scrolled = 0;
138 }
139
140 list_layout& list_layout::operator<<(coord c)
141 {
142     pos = c;
143     return *this;
144 }
145
146 list_layout& list_layout::operator<<(const char *str)
147 {
148     if(!head) //empty list
149     {
150         head = new list_layout_node;
151         current = head;
152     }
153     else
154     {
155         list_layout_node *new_node = new list_layout_node;
156         current->setnext(new_node);
157         current = current->getnext();
158     }
159
160     current->setpos(pos);
161     current->setstr(str);
162     current->settcolor(tcolor);
163     current->setbcolor(bcolor);
164
165     print();
166
167     return *this;
168 }
169
170 interactive * list_layout::settext_box(coord c, int is_pwd)
171 {
172     interactive *new_node = new text_box;
173     new_node->setpos(c);
174     new_node->settcolor(tcolor_input);
175     new_node->setbcolor(bcolor_input);
176
177     if(is_pwd)
178     {
179         ((text_box *) new_node)->setis_password(1);
180         new_node->setprint_type(list_layout_node::PASSWORD);
181     }
182
183     current->setnext(new_node);
184     current = current->getnext();
185
```

```
186     return new_node;
187 }
188
189 interactive * list_layout::setbutton(coord c, const char *s)
190 {
191     button *new_node = new button;
192     new_node->setpos(c);
193     new_node->settcolor(tcolor);
194     new_node->setbcolor(bcolor);
195     new_node->settcolor_selected(tcolor_selected);
196     new_node->setbcolor_selected(bcolor_selected);
197     new_node->setstr(s);
198
199     interactive *n = (interactive *) new_node;
200     current->setnext(n);
201     current = current->getnext();
202
203     return n;
204 }
205
206 void list_layout::settcolor(int c)
207 {
208     tcolor = c;
209     tcolor_input = c;
210 }
211
212 void list_layout::setbcolor(int c)
213 {
214     bcolor = c;
215     bcolor_input = c;
216 }
217
218 void list_layout::settcolor_selected(int c)
219 {
220     tcolor_selected = c;
221 }
222
223 void list_layout::setbcolor_selected(int c)
224 {
225     bcolor_selected = c;
226 }
227
228 void list_layout::settcolor_input(int c)
229 {
230     tcolor_input = c;
231 }
232
233 void list_layout::setbcolor_input(int c)
234 {
235     bcolor_input = c;
236 }
237
238 void list_layout::setcorner_top_left(coord c)
239 {
240     hide();
241
242     coord offset = c - corner_top_left;
243     //offset isn't a coordinate but it's just a pair of values
244
```

```
245     for(list_layout_node *curr = head; curr; curr = curr->getnext())
246     {
247         coord a = curr->getpos();
248         a += offset;
249         curr->setpos(a);
250     }
251 
252     corner_top_left += offset;
253     pos += offset;
254 
255     display();
256 }
257 
258 void list_layout::setheight(int h)
259 {
260     hide();
261     height = h;
262     display();
263 }
264 
265 void list_layout::setwidth(int w)
266 {
267     width = w;
268 }
269 
270 void list_layout::setlines_scrolled(int l)
271 {
272     hide();
273     lines_scrolled = l;
274     display();
275 }
276 
277 void list_layout::setpos(coord c)
278 {
279     pos = c;
280 }
281 
282 int list_layout::getheight()
283 {
284     return height;
285 }
286 
287 int list_layout::getwidth()
288 {
289     return width;
290 }
291 
292 int list_layout::getlines_scrolled()
293 {
294     return lines_scrolled;
295 }
296 
297 coord list_layout::getpos()
298 {
299     return pos;
300 }
301 
302 coord list_layout::getcorner_top_left()
303 {
```

```
304     return corner_top_left;
305 }
306
307 void list_layout::display()
308 {
309     print(DISPLAY);
310 }
311
312 void list_layout::hide()
313 {
314     print(HIDE);
315 }
316
317 void list_layout::clear()
318 {
319     list_layout_node *curr = head;
320     head = current = NULL;
321
322     while(curr)
323     {
324         list_layout_node *temp = curr->getnext();
325         delete curr;
326         curr = temp;
327     }
328
329     lines_scrolled = 0;
330     pos = corner_top_left;
331 }
```

17. code/UI/button.cpp

```
1  #include "ui/ui.hpp"
2
3  button::button()
4  {
5      tcolor_selected = BLACK;
6      bcolor_selected = LIGHTGRAY;
7  }
8
9  void button::settcolor_selected(int c)
10 {
11     tcolor_selected = c;
12 }
13
14 void button::setbcolor_selected(int c)
15 {
16     bcolor_selected = c;
17 }
18
19 int button::gettcolor_selected()
20 {
21     return tcolor_selected;
22 }
23
24 int button::getbcolor_selected()
25 {
26     return bcolor_selected;
27 }
```

```
28
29  int button::input(int offset)
30  {
31      coord c = getpos();
32      setoffset(offset);
33      c.y += offset;
34      gotoxy(c.x, c.y);
35
36      print(1);
37
38      int state_to_return;
39      while(1)
40      {
41          if(kbhit())
42          {
43              char ch = interactive::getkey();
44              switch((int) ch)
45              {
46                  case interactive::ENTER :
47                      state_to_return = interactive::CLICKED;
48                      goto next;
49                  case interactive::DOWN :
50                  case interactive::TAB  :
51                      state_to_return = interactive::GOTONEXT;
52                      goto next;
53                  case interactive::UP :
54                  case interactive::SHIFT_TAB :
55                      state_to_return = interactive::GOTOPREV;
56                      goto next;
57                  case interactive::SHIFT_BACKSPACE :
58                      state_to_return = interactive::BACK;
59                      goto next;
60              }
61          }
62      }
63
64      next:
65      {
66          if (
67              state_to_return == interactive::GOTONEXT ||
68              state_to_return == interactive::GOTOPREV
69             )
70          {
71              print(0);
72          }
73
74          return state_to_return;
75      }
76  }
77
78  void button::print(int isselected)
79  {
80      if(isselected)
81      {
82          textcolor(tcolor_selected);
83          textbackground(bcolor_selected);
84      }
85      else
86      {
```

```
        textcolor(gettcolor());
        textbackground(getbcolor());
    }

    coord init_pos(wherex(), wherey());
    coord c = getpos();
    gotoxy(c.x, c.y + getoffset());
    cprintf(getstr());
    gotoxy(init_pos.x, init_pos.y);
}
```

18. code/UI/textbox.cpp

```
#include "ui/ui.hpp"

text_box::text_box()
{
    is_password = 0;
}

/*
* Despite trying, this function has grown quite large
* Basically, it allows the user to enter text in the box
* and stores it.
* Returns GOTONEXT or GOTOPREV as per user's request to
* go to the next or the previous text box respectively
*/
int text_box::input(int a)
{
    coord c = getpos();
    setoffset(a);
    c.y += a;
    gotoxy(c.x, c.y);

    const char *string = getstr();
    char str[100];
    strcpy(str, string);

    string_node *head = new string_node,
                *current = head;

    int len = strlen(str);
    string_node *temp_prev = NULL;
    for(int i = 0; i < len ; i++)
    {
        current->data = str[i];
        current->next = new string_node;
        current->prev = temp_prev;
        temp_prev = current;
        current = current->next;
    }

    //At the end is a box with \0
    current->data = '\0';
    current->prev = temp_prev;
    current = head;

    int state_to_return = -1;
```

```
46
47      while(1)
48      {
49          if(kbhit())
50          {
51              char ch = interactive::getkey();
52
53              switch((int)ch)
54              {
55                  case TAB :
56                  case ENTER :
57                      state_to_return = GOTONEXT;
58                      goto convert_to_str;
59                  case BACKSPACE :
60                      if(current)
61                      {
62                          if(!current->prev)  break; //No character to be deleted
63
64                          string_node *node_to_delete = current->prev;
65
66                          if(node_to_delete->prev) node_to_delete->prev->next =
                                current;
67                          else                     head = current; //If the node to
                                 be deleted is the head
68
69                          current->prev = node_to_delete->prev;
70
71                          delete node_to_delete;
72
73                          gotoxy(wherex() - 1, wherey());
74
75                          print_str(head);
76                      }
77                      break;
78                  case DELETE:
79                      if(current)
80                      {
81                          if(current->data == '\0') break; //No character to be
                                deleted
82
83                          string_node *node_to_delete = current;
84
85                          if(current->prev) current->prev->next = current->next;
86                          else              head = current->next;
87
88                          if(current->next) current->next->prev = current->prev;
89
90                          current = current->next;
91                          delete node_to_delete;
92
93                          print_str(head);
94
95                      }
96                      break;
97                  case HOME:
98                      gotoxy(c.x, c.y);
99                      current = head;
100                     break;
101                 case END:
```

```
102                     while(current->next)
103                     {
104                         current = current->next;
105                         gotoxy(wherex()+1, wherey());
106                     }
107                     break;
108                 case SHIFT_BACKSPACE:
109                     state_to_return = BACK;
110                     goto convert_to_str;
111                 case SHIFT_TAB:
112                     state_to_return = GOTOPREV;
113                     goto convert_to_str;
114                 case UP:
115                     state_to_return = GOTOPREV;
116                     goto convert_to_str;
117                 case DOWN:
118                     state_to_return = GOTONEXT;
119                     goto convert_to_str;
120                 case LEFT:
121                     if(current->prev)
122                     {
123                         current = current->prev;
124                         gotoxy(wherex()-1, wherey());
125                     }
126                     break;
127                 case RIGHT: //Right arrow key
128                     if(current->next)
129                     {
130                         current = current->next;
131                         gotoxy(wherex()+1, wherey());
132                     }
133                     break;
134                 default:
135                     if(isprint(ch))
136                     {
137                         /*
138                         * When a new node is to be added, it is added behind
139                         * the current node
140                         */
141
142                         string_node *new_node = new string_node;
143                         new_node->data = ch;
144                         new_node->next = current;
145                         new_node->prev = current->prev;
146
147                         if(current->prev) current->prev->next = new_node;
148                         else              head = new_node;
149                         current->prev = new_node;
150
151                         gotoxy(wherex()+1, wherey());
152
153                         print_str(head);
154                     }
155             }
156         }
157     }
158
159     convert_to_str:
160     {
```

```
161         char a[100]; int insert_pointer = 0;
162         for(current = head; current; current = current->next)
163         {
164             a[insert_pointer] = current->data;
165             insert_pointer++;
166         }
167 
168         setstr(a);
169 
170         //Deleting the list
171         current = head;
172         head = NULL;
173         while(current)
174         {
175             string_node *temp = current->next;
176             delete current;
177             current = temp;
178         }
179 
180         return state_to_return;
181     }
182 
183 }
184 
185 /*
186 * Prints the string as represented by a doubly
187 * linked list whose head is pointed to by the
188 * parameter.
189 */
190 void text_box::print_str(string_node *head)
191 {
192     coord init = coord(wherex(), wherey());
193     coord c = getpos();
194     gotoxy(c.x, c.y + getoffset());
195     textcolor(gettcolor());
196     textbackground(getbcolor());
197     for(string_node *current = head; current; current = current->next)
198     {
199         if(is_password)
200         {
201             if(current->data != '\0')
202             {
203                 cprintf("*");
204             }
205             else
206             {
207                 cprintf(" ");
208             }
209         }
210         else            cprintf("%c", current->data);
211     }
212     gotoxy(init.x, init.y);
213 }
214 
215 void text_box::setis_password(int a)
216 {
217     is_password = a;
218 }
```

19. code/UI/infotbox.cpp

```
#include "ui/ui.hpp"
#include "iface.hpp"

info_tbox::info_tbox()
{
    tbox = NULL;
    data_store = NULL;
    type = OTHER;
    validator = NULL;
}

int info_tbox::setdata()
{
    if(validator(tbox->getstr()) == 0)
    {
        return 0;
    }

    char *fstr;
    switch(type)
    {
        case INT:
        {
            fstr = "%d";
            break;
        }
        case LONG:
        {
            fstr = "%ld";
            break;
        }
        case UNSIGNED_LONG:
        {
            fstr = "%lu";
            break;
        }
        case STRING:
        case PASSWORD:
        {
            char *s = (char *) data_store;
            strcpy(s, tbox->getstr());
            return 1;
        }
        case CHAR:
        {
            fstr = "%c";
            break;
        }
        case DOUBLE:
        {
            fstr = "%g";
            break;
        }
        case FLOAT:
        {
            fstr = "%f";
            break;
```

```
58          }
59          default:
60              return 0;
61      }
62
63      sscanf(tbox->getstr(), fstr, data_store);
64
65      return 1;
66  }
```

Data files

1. code/TRANSACT.DAT
2. code/PROC.DAT
3. code/PATIENT/MAXID.DAT
4. code/PATIENT/5/TRANS.DAT
5. code/PATIENT/5/BASE.DAT
6. code/PATIENT/1/BASE.DAT
7. code/PATIENT/3/BASE.DAT
8. code/PATIENT/14/TRANS.DAT
9. code/PATIENT/14/BASE.DAT
10. code/PATIENT/12/BASE.DAT
11. code/PATIENT/2/BASE.DAT
12. code/PATIENT/7/BASE.DAT
13. code/PATIENT/0/BASE.DAT
14. code/PATIENT/8/TRANS.DAT
15. code/PATIENT/8/BASE.DAT
16. code/PATIENT/13/TRANS.DAT
17. code/PATIENT/13/BASE.DAT
18. code/PATIENT/11/TRANS.DAT
19. code/PATIENT/11/BASE.DAT
20. code/PATIENT/15/BASE.DAT
21. code/PATIENT/9/TRANS.DAT
22. code/PATIENT/9/BASE.DAT
23. code/PATIENT/6/TRANS.DAT
24. code/PATIENT/6/BASE.DAT
25. code/PATIENT/10/BASE.DAT
26. code/PATIENT/4/BASE.DAT
27. code/EMPLOYEE/IDLIST.DAT
28. code/EMPLOYEE/MAXID.DAT

29. code/EMPLOYEE/1/TRANS.DAT
30. code/EMPLOYEE/1/BASE.DAT
31. code/EMPLOYEE/RECEPTIO/5/TRANS.DAT
32. code/EMPLOYEE/RECEPTIO/5/BASE.DAT
33. code/EMPLOYEE/DOCTOR/2/TRANS.DAT
34. code/EMPLOYEE/DOCTOR/2/BASE.DAT
35. code/EMPLOYEE/DOCTOR/7/TRANS.DAT
36. code/EMPLOYEE/DOCTOR/7/BASE.DAT
37. code/EMPLOYEE/6/TRANS.DAT
38. code/EMPLOYEE/6/BASE.DAT
39. code/EMPLOYEE/NURSE/3/TRANS.DAT
40. code/EMPLOYEE/NURSE/3/BASE.DAT
41. code/STOCK/MED.DAT
42. code/STOCK/MEDICINE.DAT

Output


27/1/2018
20:2
LHOSPITAL
1. Patient admission
2. Patient discharge
3. Edit patient details
4. Go to main menu
Choice : 1
Everything looks OK


28/1/2018
12:30
LHOSPITAL
Enter data for the patient :
Name : Khan Khaneja
Sex : M
Key - M/F/T = Male/Female/Trans
Date of Birth : 25/12/1991
Address
House # : 221B
Everything looks OK


28/1/2018
12:30
LHOSPITAL
House # : 221B
Street : Baker Street
District : London
State : London
Phone : 1234567890
Disease
Everything looks OK


28/1/2018
12:30
LHOSPITAL
Phone : 1234567890
Disease
Name : Melanoma
Type : 0
Type key :
0 - Brain 1 - Heart
2 - Skin 3 - Lung
4 - Bone 5 - Eye
Everything looks OK


28/1/2018
12:30
LHOSPITAL
Type key :
0 - Brain 1 - Heart
2 - Skin 3 - Lung
4 - Bone 5 - Eye
6 - Throat 7 - Teeth
8 - Stomach 9 - Blood
10 - General/full body condition
Symptoms
Symptom 1 : Headache
Symptom 2 :
Everything looks OK


28/1/2018
12:30
LHOSPITAL
Provider : LIC
Amount ($) : 30000
Expiry 25/12/2022
Admission Date : 01/01/2018
Submit
Everything looks OK


28/1/2018
12:30
LHOSPITAL
10 - General/full body condition
Symptoms
Symptom 1 : Headache
Symptom 2 :
Symptom 3 :
Symptom 4 :
Guardian name : Dr. John Watson
Everything looks OK


27/1/2018
20:2
LHOSPITAL
Patient has been
admitted with ID # 14
Okay
Everything looks OK


27/1/2018
20:6
LHOSPITAL
1. Sale
2. Purchase
3. Stock check
4. Go to main menu
Choice : 1
Everything looks OK


27/1/2018
20:6
LHOSPITAL
Medicine Sale
Code : 1
Submit
Everything looks OK


27/1/2018
20:6
LHOSPITAL
Medicine Sale
Name : LZMA
Price : $ 18.990000
Patient ID : 14
Quantity : 15
Submit
Everything looks OK


27/1/2018
20:9
LHOSPITAL
Medicine Details
Name : LZMA
Price : $ 18.990000
Dosage : 5.600000 ml
Quantity in stock :
1700
Okay
Everything looks OK


27/1/2018
20:11
LHOSPITAL
Medicine Purchase
Code : 2
Submit
Everything looks OK


27/1/2018
20:11
LHOSPITAL
Medicine Purchase
Name : ZIP
Price : $ 4.980000
Quantity : 1200
Submit
Everything looks OK


27/1/2018
20:12
LHOSPITAL
Patient Data
Alteration
Enter patient ID : 14
Submit
Everything looks OK


27/1/2018
20:12
LHOSPITAL
Choose item to edit:
1. Disease/condition
2. Guardian name
3. Emergency contact
4. Emergency contact
no.
5. Insurance
information
Choice : 1
Submit
Everything looks OK


27/1/2018
20:12
LHOSPITAL
Enter insurance
information for Khan
Khaneja
Provider : LIC
Amount (in $) : 30000
Expiry date
Everything looks OK


27/1/2018
20:12
LHOSPITAL
Patient Discharge
Enter patient ID : 14
Submit
Everything looks OK


27/1/2018
20:12
LHOSPITAL
Bill for Khan Khaneja
1. Stay for 26 days
$ 1300.000000
Final bill : $
1300.000000
Pay Bill
Everything looks OK