

# **LHospital**

*A Turbo C++ project*

A basic management system for a general hospital

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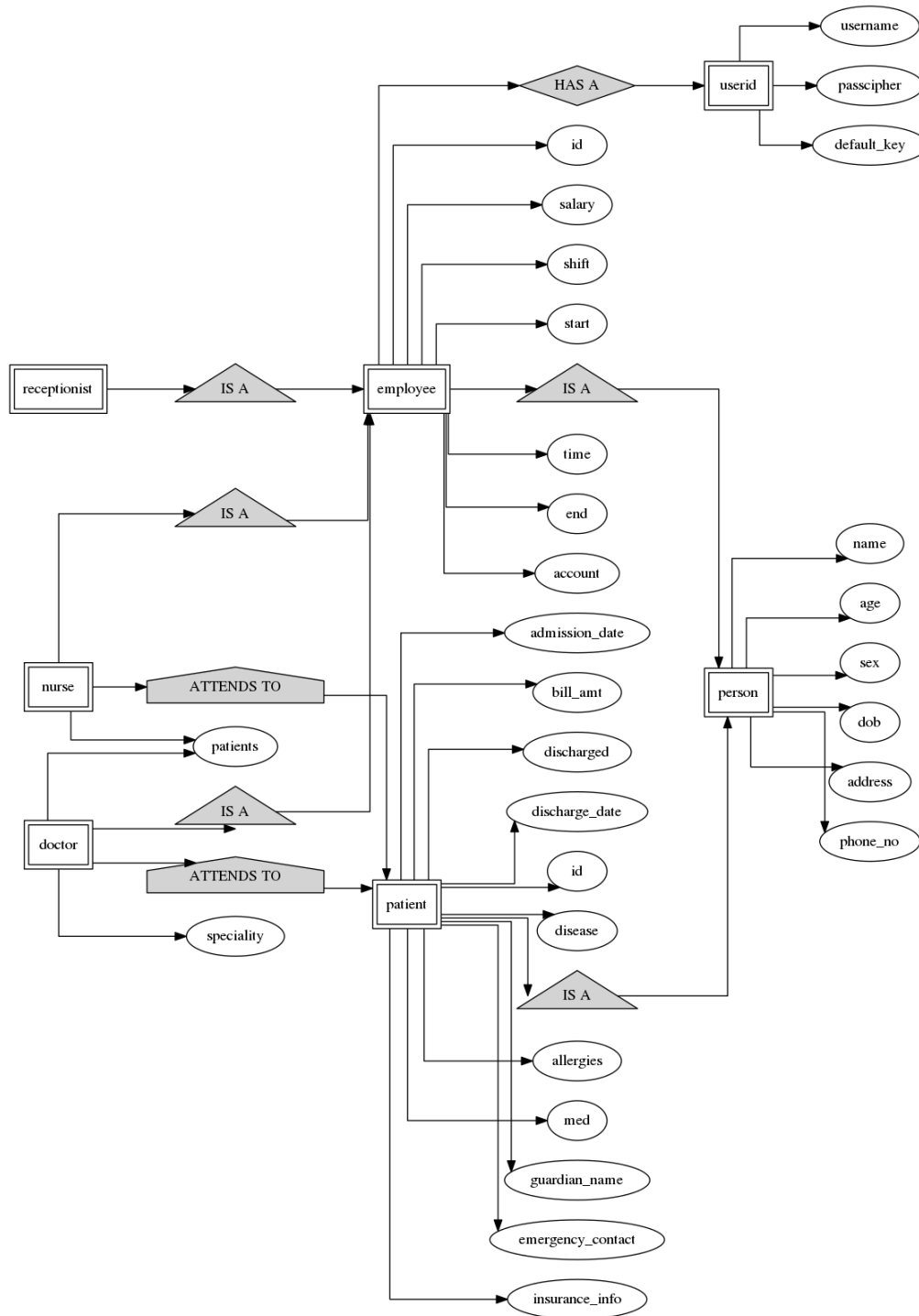
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# Diagrams

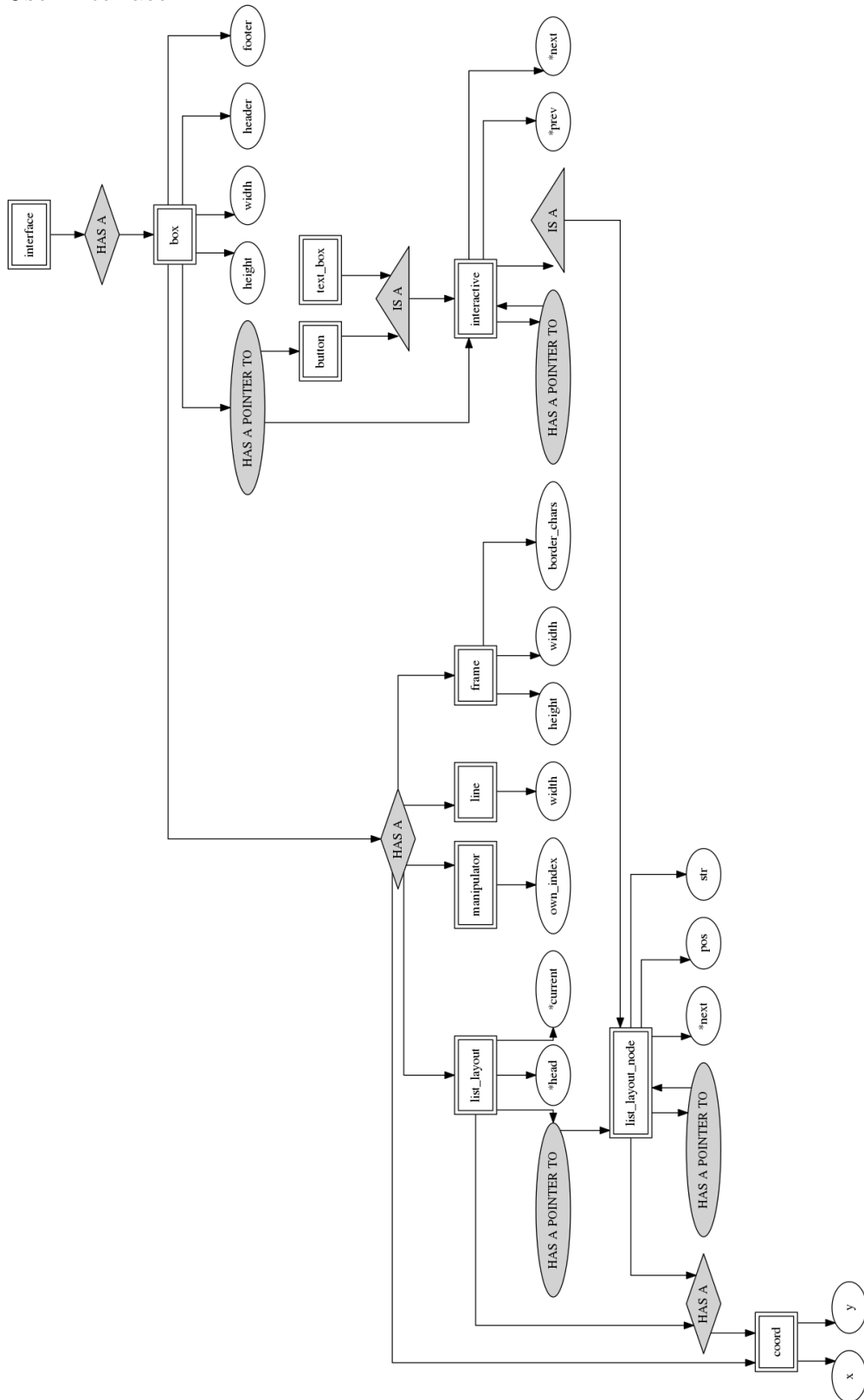
ER

diagrams

## 1. Hospital

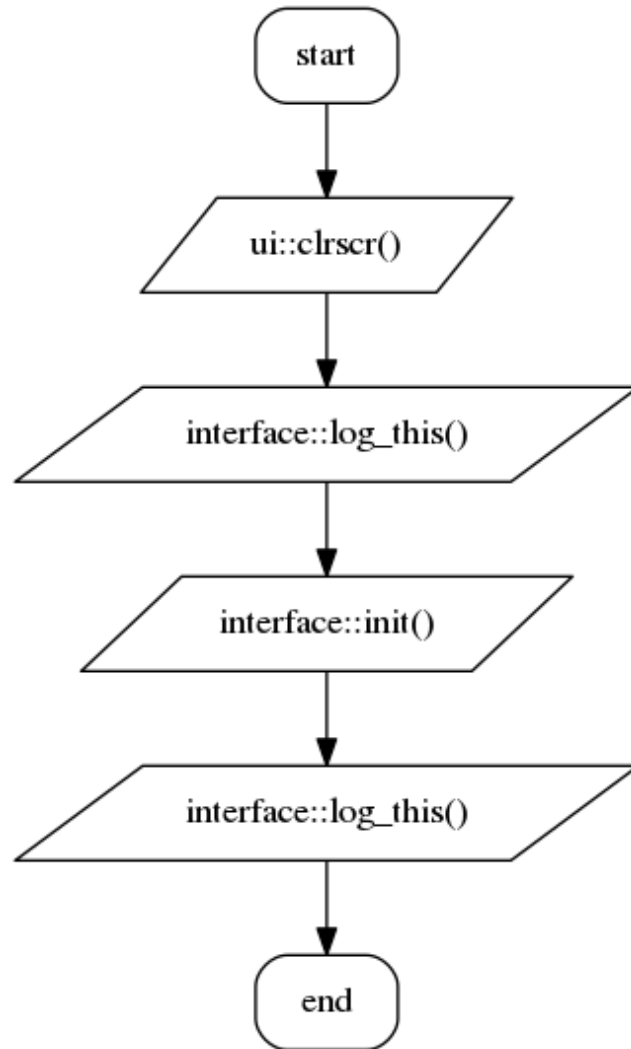


## 2. User interface



Note: The figure included has been rotated

## Flowchart of main()



# Source Code

## Header

## files

### 1. code/iface.hpp

```
1  /*!
2  \file iface.hpp
3  \brief Contains prototypes of the functions managing the interface of the
4  program
5  */
6  #ifndef INTERFACE_HPP
7  #define INTERFACE_HPP
8
9  #include "ui/ui.hpp"
10
11 ///Class containing all the functions that make up the interface of the program
12 class interface{
13     public:
14         static void init(); ///>The main interface function of the program; this
15             is the functions that runs throughout the program
16         static int login_screen(); ///>Login screen interface
17         static int menu(); ///>The first main menu interface(For administrator
18             employee only)
19         static void patient_management(); ///>Patient management interface(for
20             receptionist employees only)
21         static void employee_management(); ///>Employee management interface(for
22             administrator employees only)
23         static void stock_management(); ///>Stock management interface(for
24             administrator employees only)
25
26         static void employee_screen(unsigned long); ///>The interface for non-
27             administrator employees
28
29         static void error(char*); ///>Prints an error message at the footer of
30             interface::window
31         static void clear_error(); ///>Clears the error message at the footer of
32             interface::window
33
34         static int log_this(char *); ///>Logs a message string into a file log.
35             txt
36
37     protected:
38         interface(); ///>Objects of this class shouldn't be created
39         /*!
40         For creating a validation function to use in menus
41         to validate the choice input of the menu option to be accessed
42         */
43         class validate_menu
44         {
45             static int lowest_choice, greatest_choice; ///>The lower and
46                 upper limit of the choices of a menu
47             validate_menu(); ///>Objects of this class shouldn't be created
48             public:
49                 static int input(const char *); ///>The validation function that
50                     will be passed as an argument to box::operator>>()
```

```

40         static void set_menu_limits(int, int); //!>Setter; sets
           lowest_choice and greatest_choice
41     };
42     /*!Creates a back_func that can be passed as an argument to box::
       setback_func()*/
43     class back_func
44     {
45         back_func(); //!>Objects of this class shouldn't be created
46     public:
47         static int backbit; //!>1, if shift + bkspc is pressed, 0
           otherwise
48         static int set_backbit(); //!>Setter, passed as an argument to
           box::setback_func()
49     };
50     static box window; //!>The main outer window box
51 };
52
53 /*!Class containing all the functions that make up the interface of Employee
   management
54 class emp_mgmt : public interface
55 {
56     public:
57         static void view_emp(); //!>Interface of View Employee
58         static int view_emp(unsigned long); //!>Creates the interface that shows
           the details of an employee with a particular ID
59         static void add_emp(); //!>Interface of Add Employee
60         static void remove_emp(); //!>Interface of Remove Employee
61         static void edit_emp(); //!>Interface of Edit Employee
62         static void pay_emp(); //!>Interface of Pay Employee
63         static void pay_all(); //!>Interface of Pay All Employees
64     private:
65         emp_mgmt(); //!>Objects of this class shouldn't be created
66 };
67
68 #endif /* INTERFACE_HPP */

```

## 2. code/EMP.HPP

```

1  /*!
2   \file EMP.HPP
3   \brief Contains the definitions of the employee class and its derivatives
4   */
5
6  #ifndef EMP
7  #define EMP
8
9  #include "base.hpp"
10
11  enum emp_type {INVALID, OTHERS, DOCTOR, NURSE, RECEPTIONIST};
12  //!>Identifiers for indication of different types of employees
13
14  /*!Class storing details of employees of the hospital
15  class employee : public person{
16      int generate_id(); //!>Generates ID of the employee
17      static int generate_id_status; //!>0 if the last id generation was
           unsuccessful
18      /*!>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
20         meaningless data, which
21         will affect future id generation*/
22     public:
23         employee(str, int, Date, address, phone, unsigned long, Time, Time, str =
24             "", str = ""); //!>Explicit constructor
25         /*!>for all those with user accounts(doctors, nurses, receptionists),
26         last 2 arguments are to be provided as well*/
27         employee(); //!>Default constructor
28
29         //!@{Getters
30         int get_age(); //!>Overridden function
31         /*!>Updates the age of the employee and writes the employee object back
32         to file before returning age*/
33         unsigned long get_salary();
34         Time get_shift(int inpl); /*!>\param inpl times_of type variable that
35         indicates starting or ending shift time*/
36         unsigned long get_id();
37         static int get_generate_id_status();
38         transaction * get_last_5_transactions(); //!>Gets the last 5 records
39         present in the file TRANS.DAT of the employee's folder
40         //!}@
41
42         //!@{Setters
43         void set_salary(unsigned long);
44         void set_shift(int inpl, Time t1); /*!>\param inpl times_of type variable
45         that indicates starting or ending shift time*/
46         //!}@
47
48         userid account; //!>Facilitates login mechanism of the employee
49     protected:
50         unsigned long id; //!>ID of the employee
51         unsigned long salary; //!>Salary of the employee
52         Time shift_start; //!>Starting shift time of the employee
53         Time shift_end; //!>Ending shift time of the employee
54 };
55
56     //!Class storing details of doctors of the hospital
57     class doctor : public employee{
58     public:
59         doctor(str, int, Date, address, phone, unsigned long, Time, Time, int,
60             int, str, str); //!>Explicit constructor
61         doctor(); //!>Default constructor
62
63         //!@{Getters
64         int * get_speciality();
65         long * get_patients();
66         //!}@
67
68         //!@{Setters
69         void set_speciality(int *);
70         void set_patients(long *);
71         //!}@
72
73     private:
74         int speciality[2]; //!>Doctor's specialization
75         long patients[10]; //!>Patients currently under care, can take only 10 at
76         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
76             ); //!>Explicit constructor
77         nurse(); //!>Default constructor
78         long * get_patients(); //!>Getter
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,
89             str, str); //!>Explicit constructor
90         receptionist(); //!>Default constructor
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
95 each id,
96 and then to store these objects to a file EMPLOYEE/ID_LIST.DAT(The ctor itself
97 does all this)
98 This class is used to get the employee type of an employee having a particular id
99 */
100 class id_to_emp
101 {
102     unsigned long id; //!>ID of employee
103     int employee_type; //!>Type of employee
104     public:
105         int status; //!>True whenever the constructor runs successfully and
106         succeeds in storing the object to idlist.dat
107         id_to_emp(unsigned long, int); //!>Explicit constructor
108         id_to_emp(); //!>Default constructor
109         static int convert(unsigned long); //!>Converts id to employee type
110 };
111
112 #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]; //!

```

```

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 implementation 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; //!

```

```

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 emergency contact 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();

```

```

99         //!<} @
100     };
101
102 #endif

```

## 5. code/HOSP.HPP

```

1  /*!
2   \file HOSP.HPP
3   \brief Contains prototypes of the hospital management functions
4   */
5
6  #ifndef HOSP
7  #define HOSP
8
9  #include "base.hpp"
10 #include "patient.hpp"
11
12 //!

```



```

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
73     availed from the hospital
74     /*!
75     Gets the patient object from file using get_patient_by_id(), and adds a
76     transaction type variable to a file TRANS.DAT that is present in the
77     folder
78     of the patient(i.e the folder having name as the id of the patient)
79     \param pat_id ID of the patient
80     \param trans The transaction type variable containing details of the
81     transaction that is charged to the patient
82     */
83     static void charge_patient(int pat_id, transaction trans);
84
85     ///!Discharges a patient from the hospital
86     /*!
87     Calls the patient::discharge() function, sets the patient's discharge
88     date to the current system date, and writes the patient back to file
89     \param temp The object of the patient who is to be discharged
90     */
91     static void discharge_patient(patient temp);
92     static float calc_bill(int); ///!>Calculates the cost of the patient's
93     stay in the hospital
94     ///!}@
95
96     ///!@{Functions for medicine records management
97
98     ///!Gets a medicine from file corresponding to an input code
99     /*!
100    Reads a medicine type variable from a file STOCK/MED.DAT that has code
101    equal to the
102    code inputted to the function
103    \param inp_code The code of the required medicine
104    \return The medicine corresponding to inp_code
105    */
106    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
106     stores all
107     medicines, after it has been edited, into its position in the file.
108     */
109     static void write_med(medicine);
110     //!}@
111
112     //!@{Employee management functions
113
114     //!Gets an object of an employee(or its derivative) from file
115     corresponding to an input id
116     /*!
117     Reads an object from a file base.dat that is present in
118     a folder with name as the id of the employee. All such folders are
119     present in a folder named EMPLOYEE, or EMPLOYEE/DOCTOR, or
120     EMPLOYEE/NURSE, or EMPLOYEE/RECEPTIONIST
121     This function converts the id inputted to it into the
122     employee type, sets the string of the path to the folder containing
123     the employee object file, and reads the object from the file to a
124     buffer pointed to by a void pointer
125     A void pointer is used in this function to handle the different data
126     types
127     i.e. employee, doctor, nurse, receptionist that can be input into the
128     function as the target parameter.
129     \param id The id of the employee to be read
130     \param target void pointer pointing to the buffer that stores the object
131     \return 1 if the function executed without errors, 0 otherwise
132     */
133     static int get_employee_by_id(unsigned long id, void * target);
134
135     //!Writes an object of type employee(or its derivative) to file
136     /*!
137     This function converts the id of the object pointed to by the pointer
138     a into the employee type, sets the string of the path to the folder that
139     should
140     contain the employee object file, and then makes a new folder(if it doesn
141     't exist)
142     in EMPLOYEE, or EMPLOYEE/DOCTOR, or EMPLOYEE/NURSE, or EMPLOYEE/
143     RECEPTIONIST
144     (depending upon the type of the object pointed by the input void pointer)
145     , whose
146     name is the id of the employee object that is to be written, and writes
147     the
148     employee object to a file BASE.DAT inside that folder.
149     A void pointer is used in this function to handle the different data
150     types
151     i.e. employee, doctor, nurse, receptionist that can be input into the
152     function as the parameter a.
153     \param a void pointer pointing to the object that is to be written to
154     file
155     \return 1 if the function executed without errors, 0 otherwise
156     */
157     static int write_employee(void * a);
158
159     //!Pays salary to an employee having a particular id
160     /*!

```

```

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     //!

```

```

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     

| <i>data type</i>     | <i>What void* was</i>  |
|----------------------|------------------------|
| <i>INT</i>           | <i>int *</i>           |
| <i>LONG</i>          | <i>long *</i>          |
| <i>UNSIGNED_LONG</i> | <i>unsigned long *</i> |
| <i>STRING</i>        | <i>char *</i>          |
| <i>CHAR</i>          | <i>char *</i>          |
| <i>DOUBLE</i>        | <i>double *</i>        |
| <i>FLOAT</i>         | <i>float *</i>         |
| <i>PASSWORD</i>      | <i>char *</i>          |


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 depicting
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      corresponding 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 */

```

## 1. code/iface3.cpp

```

1  #include <fstream.h>
2  #include "base.hpp"
3  #include "iface.hpp"
4  #include "hosp.hpp"
5  #include "emp.hpp"
6
7  void interface::employee_management()
8  {
9      const int menu_corner_top_left_y = 5;
10     coord c(ui::scr.width * 0.2, menu_corner_top_left_y);
11     int ch;
12     while(1)
13     {
14         interface::clear_error();
15         box menu(c, ui::scr.width * 0.6, ui::scr.height - 6 );
16         menu.settcolor(GREEN);
17         menu << ui::centeralign << "Employee Management" << ui::endl << ui::endl;
18         menu.settcolor(ui::tcolor);
19         menu << "1. View employee data" << ui::endl
20             << "2. Add new employee" << ui::endl
21             << "3. Remove existing employee" << ui::endl
22             << "4. Edit employee data" << ui::endl
23             << "5. Pay salary to individual employee" << ui::endl
24             << "6. Pay salary to all employees" << ui::endl
25             << "7. Back" << ui::endl
26             << ui::endl << "Enter your choice: ";
27         menu.settcolor_input(YELLOW);
28         validate_menu::set_menu_limits(1, 7);
29         menu >> validate_menu::input >> ch;
30         menu << ui::endl;
31         menu.setexit_button("Submit");
32         menu.loop();
33         menu.hide();
34         switch (ch)
35         {
36             case 1:
37             {
38                 emp_mgmt::view_emp();
39                 break;
40             }
41             case 2:
42             {
43                 emp_mgmt::add_emp();
44                 break;
45             }
46             case 3:
47             {
48                 emp_mgmt::remove_emp();
49                 break;
50             }
51             case 4:
52             {
53                 emp_mgmt::edit_emp();
54                 break;
55             }

```

```

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
77     among employee, doctor, nurse and receptionist classes
78     if(temp == NULL)
79     {
80         interface::log_this("interface::employee_screen() : Not enough memory to
81         allocate buffer void * temp = malloc( sizeof(doctor) );");
82         interface::error("Out of memory!! Check log");
83         getch();
84         return;
85     }
86     if(!hospital::get_employee_by_id(id, temp))
87     {
88         interface::error("ID not found or error while reading from file!");
89         getch();
90         free(temp);
91         return;
92     }
93     employee *e = (employee *) temp;
94     const int menu_corner_top_left_y = 5;
95     coord c(ui::scr_width * 0.2, menu_corner_top_left_y);
96     int ch;
97     str heading = "Welcome, ";
98     strcat( heading, e->get_name() );
99     strcat(heading, "!");
100     while(1)
101     {
102         interface::clear_error();
103         box menu(c, ui::scr_width * 0.6, ui::scr_height - 6 );
104         menu.settcolor(GREEN);
105         menu << ui::centralalign << heading << ui::endl << ui::endl;
106         menu.settcolor(ui::tcolor);
107         menu << "1. View profile" << ui::endl
108         << "2. Change login details" << ui::endl
109         << "3. View last 5 transactions" << ui::endl;
110         emp_type type_of_emp = id_to_emp::convert(id);
111         if(type_of_emp == RECEPTIONIST)
112         {
113             menu << "4. Manage patients" << ui::endl
114             << "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::
152                     endl << ui::endl;
153                 menu3.settcolor(WHITE);
154                 menu3 << "1. Change User ID" << ui::endl
155                     << "2. Change Password" << ui::endl
156                     << "3. Back" << ui::endl
157                     << "Enter your choice: ";
158                 menu3.settcolor(ui::tcolor);
159                 menu3.settcolor_input(YELLOW);
160                 validate_menu::set_menu_limits(1, 3);
161                 menu3 >> validate_menu::input >> ch;
162                 menu3 << ui::endl;
163                 menu3.setexit_button("Submit");
164                 menu3.loop();
165                 menu3.hide();
166                 switch(ch)
167                 {
168                     case 1:
169                     {
170                         str new_username;
171                         box menu4( menu3.getcorner_top_left(), menu3.getwidth

```

```

171         (), menu3.getheight() );
172 menu4.settcolor(GREEN);
173 menu4 << ui::centeralign << "Change login details" <<
174 ui::endl << ui::endl;
175 menu4.settcolor(WHITE);
176 menu4 << "Change User ID" << ui::endl;
177 menu4.settcolor(ui::tcolor);
178 menu4 << "User ID: ";
179 menu4.setdefault( e->account.get_username() );
180 menu4.settcolor_input(YELLOW);
181 menu4 >> new_username;
182 menu4.setexit_button("Submit");
183 menu4.setback_func(back_func::set_backbit);
184 menu4.loop();
185 menu4.hide();
186 if(back_func::backbit)
187 {
188     back_func::backbit = 0;
189     break;
190 }
191 e->account.set_username(new_username);
192 const int notice_height = 10;
193 box notice( menu4.getcorner_top_left(), menu4.
194 getwidth(), notice_height );
195 notice.settcolor(GREEN);
196 notice << ui::centeralign << "Change login details"
197 << ui::endl << ui::endl;
198 if( !hospital::write_employee(temp) )
199 {
200     notice.settcolor(RED);
201     notice << "Failed to write new user ID to file!
202 Check log" << ui::endl;
203 }
204 else
205 {
206     notice.settcolor(GREEN);
207     notice << "User ID changed successfully!" << ui::
208 endl;
209 }
210 notice.setexit_button("Back");
211 notice.loop();
212 notice.hide();
213 goto loop_exit;
214 }
215 case 2:
216 {
217     str curr_pwd, new_pwd;
218     for(int i = 0; i < 3; ++i)
219     {
220         box menu4( menu3.getcorner_top_left(), menu3.
221 getwidth(), menu3.getheight() );
222         menu4.settcolor(GREEN);
223         menu4 << ui::centeralign << "Change login details
224 " << ui::endl << ui::endl;
225         menu4.settcolor(WHITE);
226         menu4 << "Change Password" << ui::endl;
227         menu4.settcolor(ui::tcolor);
228         menu4 << "Enter current password: ";
229         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::centralalign << "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::centralalign << "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
                           << "Press the button below to exit the
                           program." << ui::endl;
293     notice2.setexit_button("Exit");
294     notice2.loop();
295     notice2.hide();
296     free(temp);
297     return;
298 }
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::centralalign << "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::centralalign << "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::centralalign << "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::centralalign << "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
            << "1. Doctor" << ui::endl
582             << "2. Nurse" << ui::endl
583             << "3. Receptionist" << ui::endl
584             << "4. Others" << ui::endl << ui::endl
585             << "Enter your choice: ";
586         validate_menu::set_menu_limits(1, 4);
587         menu2.settcolor_input(YELLOW);
588         menu2 >> validate_menu::input >> ch;
589         menu2 << ui::endl;
590         menu2.setexit_button("Submit");
591         menu2.setback_func(back_func::set_backbit);
592         menu2.loop();
593         menu2.hide();
594         if(back_func::backbit)
595         {
596

```

```

597         back_func::backbit = 0;
598         return;
599     }
600 }
601 menu3:
602 {
603     box menu3( menu2_corner.top_left, menu2.width, ui::scr_height - 6 );
604     menu3.settcolor(GREEN);
605     menu3 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
606         ;
607     menu3.settcolor(WHITE);
608     menu3 << "Add new employee" << ui::endl;
609     menu3.settcolor(ui::tcolor);
610     menu3 << "Step 2: Add employee details" << ui::endl << ui::endl;
611     menu3.settcolor_input(YELLOW);
612     menu3 << "Name: ";
613     menu3 >> name;
614     menu3 << "Sex: 1. Male | 2. Female | 3. Transsexual" << ui::endl
615         << "—— Enter your choice: ";
616     validate_menu::set_menu_limits(1, 3);
617     menu3 >> validate_menu::input >> (int)sex_choice;
618     menu3 << "Date of Birth(DD/MM/YYYY): ";
619     menu3 >> hospital::date_validity >> dob_str;
620     menu3 << "Address: " << ui::endl;
621     menu3 << (char)26 << "House no.: ";
622     menu3 >> adr_hno;
623     menu3 << (char)26 << "Street: ";
624     menu3 >> adr_street;
625     menu3 << (char)26 << "City: ";
626     menu3 >> adr_city;
627     menu3 << (char)26 << "District: ";
628     menu3 >> adr_dist;
629     menu3 << (char)26 << "State: ";
630     menu3 >> adr_state;
631     menu3 << "Phone no.: ";
632     menu3 >> phn_no;
633     menu3 << "Salary: ";
634     menu3 >> salary;
635     menu3 << "Shift timings: Starts - (HH:MM:SS)";
636     menu3 >> hospital::time_validity >> shift_start_str;
637     menu3 << "——: Ends - (HH:MM:SS)";
638     menu3 >> hospital::time_validity >> shift_end_str;
639     menu3.setexit_button("Submit");
640     menu3.setback_func(back_func::set_backbit);
641     menu3.loop();
642     menu3.hide();
643     if(back_func::backbit)
644     {
645         back_func::backbit = 0;
646         goto menu2;
647     }
648     —sex_choice;
649     dob = hospital::str_to_date(dob_str);
650     adr = address(adr_hno, adr_street, adr_city, adr_dist, adr_state);
651     shift_start = hospital::str_to_time(shift_start_str);
652     shift_end = hospital::str_to_time(shift_end_str);
653 }
654 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::centralalign << "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::centralalign << "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
        << "Choose from the following list: " << ui::endl;
701         for(int i = 0; i <= GEN; ++i)
702         {
703             if(i <= 8)
704             {
705                 menu5 << i << ". " << (body-parts)i << ui::endl;
706             }
707             else
708             {
709                 inp_box << i << ". " << (body-parts)i << ui::endl;
710             }

```

```

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,
738                 shift_end, speciality[0], speciality[1], uid, pwd);
739         temp = &x;
740         id = x.get_id();
741         break;
742     }
743     case 2:
744     {
745         nurse x(name, sex_choice, dob, adr, phn_no, salary, shift_start,
746                shift_end, uid, pwd);
747         temp = &x;
748         id = x.get_id();
749         break;
750     }
751     case 3:
752     {
753         receptionist x(name, sex_choice, dob, adr, phn_no, salary,
754                        shift_start, shift_end, uid, pwd);
755         temp = &x;
756         id = x.get_id();
757         break;
758     }
759     case 4:
760     {
761         employee x(name, sex_choice, dob, adr, phn_no, salary, shift_start,
762                    shift_end);
763         temp = &x;
764         id = x.get_id();
765         break;
766     }
767 }
768 }
769 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

```

```

877         exists\nFunction aborted");
878         notice3 << "Invalid ID supplied!! Check log" << ui::endl;
879         notice3.setexit_button("Back");
880         notice3.loop();
881         notice3.hide();
882         return;
883     case OTHERS:
884         sprintf(path, "employee/%lu", id);
885         break;
886     case DOCTOR:
887         mkdir("employee/doctor");
888         sprintf(path, "employee/doctor/%lu", id);
889         break;
890     case NURSE:
891         mkdir("employee/nurse");
892         sprintf(path, "employee/nurse/%lu", id);
893         break;
894     case RECEPTIONIST:
895         mkdir("employee/receptionist");
896         sprintf(path, "employee/receptionist/%lu", id);
897         break;
898     }
899     int remove_status;
900     str file;
901     strcpy(file, path);
902     strcat(file, "/base.dat");
903     if( remove(file) == -1)
904     {
905         str log_str;
906         sprintf(log_str, "emp_mgmt::remove_emp() : Failed to delete base.dat file
907         of id %lu\nFunction aborted", id);
908         interface::log_this(log_str);
909         notice3 << "Failed to delete file of employee!!" << ui::endl;
910         notice3.setexit_button("Back");
911         notice3.loop();
912         notice3.hide();
913         return;
914     }
915     if( rmdir(path) == -1)
916     {
917         str log_str;
918         sprintf(log_str, "emp_mgmt::remove_emp() : Failed to delete folder of id
919         %lu", id);
920         interface::log_this(log_str);
921     }
922     notice3.settcolor(GREEN);
923     notice3 << "Employee deletion successful!!" << ui::endl;
924     notice3.setexit_button("Back");
925     notice3.loop();
926     notice3.hide();
927 }
928 void emp_mgmt::edit_emp()
929 {
930     void * temp = malloc( sizeof(doctor) ); //as doctor has the greatest size
931     among employee, doctor, nurse and receptionist classes
932     if(temp == NULL)
933     {
934         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::centralalign << "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
        << "—— Enter your choice: ";
1015     validate_menu::set_menu_limits(1, 3);
1016     menu3.setdefault( e->get_sex() + 1 );
1017     menu3 >> validate_menu::input >> (int)sex.choice;
1018     menu3 << "Date of Birth(DD/MM/YYYY): ";
1019     sprintf(default_dob_str, "%u/%u/%u", e->get_dob().day, e->get_dob().month
1020         , 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
        << ( ui::bottom | ui::left ) << (char)204
1083     << ( ui::top | ui::right ) << (char)203
1084     << ( ui::bottom | ui::right ) << (char)202;
1085     menu4.f.display();
1086     inp_box.f << ( ui::top | ui::left ) << (char)203
        << ( ui::bottom | ui::left ) << (char)202
1087     << ( ui::top | ui::right ) << (char)185
1088     << ( ui::bottom | ui::right ) << (char)185;
1089     inp_box.f.display();
1090     menu4 << ui::centeralign << "Employee Management" << ui::endl << ui::endl
        ;
1091     menu4.settcolor(WHITE);
1092     menu4 << "Edit employee data" << ui::endl;
1093
1094

```

```

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]);
1115     inp_box >> validate_menu::input >> speciality[0];
1116     inp_box << (char)26;    inp_box.setdefault(d->get_speciality()[1]);
1117     inp_box >> validate_menu::input >> speciality[1];
1118     inp_box << ui::endl;
1119     inp_box.setexit_button("Submit");
1120     inp_box.setback_func(back_func::set_backbit);
1121     inp_box.loop();
1122     menu4.hide();
1123     inp_box.hide();
1124     window.f.display();
1125     d->set_speciality(speciality);
1126 }
1127 if(back_func::backbit)
1128 {
1129     back_func::backbit = 0;
1130     goto menu3;
1131 }
1132 const int notice2.height = 12;
1133 box notice2(menu2.corner.top_left, menu2.width, notice2.height);
1134 notice2.settcolor(GREEN);
1135 notice2 << ui::centralalign << "Employee Management" << ui::endl << ui::endl;
1136 if(!hospital::write_employee(temp))
1137 {
1138     notice2.settcolor(RED);
1139     notice2 << "Employee edit unsuccessful!!";
1140     notice2.setexit_button("Exit");
1141     notice2.loop();
1142     notice2.hide();
1143     free(temp);
1144     return;
1145 }
1146 notice2 << "Employee edited successfully!!" << ui::endl;
1147 notice2.settcolor(WHITE);
1148 notice2 << "Hit the button below to display the details you entered: " << ui
    ::endl;
1149 notice2.settcolor(ui::tcolor);
1150 notice2 << ui::endl;
1151 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         ;
1169         menu2.settcolor(WHITE);
1170         menu2 << "Pay salary to individual employee" << ui::endl;
1171         menu2.settcolor(ui::tcolor);
1172         menu2 << "Enter employee's id: ";
1173         menu2.settcolor_input(YELLOW);
1174         menu2 >> id;
1175         menu2 << ui::endl;
1176         menu2.setexit_button("Submit");
1177         menu2.setback_func(back_func::set_backbit);
1178         menu2.loop();
1179         menu2.hide();
1180     }
1181     if(back_func::backbit)
1182     {
1183         back_func::backbit = 0;
1184         return;
1185     }
1186     notice:
1187     {
1188         const int notice_height = 14;
1189         box notice(menu2_corner_top_left, menu2_width, notice_height);
1190         notice.settcolor(GREEN);
1191         notice << ui::centeralign << "Employee Management" << ui::endl << ui::
1192         endl;
1193         notice.settcolor(WHITE);
1194         notice << "Hit the button below to display the details of the employee
1195         you want to pay salary to: " << ui::endl;
1196         notice.settcolor(ui::tcolor);
1197         notice << ui::endl;
1198         notice.setexit_button("View employee...");
1199         notice.setback_func(back_func::set_backbit);
1200         notice.loop();
1201         notice.hide();
1202     }
1203     if(back_func::backbit)
1204     {
1205         back_func::backbit = 0;
1206         goto menu2;
1207     }
1208     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::centralalign << "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::centralalign << "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::centralalign << "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 );
1277     notice.hide();
1278     box notice2( notice.getcorner_top_left(), notice.getwidth(), notice.getheight
1279     ( ) );
1278     notice2.settcolor(GREEN);
1279     notice2 << ui::centralalign << "Employee Management" << ui::endl << ui::endl;
1280     notice2.hide(); notice.display();
1281     notice.settcolor(GREEN);
1282     notice << ui::centralalign << "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 *
145                 dist, const char *stat)
146 {
147     strcpy(house_no, hno);
148     strcpy(street, strt);
149     strcpy(city, cty);
150     strcpy(district, dist);
151     strcpy(state, stat);
152 }
153
154 userid::userid(str name, str plaintext) //plaintext is the unencrypted password
155 {
156     strcpy(username, name);
157     set_key(plaintext);
158     makecipher(plaintext);
159 }
160
161 userid::userid()
162 {
163     strcpy(username, "");
164     strcpy(passcipher, "");
165 }
166
167 void userid::makecipher(str plaintext)
168 {
169     int len = strlen(plaintext);
170     int keylen = strlen(default_key);
171     for(int i = 0; i < len; ++i)
172     {
173         int plntext_i = (int)plaintext[i] + 127;
174         int key_i = (int)default_key[i % keylen] + 127;
175         passcipher[i] = (char) ( ( plntext_i + key_i ) % 256 ) - 127);
176     }
177     passcipher[i] = '\0';
178 }
179
180 void userid::set_key(char * plaintext)
181 {
182     randomize();
183     int len = strlen(plaintext);
184     int keylen = random(len/2 + 1) + len/2; //so that the key is not too short
185     for (int i = 0; i <=keylen; ++i)
186     {
187         default_key[i] = (char) ( random(256) - 127 );
188     }
189     default_key[i] = '\0';
190 }
191
192 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 << ", "
        << a.city << ", " << a.district << ", " << a.state;
301 }
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
54     return a;
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
166             supplied to function\nFunction aborted");
167         return 0;
168     }
169     str temp;
170     int size_of_target;
171     switch(id_to_emp::convert(ID))
172     {
173         case INVALID:
174             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
244             could not be created or accessed\nFunction aborted");
245         return 0;
246     }
247     fout.write( (char *) a , size_of_target );
248     if(fout.fail())
249     {
250         interface::log_this("hospital::write_employee() : Error while writing to
251             file (fout.fail())\nFunction aborted");
252         return 0;
253     }
254     return 1;
255 }
256
257 int hospital::pay_salary(unsigned long id, Date d1, Time t1)
258 {
259     void * e = malloc( sizeof(doctor) );
260     if(e == NULL)
261     {
262         interface::log_this("hospital::pay_salary() : Not enough memory to
263             allocate buffer void * temp = malloc( sizeof(docto) )");
264         interface::error("Out of memory!! Check log");
265         getch();
266         return 0;
267     }
268     str temp;
269     switch(id.to_emp::convert(id))
270     {
271         case INVALID:
272             interface::log_this("hospital::pay_salary() : Invalid id supplied to
273                 function\nFunction aborted");
274             return 0;
275         case OTHERS:
276             sprintf(temp, "employee/%lu/trans.dat", id);
277             break;
278         case DOCTOR:
279             sprintf(temp, "employee/doctor/%lu/trans.dat", id);
280             break;
281         case NURSE:
282             sprintf(temp, "employee/nurse/%lu/trans.dat", id);
283             break;
284         case RECEPTIONIST:
285             sprintf(temp, "employee/receptionist/%lu/trans.dat", id);
286             break;
287     }
288     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 || inp_date.month < 1 ||
394         inp_date.day > monthDays[inp_date.month - 1] || inp_date.day < 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 (32, 14, 0);
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                                     ) );
438                     temp--;
439                     temp2++;
440                 }
441                 counter++;
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.
96                     get_med(i, 1) + quantity);
97             }
98         }
99
100        hospital::write_patient(temp_patient);
101        hospital::write_med(temp);
102
103        break;
104    }
105
106    case 2:
107    {
108        medicine temp;
109        temp.code = 0;
110
111        while(temp.code == 0){
112            coord c(ui::scr_width / 3, ui::scr_height / 3);
113            box purchase_menu (c, ui::scr_width / 3, ui::scr_height / 3);
114            purchase_menu.settcolor_input(YELLOW);
115            purchase_menu << ui::centralalign << "Medicine Purchase" << ui::
116                endl;
117            purchase_menu << "Code : ";
118            purchase_menu.setdefault(42);
119            purchase_menu >> temp.code;
120            purchase_menu << ui::endl;
121            purchase_menu.setexit_button("Submit");
122            purchase_menu.loop();
123            purchase_menu.hide();
124
125            temp = hospital::get_med_by_code(temp.code);
126        }
127
128        int quantity = -2;
129
130        while(quantity < 0 || quantity > 5000){
131            coord c(ui::scr_width / 3, ui::scr_height / 3);
132            box purchase_menu (c, ui::scr_width / 3, ui::scr_height / 2);
133            purchase_menu.settcolor_input(YELLOW);
134            purchase_menu << ui::centralalign << "Medicine Purchase" << ui::
135                endl;
136            purchase_menu << "Name : " << temp.name
137                << ui::endl << "Price : $" << temp.price
138                << ui::endl << ui::endl << "Quantity : ";
139            purchase_menu.setdefault(1);
140            purchase_menu >> quantity;
141            purchase_menu.setexit_button("Submit");
142            purchase_menu.loop();
143            purchase_menu.hide();

```

```

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",
149         system::get_date(), system::get_time());
150     hospital::write_med(temp);
151
152     break;
153 }
154
155 case 3:
156 {
157     medicine temp;
158     temp.code = 0;
159
160     while(temp.code == 0){
161         coord c(ui::scr_width / 3, ui::scr_height / 3);
162         box stock_menu (c, ui::scr_width / 3, ui::scr_height / 3);
163         stock_menu.settcolor_input(YELLOW);
164         stock_menu << ui::centralalign << "Stock check" << ui::endl;
165         stock_menu << "Code : ";
166         stock_menu.setdefault(42);
167         stock_menu >> temp.code;
168         stock_menu << ui::endl;
169         stock_menu.setexit_button("Submit");
170         stock_menu.loop();
171         stock_menu.hide();
172
173         temp = hospital::get_med_by_code(temp.code);
174     }
175
176     coord c(ui::scr_width / 3, ui::scr_height / 3);
177     box stock_menu (c, ui::scr_width / 3, ui::scr_height / 2);
178     stock_menu.settcolor_input(YELLOW);
179     stock_menu << ui::centralalign << "Medicine Details" << ui::endl;
180     stock_menu << "Name : " << temp.name
181         << ui::endl << "Price : $" << temp.price
182         << ui::endl << "Dosage : " << temp.dosage << " ml"
183         << ui::endl << "Quantity in stock : " << temp.stock
184         << ui::endl;
185     stock_menu.setexit_button("Okay");
186     stock_menu.loop();
187     stock_menu.hide();
188
189     break;
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() {}

```

```

258
259 box interface::window;

```

## 6. code/iface2.cpp

```

1  #include <fstream.h>
2  #include "base.hpp"
3  #include "iface.hpp"
4  #include "hosp.hpp"
5  #include "emp.hpp"
6
7  void interface::init() {
8      window.hide();
9      window.display();
10     window.settcolor(WHITE);
11     window << ui::centeralign << "LHOSPITAL";
12     window.settcolor(ui::tcolor);
13     window.setfooter.tcolor(GREEN);
14
15     Date current_date = system::get_date();
16     Time current_time = system::get_time();
17
18     str curr_date, curr_time;
19     sprintf(curr_date, "%d/%d/%d", current_date.day, current_date.month,
20             current_date.year);
21     sprintf(curr_time, "%d:%d", current_time.hour, current_time.minute);
22
23     window << box::setheader << curr_date << box::setheader << ui::rightalign
24             << curr_time << box::setfooter << ui::centeralign
25             << "Everything looks OK";
26
27     int id;
28     do
29     {
30         id = interface::login_screen();
31         if(id && id_to_emp::convert(id) != OTHERS || id == 1) //so that general
32             employees (except administrator) do // not
33             {
34                 accidentally login(as they have been assigned
35                 interface::clear.error(); // username and
36                 password as "", "")
37                 break;
38             }
39     }while(1);
40     if(id == 1) //if user logging in is administrator
41     {
42         int choice = 0;
43
44         while(1){
45             choice = interface::menu();
46
47             switch(choice){
48                 case 1:
49                     interface::employee_management();
50                     break;
51                 case 2:
52                     interface::stock_management();
53                     break;
54                 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
60                 account");
61             break;
62         case DOCTOR:
63         case NURSE:
64         case RECEPTIONIST:
65             interface::employee_screen(id);
66             break;
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
109             allocate buffer void * temp = malloc( sizeof(doctor) );");
110         interface::error("Out of memory!! Check log");
111         getch();
112         return 0;
113     }
114     if(!hospital::get_employee_by_id(id, x))
115     {
116         char log_msg[300];
117         sprintf(log_msg, "interface::login_screen() : Error in reading file
118             of id %lu (hospital::get_employee_by_id(id, x) returned 0), could
119             be due to invalid login details entered", id);
120         interface::log_this(log_msg);
121     }
122     employee * e = (employee *)x;
123     if(!strcmp(e->account.get_username(), uid) && e->account.login(pwd))
124     {
125         interface::clear_error();
126         free(x);
127         return id;
128     }
129     }
130     interface::error("Invalid login details!!");
131     free(x);
132     return 0;
133 }
134
135 int interface::menu(){
136     coord c(ui::scr.width / 3, ui::scr.height / 3);
137     box menu (c, ui::scr.width / 3, ui::scr.height / 2.2 + 1);
138
139     int ch;
140     menu << ui::endl << "1. Employee management"
141         << ui::endl << "2. Stock management"
142         << ui::endl << "3. Exit"
143         << ui::endl << ui::endl << "Choice : ";
144     menu.settcolor.input(YELLOW);
145     validate_menu::set_menu_limits(1, 3);
146     menu >> validate_menu::input >> ch;
147
148     menu << ui::endl;
149     menu.setexit.button("Submit");
150
151     menu.loop();
152     menu.hide();
153
154     return ch;
155 }
156
157 void interface::patient_management(){
158     int ch = 0;
159
160     coord c(ui::scr.width / 3, ui::scr.height / 3);
161     box menu (c, ui::scr.width / 3, ui::scr.height / 2.2);
162
163     menu << "1. Patient admission"
164         << ui::endl << "2. Patient discharge"
165         << ui::endl << "3. Edit patient details"
166         << 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 >> hospital::date_validity >> 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 >> hospital::date-validity >> 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 >> hospital::date-validity >> 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             )
307             , hospital::str-to-date(inp-dob.str),
308             inp-adr
309             , inp-phone, inp-dis, inp-guardname
310             , inp-emer-contact, inp-emer-phone
311             , inp-insur, hospital::str-to-date(
312                 inp-admdate.str));
313
314         hospital::write-patient(temp-pat);
315
316         coord d(ui::scr-width / 3, ui::scr-height / 3);
317         box message (d, ui::scr-width / 3, ui::scr-height / 3);
318
319         message << ui::centralalign << "Patient has been admitted with ID #"
320             << temp-pat.get-id() << ui::endl << ui::endl;
321
322         message.setexit_button("Okay");
323         message.loop();
324         message.hide();
325
326         break;
327     }
328
329     case 2:
330     {
331         patient temp-patient;
332
333         while(1){
334             coord c(ui::scr-width / 3, ui::scr-height / 3);
335             box login-box (c, ui::scr-width / 3, ui::scr-height / 2.5);
336
337             long inp-pat-id;
338
339             login-box << ui::endl << "Patient Discharge"
340                 << 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.
366                                                    get_admission_date
367                                                    (MONTH),
368                                                    temp_patient.
369                                                    get_admission_date
370                                                    (YEAR));
371
372     interface::log_this(
373         tt);
374
375     int stay_len = abs( hospital::get_date_difference(
376                                                    system::get_date(),
377                                                    Date(
378                                                    temp_patient.
379                                                    get_admission_date
380                                                    (DAY),
381                                                    temp_patient.
382                                                    get_admission_date
383                                                    (MONTH),
384                                                    temp_patient.
385                                                    get_admission_date
386                                                    (YEAR)
387                                                    )
388                                                    ) );
389
390     bill << ui::endl << "Bill for " << temp_patient.get_name()
391         << ui::endl << "1. Stay for "
392         << stay_len << " days" << ui::endl;
393
394     float total_bill;
395     bill.settcolor(GREEN);
396     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 " <<
480                 temp_patient.get_name()
481                 << ui::endl << "Disease : ";
482             disease temp = temp_patient.get_dis();
483             edit_screen.setdefault(temp.name);
484             edit_screen >> temp.name;
485             edit_screen << ui::endl << "Type : ";
486             edit_screen.setdefault(temp.type);
487             edit_screen >> temp.type;
488             edit_screen << ui::endl << "Type key : " << ui::endl
489                 << "0 - Brain\t1 - Heart" << ui::endl
490                 << "2 - Skin\t3 - Lung" << ui::endl
491                 << "4 - Bone\t5 - Eye" << ui::endl
492                 << "6 - Throat\t7 - Teeth" << ui::endl
493                 << "8 - Stomach\t9 - Blood" << ui::endl
494                 << "10 - General/full body condition"
495                 << ui::endl << ui::endl
496                 << "Symptoms" << ui::endl
497                 << "Symptom 1 : ";
498             edit_screen.setdefault(temp.symptoms[0]);
499             edit_screen >> temp.symptoms[0];
500             edit_screen << ui::endl << "Symptom 2 : ";
501             edit_screen.setdefault(temp.symptoms[1]);
502             edit_screen >> temp.symptoms[1];
503             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
529             .get_name()
530             << ui::endl << "Guardian Name : ";
531         str temp;
532         edit_screen.setdefault(temp_patient.get_guardian_name());
533         edit_screen >> temp;
534
535         edit_screen << ui::endl << ui::endl;
536         edit_screen.setexit_button("Submit");
537
538         edit_screen.loop();
539
540         edit_screen.hide();
541
542         temp_patient.set_guardian_name(temp);
543         hospital::write_patient(temp_patient);
544
545         break;
546     }
547
548     case 3:
549     {
550         coord c(ui::scr_width / 3, ui::scr_height / 3);
551         box edit_screen (c, ui::scr_width / 3, ui::scr_height / 2);
552         edit_screen.settcolor_input(YELLOW);
553
554         edit_screen << "Enter emergency contact no. for " <<
555             temp_patient.get_name()
556             << ui::endl << "Contact no. : ";
557         str temp;
558         edit_screen.setdefault(temp_patient.get_emergency_contact());
559         edit_screen >> temp;
560
561         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
19         or error while loading file\nmax_id will be set to zero");
20         max_id = 0;
21     }
22     else
23     {
24         fin.read((char *) &max_id, sizeof(unsigned long));
25         if(fin.fail())
26         {
27             interface::log_this("employee::generate_id() : Error while reading
28             from file max_id.dat (fin.fail())\nFunction aborted");
29             id = 0;
30             return 0;
31         }
32     }
33     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 il(id, OTHERS);
59         if(!il.status)
60         {
61             interface::error("ID not generated properly for this employee. Check
                                    log");
62             interface::log_this("employee::employee() : il.status was set to zero
                                    , i.e idlist.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 il(get_id(), DOCTOR);
220     if(!il.status)
221     {
222         interface::error("ID not generated properly for this employee. Check log"
            );
223         interface::log_this("doctor::doctor() : il.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 il(get_id(), NURSE);
269     if(!il.status)
270     {
271         interface::error("ID not generated properly for this employee. Check log"
            );
272         interface::log_this("nurse::nurse() : il.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)
301 {
302     id_to_emp il(get_id(), RECEPTIONIST);
303     if(!il.status)
304     {
305         interface::error("ID not generated properly for this employee. Check log"
306             );
307         interface::log_this("receptionist::receptionist() : il.status was set to
308             zero, i.e id_list.dat doesn't have a record of the employee's id");
309     }
310 }
311 receptionist::receptionist() : employee()
312 {}
313
314 //////////////////////////////////////
315 /// Function definitions for class id_to_emp
316
317 id_to_emp::id_to_emp(unsigned long inp1, int inp2)
318 {
319     status = 0;
320     id = inp1;
321     if(!id)
322     {
323         employee_type = INVALID;
324     }
325     else
326     {
327         employee_type = inp2;
328     }
329     mkdir("employee");
330     ofstream fout;
331     fout.open("employee/id_list.dat", ios::binary | ios::ate);
332     if(!fout)
333     {
334         interface::log_this("id_to_emp::id_to_emp() : File id_list.dat couldn't
335             be opened...\nFunction aborted");
336     }
337     else
338     {
339         fout.seekp(id * sizeof(id_to_emp), ios::beg);
340         fout.write((char *) this, sizeof(id_to_emp));
341         if(fout.fail())
342         {
343             interface::log_this("id_to_emp::id_to_emp() : Error while writing to
344                 file id_list.dat (fout.fail())\nFunction aborted");
345         }
346         else
347         {
348             status = 1;
349         }
350     }
351 }
352 id_to_emp::id_to_emp()
353 {
354     id = employee_type = status = 0;
355 }

```

```

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                               );
365         return INVALID;
366     }
367     fin.seekg( (ID * sizeof(id_to_emp)) );
368     fin.read((char *) &a, sizeof(id_to_emp));
369     if(fin.fail())
370     {
371         interface::log_this("id_to_emp::convert() : Error while reading from file
372                               id_list.dat (fin.fail())");
373         return INVALID;
374     }
375     fin.close();
376     if(a.id != ID)
377     {
378         interface::log_this("id_to_emp::convert() : (For dev only)Error in the
379                               code... Recheck it!!");
380         return INVALID;
381     }
382     return a.employee_type;
383 }

```

## 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,
7  disease inp6, str inp7, str inp8, phone inp9, insurance inp10, Date inp11) :
8  person(inp1, inp2, inp3, inp4, inp5)    //if date_of_admission is the current
9  system date, last argument is not needed
10 {
11     fstream pat ("patient/max_id.dat", ios::in | ios::binary | ios::out);
12     long max_id;
13     pat.read( (char*) &max_id, sizeof(long) );
14     max_id++;
15
16     id = max_id;
17
18     pat.seekp(0);
19     pat.write( (char*) &max_id, sizeof(long) );
20     pat.close();
21
22     dis = inp6;
23     strcpy(guardian_name, inp7);
24     strcpy(emergency_contact, inp8);
25     strcpy(emer_contact_no, inp9);
26     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);

```

```

142 }
143
144 void patient::set_emergency_contact(char *a)
145 {
146     strcpy(emergency_contact, a);
147 }
148
149 void patient::set_emer_contact_no(char *a)
150 {
151     strcpy(emer_contact_no, a);
152 }
153
154 void patient::set_insur_info(insurance a)
155 {
156     insur_info = a;
157 }
158
159 void patient::set_admission_date(Date a)
160 {
161     admission_date = a;
162     set_dob(dob, admission_date);
163 }
164
165 void patient::set_bill_amt(unsigned long a)
166 {
167     bill_amt = a;
168 }
169
170 void patient::set_med(int a, int b, int c){
171     med[a][0] = b;
172     med[a][1] = c;
173 }
174
175 void patient::set_discharge_date(Date inp){
176     discharge_date = inp;
177 }
178
179 void patient::discharge(){
180     discharged = 1;
181 }

```

## 9. code/PROC.CPP

```

1  #include <iostream.h>
2  #include <fstream.h>
3
4  typedef char str[100];
5
6  struct procedure{
7      str name;
8      float cost;
9  };
10
11 void main(){
12     ofstream proc ("proc.dat" , ios::out | ios::binary | ios::app);
13     procedure a;
14     cin.ignore(1000, '\n');
15     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::centralalign << "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::centralalign << "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
282                               -f.getheight()) / 2));
283     getch();

```



```

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             }

```

```

54         case 0:      break;
55         default:     return ch;
56     }
57
58     ch = getch();
59
60     unsigned char far *key_state_byte
61     = (unsigned char far*) 0x00400017;
62     int key_state = (int) *key_state_byte;
63
64     switch(ch)
65     {
66         case 72:      return UP;
67         case 80:      return DOWN;
68         case 75:      return LEFT;
69         case 77:      return RIGHT;
70         case 15:      if (key_state & 2) return SHIFT_TAB;
71                     //    ^^ Checks if shift was pressed
72         case 83:      return DELETE;
73         case 71:      return HOME;
74         case 79:      return END;
75     }
76
77     return -1;
78 }

```

## 12. code/UI/uibase.cpp

```

1  #include "ui/ui.hpp"
2  #include "iface.hpp"
3
4  int init_lib_ui::counter = 0;
5
6  init_lib_ui::init_lib_ui()
7  {
8      if(counter++ == 0)
9      {
10         ui::init();
11     }
12 }
13
14 int manipulator::index = 0;
15
16 manipulator::manipulator()
17 {
18     own_index = index;
19     index++;
20 }
21
22 int manipulator::operator==(manipulator m)
23 {
24     return own_index == m.own_index;
25 }
26
27 int ui::scr_height = 0,
28     ui::scr_width = 0,
29     ui::tcolor = LIGHTGRAY,
30     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::setttcolor(int c)
309 {
310     layout.setttcolor(c);
311 }
312
313 void box::setbcolor(int c)
314 {
315     layout.setbcolor(c);
316 }
317
318 void box::setttcolor_selected(int c)
319 {
320     layout.setttcolor_selected(c);
321 }
322
323 void box::setbcolor_selected(int c)
324 {
325     layout.setbcolor_selected(c);
326 }
327
328 void box::setttcolor_input(int c)
329 {
330     layout.setttcolor_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::unsigned_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/layout.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::set_tcolor_selected(int c)
10 {
11     tcolor_selected = c;
12 }
13
14 void button::set_bcolor_selected(int c)
15 {
16     bcolor_selected = c;
17 }
18
19 int button::get_tcolor_selected()
20 {
21     return tcolor_selected;
22 }
23
24 int button::get_bcolor_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     {

```

```

87         textcolor(gettcolor());
88         textbackground(getbcolor());
89     }
90
91     coord init_pos(wherex(), wherey());
92     coord c = getpos();
93     gotoxy(c.x, c.y + getoffset());
94     cprintf(getstr());
95     gotoxy(init_pos.x, init_pos.y);
96 }

```

## 18. code/UI/textbox.cpp

```

1  #include "ui/ui.hpp"
2
3  text_box::text_box()
4  {
5      is_password = 0;
6  }
7
8  /*
9   * Despite trying, this function has grown quite large
10  * Basically, it allows the user to enter text in the box
11  * and stores it.
12  * Returns GOTONEXT or GOTOPREV as per user's request to
13  * go to the next or the previous text box respectively
14  */
15  int text_box::input(int a)
16  {
17      coord c = getpos();
18      setoffset(a);
19      c.y += a;
20      gotoxy(c.x, c.y);
21
22      const char *string = getstr();
23      char str[100];
24      strcpy(str, string);
25
26      string_node *head = new string_node,
27                  *current = head;
28
29      int len = strlen(str);
30      string_node *temp_prev = NULL;
31      for(int i = 0; i < len ; i++)
32      {
33          current->data = str[i];
34          current->next = new string_node;
35          current->prev = temp_prev;
36          temp_prev = current;
37          current = current->next;
38      }
39
40      //At the end is a box with \0
41      current->data = '\0';
42      current->prev = temp_prev;
43      current = head;
44
45      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 =
67                         current;
68                     else head = current; //If the node to
69                         be deleted is the head
70
71                     current->prev = node_to_delete->prev;
72
73                     delete node_to_delete;
74
75                     gotoxy(wherex() - 1, wherey());
76
77                     print_str(head);
78                 }
79                 break;
80             case DELETE:
81                 if(current)
82                 {
83                     if(current->data == '\0') break; //No character to be
84                         deleted
85
86                     string_node *node_to_delete = current;
87
88                     if(current->prev) current->prev->next = current->next;
89                     else head = current->next;
90
91                     if(current->next) current->next->prev = current->prev;
92
93                     current = current->next;
94                     delete node_to_delete;
95
96                     print_str(head);
97                 }
98                 break;
99             case HOME:
100                 gotoxy(c.x, c.y);
101                 current = head;
102                 break;
103             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

```
1  #include "ui/ui.hpp"
2  #include "iface.hpp"
3
4  info_tbox::info_tbox()
5  {
6      tbox = NULL;
7      data_store = NULL;
8      type = OTHER;
9      validator = NULL;
10 }
11
12 int info_tbox::setdata()
13 {
14     if(validator(tbox->getstr()) == 0)
15     {
16         return 0;
17     }
18
19     char *fstr;
20     switch(type)
21     {
22         case INT:
23         {
24             fstr = "%d";
25             break;
26         }
27         case LONG:
28         {
29             fstr = "%ld";
30             break;
31         }
32         case UNSIGNED_LONG:
33         {
34             fstr = "%lu";
35             break;
36         }
37         case STRING:
38         case PASSWORD:
39         {
40             char *s = (char *) data_store;
41             strcpy(s, tbox->getstr());
42             return 1;
43         }
44         case CHAR:
45         {
46             fstr = "%c";
47             break;
48         }
49         case DOUBLE:
50         {
51             fstr = "%g";
52             break;
53         }
54         case FLOAT:
55         {
56             fstr = "%f";
57             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/21/BASE.DAT
8. code/PATIENT/17/BASE.DAT
9. code/PATIENT/3/BASE.DAT
10. code/PATIENT/24/BASE.DAT
11. code/PATIENT/22/BASE.DAT
12. code/PATIENT/14/TRANS.DAT
13. code/PATIENT/14/BASE.DAT
14. code/PATIENT/12/BASE.DAT
15. code/PATIENT/20/BASE.DAT
16. code/PATIENT/2/BASE.DAT
17. code/PATIENT/7/BASE.DAT
18. code/PATIENT/26/BASE.DAT
19. code/PATIENT/0/BASE.DAT
20. code/PATIENT/8/TRANS.DAT
21. code/PATIENT/8/BASE.DAT
22. code/PATIENT/25/BASE.DAT
23. code/PATIENT/23/BASE.DAT
24. code/PATIENT/16/BASE.DAT

25. code/PATIENT/13/TRANS.DAT
26. code/PATIENT/13/BASE.DAT
27. code/PATIENT/11/TRANS.DAT
28. code/PATIENT/11/BASE.DAT
29. code/PATIENT/18/BASE.DAT
30. code/PATIENT/19/BASE.DAT
31. code/PATIENT/15/BASE.DAT
32. code/PATIENT/9/TRANS.DAT
33. code/PATIENT/9/BASE.DAT
34. code/PATIENT/6/TRANS.DAT
35. code/PATIENT/6/BASE.DAT
36. code/PATIENT/10/BASE.DAT
37. code/PATIENT/4/BASE.DAT
38. code/EMPLOYEE/IDLIST.DAT
39. code/EMPLOYEE/MAXID.DAT
40. code/EMPLOYEE/1/TRANS.DAT
41. code/EMPLOYEE/1/BASE.DAT
42. code/EMPLOYEE/RECEPTIO/5/TRANS.DAT
43. code/EMPLOYEE/RECEPTIO/5/BASE.DAT
44. code/EMPLOYEE/DOCTOR/2/TRANS.DAT
45. code/EMPLOYEE/DOCTOR/2/BASE.DAT
46. code/EMPLOYEE/DOCTOR/7/TRANS.DAT
47. code/EMPLOYEE/DOCTOR/7/BASE.DAT
48. code/EMPLOYEE/6/TRANS.DAT
49. code/EMPLOYEE/6/BASE.DAT

50. code/EMPLOYEE/NURSE/3/TRANS.DAT

51. code/EMPLOYEE/NURSE/3/BASE.DAT

52. code/STOCK/MED.DAT



# Output

27/1/2018

20:27

LHOSPITAL

1. Patient admission  
2. Patient discharge  
3. Edit patient  
details  
4. Go to main menu  
  
Choice : 1

Everything looks OK

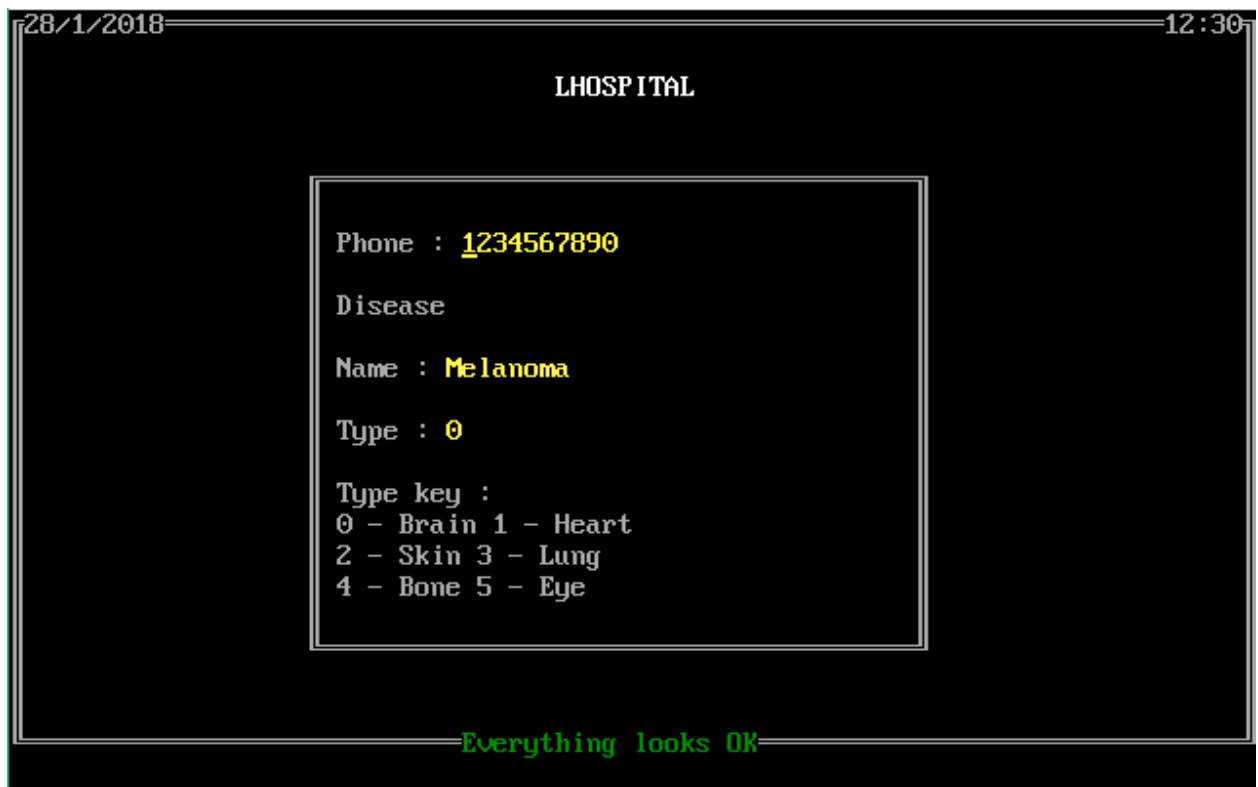
28/1/2018

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



28/1/201812:30

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 : \_

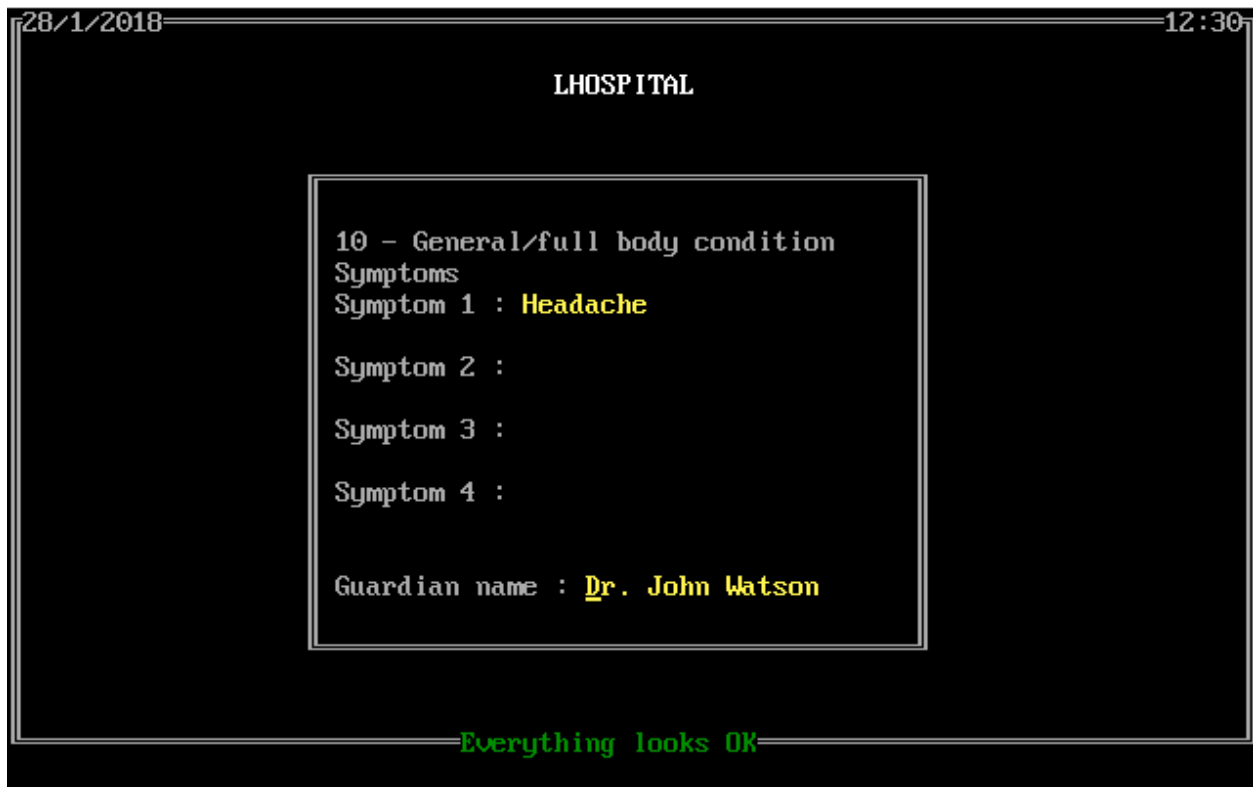
Everything looks OK

28/1/201812:30

LHOSPITAL

Provider : LIC  
Amount (\$) : 30000  
Expiry 25/12/2022  
  
Admission Date : 01/01/2018  
  
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

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Patient Discharge  
Enter patient ID : 14  
  
Submit

Everything looks OK

