

```

1 package com.company;
2 import java.security.NoSuchAlgorithmException;
3 import java.sql.ResultSet;
4 import java.util.Locale;
5 import java.util.Scanner;
6 import java.sql.SQLException;
7 import java.util.concurrent.atomic.AtomicBoolean;
8 import java.util.concurrent.atomic.AtomicInteger;
9
10 public class Main {
11     public static void main(String[] args){
12         AccountManager accountManager = new
13             AccountManager();
14         Scanner keyboard = new Scanner(System.in);
15         while(true) {
16             Thread loginAndSignUpThread = new
17                 Thread(() -> { try { loginAndSignUp(accountManager
18                     ); } catch (NoSuchAlgorithmException | SQLException
19                     | InterruptedException exception) { exception.
20                         printStackTrace(); } });
21             AtomicBoolean getOutOfLoginScreen = new
22                 AtomicBoolean(false);
23             boolean isTimeDateCheckThreadsCreated
24 = false;
25             Thread informSchedulesThread = null;
26             Thread notifyGranularSchedules = null;
27             try {
28                 loginAndSignUpThread.start();
29                 loginAndSignUpThread.join();
30
31                 while (true) {
32                     int userId = accountManager.
33                         getUserId(accountManager.getUsername());
34                     TimeDateCheck timeDateCheck =
35                         new TimeDateCheck(userId);
36                     if(
37                         !isTimeDateCheckThreadsCreated) {
38                             //execute thread for day-to
39                             -day schedule notification
40                             informSchedulesThread = new
41                                 Thread(() -> {
42                                     while (true) {

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33                                         timeDateCheck.  
34                                         informSchedules();  
35                                         final int  
36                                         APPROX_THIRTY_EIGHT_MINUTES = 2300000;  
37                                         try {  
38                                         Thread.sleep(  
39                                         APPROX_THIRTY_EIGHT_MINUTES);  
40                                         } catch (  
41                                         InterruptedException exception) {  
42                                         exception.  
43                                         printStackTrace();  
44                                         }  
45                                         }  
46                                         informSchedulesThread.start()  
47                                         //no .join; concurrent operation  
48                                         Thread.sleep(1500); //wait  
49                                         for informSchedulesThread to use ResultSet in its  
50                                         cycle (inside while)  
51                                         //execute thread for minute  
52                                         -to-minute schedule notification  
53                                         notifyGranularSchedules =  
54                                         new Thread(() -> {  
55                                         while (true) {  
56                                         try {  
57                                         timeDateCheck.  
58                                         notifyGranularSchedules();  
59                                         final int  
60                                         FIFTY_NINE_SECONDS = 59000;  
61                                         Thread.sleep(  
62                                         FIFTY_NINE_SECONDS);  
63                                         } catch (  
64                                         InterruptedException | SQLException exception) {  
65                                         exception.  
66                                         printStackTrace();  
67                                         }  
68                                         }  
69                                         }  
70                                         );  
71                                         notifyGranularSchedules.  
72                                         start(); //no .join; concurrent operation  
73                                         isTimeDateCheckThreadsCreated = true;  
74                                         }  
75                                         }
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60                                     Thread.sleep(10); //wait
61                                     for those two threads to finish its cycle
62                                     }
63                                     timeDateCheck.printLocalTime
64                                     ();
65                                     System.out.println("1. Show/
print schedules 2. Add a schedule\t3. Edit/Update
a schedule\t4. Complete/Delete a schedule\t5.
Logout\t6. Change a username\t7. Change a password
\t8. Delete an account\n(Type \"exit\" for Exit")
);
66                                     String optionChoice = keyboard
67                                     .nextLine().toLowerCase(Locale.ROOT).replaceAll(
68                                     "\\s", "");
69                                     //let user choose what to do
70                                     switch (optionChoice) {
71                                         case "printschedule", "
72                                         printschedules", "print", "showschedule", "
73                                         showschedules", "show", "1" -> {
74                                             Thread
75                                             printTasksThread = new Thread (()-> {try {
76                                                 accountManager.printTasks(userId, accountManager.
77                                                 getUsername()); } catch (SQLException |
78                                                 InterruptedException exception){ exception.
79                                                 printStackTrace();}});
80                                             printTasksThread.start
81                                         ());
82                                         printTasksThread.join
83                                         ();
84                                         }
85                                         case "addschedule", "
86                                         addaschedule", "addtheschedule", "2" -> {
87                                             Thread
88                                             addScheduleThread = new Thread(()-> { try {
89                                                 accountManager.addManualSchedule(userId); } catch
90                                                 (SQLException exception) { exception.
91                                                 printStackTrace(); } });
92                                             addScheduleThread.
93                                             start();
94                                             addScheduleThread.join
95                                         ());
96                                         }
97                                         case "editschedule", "
98                                         editschedules", "edittheschedule", "3" -> {
99                                             Thread
100                                            editScheduleThread = new Thread(()-> { try {
101                                                accountManager.editManualSchedule(userId); } catch
102                                                (SQLException exception) { exception.
103                                                printStackTrace(); } });
104                                            editScheduleThread.
105                                            start();
106                                            editScheduleThread.join
107                                         ());
108                                         }
109                                         case "deleteschedule", "
110                                         deleteschedules", "deletetheschedule", "4" -> {
111                                             Thread
112                                             deleteScheduleThread = new Thread(()-> { try {
113                                                 accountManager.deleteManualSchedule(userId); } catch
114                                                 (SQLException exception) { exception.
115                                                 printStackTrace(); } });
116                                             deleteScheduleThread.
117                                             start();
118                                             deleteScheduleThread.join
119                                         ());
120                                         }
121                                         case "logout", "exit" -> {
122                                             System.out.println("Logout successful!");
123                                             System.exit(0);
124                                         }
125                                         }
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78  editaschedule", "updateschedule", "updateaschedule
    ", "edit/updateschedule", "edit/updateaschedule",
    "editorupdateschedule", "editorupdateaschedule", "
3" -> {
79          Thread
80          editScheduleThread = new Thread(()-> { try {
81              accountManager.editSchedule(userId); } catch (
82                  SQLException | InterruptedException exception) {
83                  exception.printStackTrace(); } });
84          editScheduleThread.
85          start();
86          editScheduleThread.
87          join();
88      }
89      case "completeschedule", "
90      deleteschedule", "completeaschedule", "
91      deleteaschedule", "complete/deleteschedule", "
92      complete/deleteaschedule", "
93      completeordeleteschedule", "
94      completeordeleteaschedule", "4" -> {
95          Thread
96          editScheduleThread = new Thread(()-> { try {
97              accountManager.completeOrRemoveSchedule(userId
98          ); } catch (SQLException | InterruptedException
99              exception) { exception.printStackTrace(); } });
100         editScheduleThread.
101         start();
102         editScheduleThread.
103         join();
104     }
105     case "logout", "5" -> {
106         getOutOfLoginScreen.
107         set(accountManager.logout()); //too costly too
108         make a new thread
109     }
110     informSchedulesThread.
111     stop();
112     notifyGranularSchedules.stop();
113     }
114     case "changeusername", "
115     changeusername", "6" -> {
116         Thread
117         finalInformSchedulesThread = informSchedulesThread
118         ;

```

```

95                                     Thread
96                                     finalNotifyGranularSchedules =
97                                     notifyGranularSchedules;
96                                     Thread
97                                     changeUsernameThread = new Thread(()-> {
98                                         try {
99                                             accountManager.changeUsername(userId); } catch (
100                                                 NoSuchAlgorithmException | SQLException exception
101                                         ) { exception.printStackTrace(); }
102                                         getOutOfLoginScreen.set(accountManager.logout());
103                                         finalInformSchedulesThread.stop();
104                                         finalNotifyGranularSchedules.stop();
105                                         });
102                                         changeUsernameThread.
103                                         start();
103                                         changeUsernameThread.
104                                         join();
104                                         }
105                                         case "changepassword", "
106                                         changeapassword", "7" -> {
106                                         Thread
107                                         finalInformSchedulesThread1 =
107                                         informSchedulesThread;
108                                         Thread
108                                         finalNotifyGranularSchedules1 =
108                                         notifyGranularSchedules;
109                                         Thread
109                                         changeUsernameThread = new Thread(()-> {
110                                             try {
111                                                 accountManager.changePassword(userId); } catch (
112                                                 NoSuchAlgorithmException | SQLException exception
113                                         ) { exception.printStackTrace(); }
110                                         getOutOfLoginScreen.set(accountManager.logout());
111                                         finalInformSchedulesThread1.stop();
112                                         finalNotifyGranularSchedules1.stop();
113                                         });
114                                         changeUsernameThread.
114                                         start();

```

```

115                               changeUsernameThread.
116                           join();
117                           }
118                           case "deleteaccount", "
119                               deleteanaccount", "8" -> {
120                               Thread
121                               finalInformSchedulesThread2 =
122                               informSchedulesThread;
123                               Thread
124                               finalNotifyGranularSchedules2 =
125                               notifyGranularSchedules;
126                               Thread
127                               deleteAccountThread = new Thread(()-> {
128                                   try {
129                                       accountManager.removeAccount(userId); } catch (
130                                       SQLException exception) { exception.
131                                       printStackTrace(); }
132
133                                   getOutOfLoginScreen.set(accountManager.logout());
134
135                                   finalInformSchedulesThread2.stop();
136                                   finalNotifyGranularSchedules2.stop();
137                                   deleteAccountThread.
138                                   start();
139                                   deleteAccountThread.
140                                   join();
141                               }
142                               }
143                               case "exit" -> {
144                                   System.out.println("Bye!");
145                                   System.exit(0);
146                               }
147                               default -> System.out.
148                                   println("Wrong option.");
149                               }
150                               if (getOutOfLoginScreen.get
151                                   ())
152                               {
153                                   System.out.println("Logged
154                                   out.");
155                               break;
156                           }
157                           }
158                           }
159                           }

```

```

140             } catch (InterruptedException |  

141                 SQLException exception){  

142                     exception.printStackTrace();  

143                 }  

144             }  

145         }  

146     private static void loginAndSignUp(  

147         AccountManager accountManager) throws  

148             NoSuchAlgorithmException, SQLException,  

149             InterruptedException {  

150         AtomicBoolean loginSucceed = new  

151             AtomicBoolean(false);  

152         Scanner keyboard = new Scanner(System.in);  

153         AtomicInteger countLoginAttempt = new  

154             AtomicInteger(0);  

155         do {  

156             Thread getPasswordHintThread = new  

157             Thread(()-> { try { getPasswordHint(  

158                 countLoginAttempt.get()); } catch (SQLException  

159                 exception) { exception.printStackTrace(); } });  

160             getPasswordHintThread.start();  

161             getPasswordHintThread.join();  

162             System.out.println("Do you want to  

163                 Login (1) or Sign-up (2) to an account? (Type \"  

164                 exit\" for Exit)");  

165             String signUpOrLogin = keyboard.  

166             nextLine().toLowerCase(Locale.ROOT);  

167             switch (signUpOrLogin) {  

168                 case "login" , "log in" , "1"-> {  

169                     Thread loginThread = new  

170                     Thread(() -> {  

171                         try { loginSucceed.set(  

172                             accountManager.login()); } catch (  

173                             NoSuchAlgorithmException exception) { exception.  

174                             printStackTrace(); }  

175                         countLoginAttempt.  

176                         getAndIncrement();  

177                     });  

178                     loginThread.start();  

179                     loginThread.join();  

180                 }  

181                 case "sign-up" , "signup" , "2" -> {  

182

```

```

167                     Thread signUpThread = new
168                         Thread(()-> { try { accountManager.signUp(); } }
169                           catch (NoSuchAlgorithmException exception) {
170                             exception.printStackTrace(); } });
171                         signUpThread.start();
172                         signUpThread.join();
173                     }
174                     case "exit" -> {
175                         System.out.println("Bye!");
176                         System.exit(0);
177                     }
178                     default -> System.out.println(
179                         "Wrong option.");
180                 }
181             } while (!loginSucceed.get()); //repeat
until login succeed
182         }
183
184     private static void getPasswordHint(int
185 countLoginAttempt) throws SQLException {
186         Scanner keyboard = new Scanner(System.in);
187
188         if(countLoginAttempt >= 6){
189             System.out.println("Shutting down the
190 program for security reasons. (6 incorrect login
191 attempts)");
192             System.exit(0);
193         } else if(countLoginAttempt >=3){
194             MysqlExecute mysqlExecute = new
195 MysqlExecute();
196             System.out.println("In order to get
197 the password hint, what is the username of the
198 user that you are trying to log in?");
199             String usernameSearch = keyboard.
200 nextLine();
201             ResultSet passwordHint = mysqlExecute.
202 mysqlQuery("SELECT passwordHint FROM UserList
203 WHERE username = '" + usernameSearch + "'");
204             if(passwordHint == null){
205                 throw new SQLException();
206             }
207             if(passwordHint.next()){
208                 System.out.println("Password Hint
209 : " + passwordHint.getString(1) + ".");
210             }
211         }
212     }

```

```
196         }else{
197             System.out.println("Sorry, there
198             is no user called \"" + usernameSearch + "\".");
199         }
200     }
201 }
202
203
```

```
1 package com.company;
2 import java.math.BigInteger;
3 import java.nio.charset.StandardCharsets;
4 import java.security.NoSuchAlgorithmException;
5 import java.security.MessageDigest;
6
7 public class Sha256Hash {
8     private static byte [] getSHA256 (String
9         inputString) throws NoSuchAlgorithmException{
10         MessageDigest messageDigest = MessageDigest
11             .getInstance("SHA-256");
12         return messageDigest.digest(inputString.
13             getBytes(StandardCharsets.UTF_8));
14     }
15     private static String toHexStringMD(byte []
16         digest){
17         BigInteger bigIntegerMD = new BigInteger(1,
18             digest);
19         StringBuilder hexStringMD = new
20             StringBuilder(bigIntegerMD.toString(16));
21         for(int i = hexStringMD.length(); i<32; i
22             ++){
23             hexStringMD.insert(0, '0');
24         }
25         return hexStringMD.toString();
26     }
27     public static String doubleSHA256(String
28         passwordInput) throws NoSuchAlgorithmException {
29         return toHexStringMD(getSHA256(
30             toHexStringMD(getSHA256(passwordInput))));
31     }
32 }
33 }
```

```
1 package com.company;
2 import java.sql.*;
3
4 public class MysqlExecute {
5     private Statement statement;
6     public MysqlExecute(){
7         try {
8             Class.forName("com.mysql.cj.jdbc.Driver");
9             Connection connectionMysql =
10                DriverManager.getConnection("jdbc:mysql://fedora-
11                service.tplinkdns.com:215", "root", "EaCJoon@ted");
12             statement = connectionMysql.
13                 createStatement(ResultSet.TYPE_SCROLL_INSENSITIVE,
14                 ResultSet.CONCUR_READ_ONLY);
15             statement.executeQuery("use users");
16         } catch (SQLException | 
17             ClassNotFoundException exception){
18             exception.printStackTrace();
19         }
20     }
21
22     public ResultSet mysqlQuery(String
23         queryStatement){
24         try {
25             return statement.executeQuery(
26                 queryStatement);
27         } catch (SQLException exception) {
28             exception.printStackTrace();
29         }
30         return null;
31     }
32     public int mysqlUpdate(String updateStatement){
33         try {
34             return statement.executeUpdate(
35                 updateStatement);
36         } catch (SQLException exception) {
37             exception.printStackTrace();
38         }
39         return -1;
40     }
41 }
```

```

1 package com.company;
2 import java.sql.ResultSet;
3 import java.sql.SQLException;
4 import java.time.format.DateTimeFormatter;
5 import java.time.LocalDateTime;
6 import java.util.ArrayList;
7 import java.util.Calendar;
8 import java.util.HashMap;
9 import java.util.Map;
10
11 public class TimeDateCheck extends Thread{
12     MysqlExecute mysqlExecute = new MysqlExecute();
13
14     private final String localTime;
15     private final int userId;
16
17     public TimeDateCheck(int userId) throws
18         SQLException {
19         this.userId = userId;
20         DateTimeFormatter dateTimeFormatter =
21             DateTimeFormatter.ofPattern("yyyy-MM-dd HH:mm");
22         LocalDateTime updatedTime = LocalDateTime.
23             now();
24         localTime = dateTimeFormatter.format(
25             updatedTime);
26     }
27
28     private synchronized ResultSet getScheduleDate
29         () throws SQLException { //return resultSet of
30         TaskList table
31         //synchronized to prevent the two Threads
32         //accessing ResultSet at the same time (just to make
33         //sure)
34         ResultSet scheduledDate = mysqlExecute.
35         mysqlQuery("SELECT manualScheduleDate,
36         manualScheduleName, interestScheduleId FROM
37         TaskList WHERE userId = " + userId);
38         if (scheduledDate == null) {
39             throw new SQLException();
40         }
41         return scheduledDate;
42     }
43     public void printLocalTime() {
44         System.out.println("\nCurrent Time: " +
45

```

```

33 localTime);
34     }
35
36     public void informSchedules() { //inform
37         schedules in a day-to-day classification
38         ArrayList<Integer> interestScheduleIds =
39             new ArrayList<>();
40
41         //variable i is for counting number of rows
42         //representing interest-based schedule;
43         int i = 1;
44         try {
45             ResultSet scheduledDate =
46             getScheduledDate();
47             scheduledDate.next();
48             while ((scheduledDate.getString(3) !=
49 null)) {
50                 interestScheduleIds.add(
51                     scheduledDate.getInt(3));
52                 scheduledDate.next();
53                 i++;
54                 if (scheduledDate.isAfterLast()) {
55                     break;
56                 }
57                 //i's initial value is 0 because i
58                 //is incremented before going to examine the next
59                 //row in this loop.
60             }
61             HashMap<String, String>
62             interestScheduleHM = getInterestScheduleHM(
63             interestScheduleIds);
64             scheduledDate.absolute(1); //reset the
65             cursor
66
67             String localDateStr = localTime.
68             substring(0, localTime.length() - 6);//print
69             interest-based schedules that are due.
70             if (scheduledDate.getString(3) != null
71             ) { //make sure 1st row is interest-based schedule
72                 for (Map.Entry<String, String>
73                 interestScheduleHMMMap : interestScheduleHM.entrySet
74                 ()) {
75                     if (interestScheduleHMMMap.
76                     getValue().substring(0, interestScheduleHMMMap.

```

```

59 getValue().length() - 9).equals(localDateStr)) {
60                                     System.out.println("\t It
61             is " + interestScheduleHMMMap.getKey() + " Today
62             \t");
63             }
64             scheduledDate.absolute(i); //set
65             the cursor so that it reads manually added
66             schedules
67             scheduledDate.previous();
68             }
69
70             //store schedules due in arrayList and
71             print them out
72             ArrayList<String> schedulesToday = new
73             ArrayList<>();
74             ArrayList<String> schedulesTomorrow =
75             new ArrayList<>();
76             ArrayList<String> schedulesNext7Days =
77             = new ArrayList<>();
78             ArrayList<String> schedulesThisWeek =
79             new ArrayList<>();
80             ArrayList<String> overdueSchedules =
81             new ArrayList<>();
82
83             while (scheduledDate.next()) {
84                 String dbScheduleDate =
85                 scheduledDate.getString(1);
86                 String dbScheduleName =
87                 scheduledDate.getString(2);
88
89                 String localYearAndMonth =
90                 localTime.substring(0, localTime.length() - 9);
91                 String dbScheduleYearAndMonth =
92                 dbScheduleDate.substring(0, dbScheduleDate.length
93                 () - 12);
94
95                 boolean ifDateEquals =
96                 dbScheduleDate.substring(0, dbScheduleDate.length
97                 () - 9).equals(localDateStr);
98
99                 if (ifDateEquals) {
100                     schedulesToday.add("\t You
101 have \" + dbScheduleName + "\" in " +

```

```

84 dbScheduleDate + ". Have a great today! ");
85 } else {
86         int localYear = Integer.
87             parseInt(localTime.substring(0, localTime.length()
88             () - 12));
89         int dbYear = Integer.parseInt(
90             dbScheduleDate.substring(0, dbScheduleDate.length()
91             () - 15));
92
93         int localMonth = Integer.
94             parseInt(localTime.substring(localTime.length() -
95             11, localTime.length() - 9));
96         int dbMonth = Integer.parseInt(
97             dbScheduleDate.substring(dbScheduleDate.length()
98             () - 14, dbScheduleDate.length() - 12));
99
100        int localDay = Integer.
101            parseInt(localTime.substring(localTime.length() -
102             8, localTime.length() - 6));
103        int dbDay = Integer.parseInt(
104            dbScheduleDate.substring(dbScheduleDate.length()
105             () - 11, dbScheduleDate.length() - 9));
106
107
108        if (dbScheduleYearAndMonth.
109            equals(localYearAndMonth) && (dbDay - localDay
110            ) == 1) {
111            schedulesTomorrow.add("\t
112                You have \"" + dbScheduleName + "\" in "
113                + dbScheduleDate + ". Have a great Tomorrow! ");
114        } else if (dayDiff < 0 &&
115            dbMonth - localMonth <= 0 && dbYear - localYear
116            <= 0) {
117            overdueSchedules.add("\t
118                You have \"" + dbScheduleName + "\" in "
119                + dbScheduleDate + ". Please do your work. ");
120        } else if (
121            dbScheduleYearAndMonth.equals(localYearAndMonth
122            ) && dayDiff <= 7) {
123            //doesn't work in when the
124            //day goes to next month

```

```

104             schedulesNext7Days.add("\t
105                 You have \"" + dbScheduleName + "\" in " +
106                 dbScheduleDate + ". Have a great day! ");
107
108             Calendar localCalendar =
109                 Calendar.getInstance();
110                 localCalendar.set(localYear,
111                 localMonth, localDay);
112                 Calendar dbCalendar = Calendar
113                 .getInstance();
114                 dbCalendar.set(dbYear, dbMonth
115                 , dbDay);
116
117                 //get week of year to get what
118                 //schedules are in this week.
119                 int localWeekOfYear =
120                     localCalendar.get(Calendar.WEEK_OF_YEAR);
121                 int dbWeekOfYear = dbCalendar.
122                     get(Calendar.WEEK_OF_YEAR);
123                 if (localWeekOfYear ==
124                     dbWeekOfYear && localYear == dbYear) {
125                     schedulesThisWeek.add("\t
126                         You have \"" + dbScheduleName + "\" in " +
127                         dbScheduleDate + ". Have a great week! ");
128                     }
129                 }
130
131                 System.out.println("\n(complete the
132                 schedule to remove items below)\nSchedules for
133                 Today:");
134                 for (String s : schedulesToday) {
135                     System.out.println(s);
136                 }
137
138                 System.out.println("\nSchedules for
139                 Tomorrow:");
140                 for (String s : schedulesTomorrow) {
141                     System.out.println(s);
142                 }
143
144                 System.out.println("\nSchedules for
145                 the next 7 Days:");

```

```

132             for (String s : schedulesNext7Days) {
133                 System.out.println(s);
134             }
135
136             System.out.println("\nOverdue
Schedules: (Please complete these works ASAP):");
137             for (String s : overdueSchedules) {
138                 System.out.println(s);
139             }
140
141             System.out.println("\nSchedules for
this Week:");
142             for (String s : schedulesThisWeek) {
143                 System.out.println(s);
144             }
145         } catch (SQLException exception) {
146             exception.printStackTrace();
147         }
148     }
149     private static HashMap<String, String>
getInterestScheduleHM(ArrayList<Integer> eventIds
) throws SQLException{
150     //return arrayList that has name and date of
interest based schedules from their event ids.
151     MysqlExecute mysqlExecute = new
MysqlExecute();
152     HashMap<String, String> interestScheduleHM
= new HashMap<>();
153     for (Integer eventId : eventIds) {
154         ResultSet interestSchedule =
mysqlExecute.mysqlQuery("SELECT eventName,
eventDate FROM InterestSchedule WHERE eventId = \
" + eventId + "\;" );
155         interestSchedule.next();
156         interestScheduleHM.put(
interestSchedule.getString(1), interestSchedule.
getString(2));
157     }
158     return interestScheduleHM;
159 }
160
161     public void notifyGranularSchedules() throws
SQLException { //notify schedules that in minute
to minute granularity.

```

```

162         //set the cursor where manually added
163         schedules start
164             ResultSet scheduledDate = getScheduleDate
165             ();
166             scheduledDate.next();
167             while ((scheduledDate.getString(3) != null
168 )) {
169                 scheduledDate.next();
170                 if (scheduledDate.isAfterLast()) {
171                     break;
172                 }
173                 scheduledDate.previous();
174                 while (scheduledDate.next()) {
175                     String dbScheduleDate = scheduledDate.
176                     getString(1);
177                     String dbScheduleName = scheduledDate.
178                     getString(2);
179                     String localDateStr = localTime.
180                     substring(0, localTime.length() - 6);
181                     boolean ifDateEquals = dbScheduleDate.
182                     substring(0, dbScheduleDate.length() - 9).equals(
183                     localDateStr); //if year, month, day equals
184                     int dbDateLen = dbScheduleDate.length
185                     () - 3;
186                     int minLocal, minDB;
187                     minLocal = Integer.parseInt(localTime.
188                     substring(localTime.length() - 2));
189                     minDB = Integer.parseInt(
190                     dbScheduleDate.substring(dbDateLen - 2, dbDateLen
191                     ));
192                     int hourToMinLocal, hourToMinDB;
193                     hourToMinLocal = Integer.parseInt(
194                     localTime.substring(localTime.length() - 5,
195                     localTime.length() - 3)) * 60;//hour value to
196                     minutes
197                     hourToMinDB = Integer.parseInt(
198                     dbScheduleDate.substring(dbDateLen - 5, dbDateLen
199                     - 3)) * 60;//hour value to minutes
200

```

```

189             int minTotalDiff = (minDB +
    hourToMinDB) - (minLocal + hourToMinLocal); //  

    minute difference  

190
191             if (minTotalDiff < 0) {
192                 continue;
193             }
194             if (dbScheduleDate.substring(0,
    dbScheduleDate.length() - 3).equals(localTime)) {
195                 System.out.println("\n    You are
    scheduled to have " + dbScheduleName + " Right Now
    !");
196             } else if (ifDateEquals && (
    minTotalDiff <= 10)) {
197                 System.out.println("\n    You are
    scheduled to have " + dbScheduleName + " within 10
    minutes. Hurry!    ");
198             } else if (ifDateEquals && (
    minTotalDiff <= 30)) {
199                 System.out.println("\n    You are
    scheduled to have " + dbScheduleName + " within 30
    minutes. Get your pace up!    ");
200             } else if (ifDateEquals && (
    minTotalDiff <= 60)) {
201                 System.out.println("\n    You are
    scheduled to have \" + dbScheduleName + "
    within 1 hour. Work or prepare on it if you haven't
    done it!    ");
202             } else if (ifDateEquals && (
    minTotalDiff <= 150)) {
203                 System.out.println("\n✓ You are
    scheduled to have \" + dbScheduleName + "
    within 2 hour and 30 minutes. Hope that this
    reminds your schedule! ✓");
204             } else if (ifDateEquals && (
    minTotalDiff <= 720)) {
205                 System.out.println("\n    You are
    scheduled to have \" + dbScheduleName + "
    within 12 hours. It's just a reminder. you don't
    have to worry about it right know.    ");
206             }
207         }
208     }
209 }
```

```
1 package com.company;
2
3 import java.security.NoSuchAlgorithmException;
4 import java.sql.*;
5 import java.util.*;
6
7 public class AccountManager {
8     private final Scanner keyboard = new Scanner(
9         System.in);
10    private String username; //cannot be declared
11    final
12    private final MysqlExecute mysqlExecute;
13
14    public AccountManager(){
15        mysqlExecute = new MysqlExecute();
16    }
17    public String getUsername() {
18        return username;
19    }
20    public int getUserId(String username){
21        int userId = 0;
22        try{
23            ResultSet resultSet = mysqlExecute.
24 mysqlQuery("SELECT userId FROM UserList WHERE
25 username=\"" + username + "\";");
26            if(resultSet == null){
27                throw new SQLException();
28            }
29            resultSet.next();
30            userId = resultSet.getInt(1);
31        } catch (SQLException exception){
32            exception.printStackTrace();
33        }
34        return userId;
35    }
36
37    public void signUp() throws
38    NoSuchAlgorithmException {
39        final String signingUsername, password,
40        passwordHint, userAddStatement;
41        final int interestedBranchId;
42        System.out.println("Please enter your
43        username:");
44        signingUsername = keyboard.nextLine();
```

```

38         if(signingUsername.equals("admin")){
39             System.out.println("Cannot sign-up to
Administrator account in client version.");
40             return;
41         }
42         System.out.println("Please enter your
password:");
43         password = Sha256Hash.doubleSHA256(keyboard
.nextLine());
44         System.out.println("Please enter your
password hint (optional):");
45         passwordHint = keyboard.nextLine();
46         System.out.println("Options available: 1.
Holidays or Other Special Days\t2. Computers\t3.
Politics");
47         System.out.println("Please choose your
interested subject:");
48         switch (keyboard.nextLine().toLowerCase(
Locale.ROOT).replaceAll("\\s","")){
49             case "holidays", "otherspecialdays", "holidaysorotherspecialdays", "1" ->
interestedBranchId = 1;
50             case "computers", "computer", "2" ->
interestedBranchId = 2;
51             case "politics", "politic", "3" ->
interestedBranchId = 3;
52             default -> {
53                 System.out.println("Invalid option
.");
54             return;
55         }
56     }
57
58     try {
59         ResultSet userList = mysqlExecute.
mysqlQuery("SELECT username FROM UserList");
60         if(userList == null){
61             throw new SQLException();
62         }
63         while(userList.next()){
64             if(signingUsername.equals(userList.
getString(1))){
65                 System.out.println("Username
already exists!");

```

```

66                     return;
67                 }
68             }
69             userAddStatement = "INSERT INTO
70             UserList(username,password,passwordHint,
71             interestedBranchId) VALUES (" + signingUsername
72             + "\",\" + password + "\",\" + passwordHint + "
73             + "\",\" + interestedBranchId + ");";
74             int resultValue = mysqlExecute.
75             mysqlUpdate(userAddStatement);
76             if(resultValue == -1) {
77                 throw new SQLException();
78             } else if(!
79             addInterestedSchedulesToTaskList(getUserId(
80             signingUsername),interestedBranchId)){
81                 System.out.println("Failed to
82                 allocate interest-based schedules for the user.");
83             } else{
84                 System.out.println("User " +
85             signingUsername + " successfully registered.");
86             }
87         } catch (SQLException exception) {
88             exception.printStackTrace();
89         }
90     }
91     private boolean
92     addInterestedSchedulesToTaskList(int userId, int
93     branchId){
94         if(userId == 1){
95             System.out.println("You cannot modify/
96             change anything about Administrator's account on
97             the client version.");
98             return false;
99         }
100        try {
101            ArrayList<Integer> eventIds = new
102            ArrayList<>();
103            ResultSet eventsSet = mysqlExecute.
104            mysqlQuery("SELECT eventId, eventName, eventDate
105            FROM InterestSchedule WHERE branchId = " +
106            branchId + ";");
107            if (eventsSet == null) {
108                return false;
109            }
110        }
111    }

```

```

93             while (eventsSet.next()) {
94                 eventIds.add(eventsSet.getInt(1));
95             }
96             for (int eventId : eventIds) {
97                 if (mysqlExecute.mysqlUpdate("INSERT INTO TaskList(userId, interestScheduleId)
VALUES (" + userId + "," + eventId + ");") == -1
) {
98                     return false;
99                 }
100            }
101        } catch (SQLException exception){
102             return false;
103         }
104     return true;
105 }
106
107     public void removeAccount(int userId) throws
SQLException {
108         if(userId == 1){
109             System.out.println("You cannot delete
Administrator's account on the client version.");
110             return;
111         }
112         if(mysqlExecute.mysqlUpdate("DELETE FROM
UserList WHERE userId = " + userId + ";") == -1){
113             throw new SQLException();
114         }
115         System.out.println("User \" " + username +
"\\" successfully deleted. Hope we see again.");
116     }
117
118     public boolean login() throws
NoSuchAlgorithmException {
119         final String password, usernameTemp; // //usernameTemp for security reasons
120         System.out.println("Please enter your
username:");
121         usernameTemp = keyboard.nextLine();
122         if(usernameTemp.equals("admin")){
123             System.out.println("Cannot login as
Administrator in a client version.");
124             return false;
125         }

```

```

126         System.out.println("Please enter your
127             password:");
128             password = Sha256Hash.doubleSHA256(
129                 keyboard.nextLine());
130
131             try {
132                 ResultSet resultSet = mysqlExecute.
133                     mysqlQuery("SELECT username, password FROM
134                     UserList;");
135                     if(resultSet == null){
136                         return false;
137                     }
138                     while (resultSet.next()) {
139                         if (resultSet.getString(1).equals(
140                             usernameTemp) && resultSet.getString(2).equals(
141                             password)) {
142                             username = usernameTemp;
143                             System.out.println("Welcome "
144                                 + username + "!\nNow you are logged in as " +
145                                 username + ".");
146                             return true;
147                         }
148                     } //implicit else -> loginSucceed =
149                     false
150                     System.out.println("Login failed.\n
151                     Please check your username and password.");
152             } catch (SQLException exception) {
153                 exception.printStackTrace();
154             }
155             return false;
156         }
157
158         public boolean logout(){ //erase user's data
159             for security. (final and method scope)
160                 username = "";
161                 return true;
162             }
163             public void addManualSchedule(int userId)
164                 throws SQLException {
165                 if(userId == 1){
166                     System.out.println("You cannot modify/
167                         change anything about Administrator's account on
168                         the client version.");
169                     return;

```

```

156      }
157      final String descrpSchedule;
158      final String dateSchedule;
159      final String manualScheduleAddStatement;
160      System.out.println("To add a schedule,
161      first provide a description of the event: (Must be
162      in the form of yyyy-MM-dd HH:mm:ss)");
163      descrpSchedule = keyboard.nextLine();
164      System.out.println("Second, provide a date
165      of the event:");
166      dateSchedule = keyboard.nextLine();
167      manualScheduleAddStatement = "INSERT INTO
168      TaskList(userId,manualScheduleName,
169      manualScheduleDate) VALUES (" + userId + ",\"" +
170      descrpSchedule + "\",\"" + dateSchedule + "\");";
171      int resultValue = mysqlExecute.mysqlUpdate
172      (manualScheduleAddStatement);
173      if (resultValue == -1) {
174          throw new SQLException();
175      } else{
176          System.out.println("Schedule " +
177          descrpSchedule + " successfully added.");
178      }
179
180      public void editSchedule(int userId) throws
181      SQLException, InterruptedException {
182          if(userId == 1){
183              System.out.println("You cannot modify/
184              change anything about Administrator's account on
185              the client version.");
186              return;
187          }
188          printTasks(userId,username);
189          System.out.println("Please select from
190          schedules above: (either by its name or number)");
191          final String enteredTaskIdOrName= keyboard
192          .nextLine();
193
194          ResultSet taskIdsAndNames = mysqlExecute.
195          mysqlQuery("SELECT taskId, manualScheduleName FROM
196          TaskList WHERE userId = " + userId);
197          if(taskIdsAndNames == null){
198              throw new SQLException();
199

```

```

185         }
186         while(taskIdsAndNames.next()){
187             if(enteredTaskIdOrName.equals(
188                 taskIdsAndNames.getString(1)) ||
189                 enteredTaskIdOrName.equals(taskIdsAndNames.
190                 getString(2))){
191                 System.out.println("Enter the new
192                 description for the new schedule: ");
193                 final String newScheduleName =
194                 keyboard.nextLine();
195                 System.out.println("Enter the new
196                 due date for the new schedule: ");
197                 final String newScheduleDate =
198                 keyboard.nextLine();
199                 ResultSet
200                 manualScheduleNameAndDate= mysqlExecute.mysqlQuery
201                 ("SELECT manualScheduleName FROM TaskList WHERE
202                 NOT (TaskId = \\" + enteredTaskIdOrName + "\\ OR
203                 manualScheduleName = \\" + enteredTaskIdOrName + "
204                 \\);");
205                 if(manualScheduleNameAndDate ==
206                     null){
207                     throw new SQLException();
208                 }
209                 while (manualScheduleNameAndDate.
210                     next()){
211                     if(manualScheduleNameAndDate.
212                         getString(1).equals(newScheduleName)){
213                         System.out.println("Cannot
214                         update a schedule with duplicate or same
215                         information.");
216                         return;
217                     }
218                 }
219                 if(mysqlExecute.mysqlUpdate(
220                     "UPDATE TaskList SET manualScheduleName = \\" +
221                     newScheduleName + "\\, manualScheduleDate = \\" +
222                     newScheduleDate + "\\ WHERE userId = " + userId +
223                     " AND " + "(taskId = \\" + enteredTaskIdOrName + "
224                     \\ OR manualScheduleName = \\" + enteredTaskIdOrName + "
225                     \\);") == -1){
226                     throw new SQLException();
227                 }

```

```

206             System.out.println("Schedule
207             information successfully changed.");
208         }
209     }
210     System.out.println("Did not find a
211     matching schedule; please try again.");
212 }
213 public void completeOrRemoveSchedule(int
214 userId) throws SQLException, InterruptedException
215 { //later implement streak system
216     if(userId == 1){
217         System.out.println("You cannot modify/
218         change anything about Administrator's account on
219         the client version.");
220         return;
221     }
222     printTasks(userId,username);
223     Thread.sleep(10);
224     System.out.println("Do you want to remove
225     a schedule by its Task ID or its Name?");
226     if(keyboard.nextLine().equalsIgnoreCase("taskid")){
227         System.out.println("Please select from
228         schedules above: (by its Task ID) (cannot delete
229         interest-based schedule by its ID)");
230         String removingTaskId = keyboard.
231         nextLine();
232         if(mysqlExecute.mysqlUpdate("DELETE
233             FROM TaskList WHERE userId = " + userId + " AND
234             taskId = " + removingTaskId + ";") == -1){
235             throw new SQLException(); //make
236             for deletion by schedule name in the future
237         }
238     } else if(keyboard.nextLine().
239     equalsIgnoreCase("name")){
240         System.out.println("Please select from
241         schedules above: (by its Name) (cannot delete
242         interest-based schedule by its ID)");
243         String removingTaskId = keyboard.
244         nextLine();
245         if(mysqlExecute.mysqlUpdate("DELETE
246             FROM TaskList WHERE userId = " + userId + " AND

```

```

230 manualScheduleName = "\"" + removingTaskId + "\";"
231 ) == -1){
232             throw new SQLException(); //make
for deletion by schedule name in the future
233         }
234     } else {
235         System.out.println("Wrong option.");
236         return;
237     }
238     System.out.println("Task successfully
completed/deleted.");
239 }
240 public void changeUsername(int userId) throws
    NoSuchAlgorithmException, SQLException {
241     if(userId == 1){
242         System.out.println("You cannot modify/
change anything about Administrator's account on
the client version.");
243         return;
244     }
245     while(true) {
246         System.out.println("Please enter your
password for security check.");
247         String passwdCheck = Sha256Hash.
    doubleSHA256(keyboard.nextLine());
248         ResultSet password = mysqlExecute.
    mysqlQuery("SELECT password FROM UserList WHERE
    userId = " + userId);
249         if(password == null){
250             throw new SQLException();
251         }
252         password.next();
253         if(!passwdCheck.equals(password.
    getString(1))){
254             System.out.println("Security check
    failed; please enter valid password.");
255             continue;
256         }
257         System.out.println("Please enter your
    new username:");
258         String newUsername = keyboard.nextLine
    ();
259         System.out.println("Please confirm (re

```

```

259 -type) your new username:");
260             String confirmPassword = keyboard.
261                 nextLine();
262             ResultSet currentUsername =
263                 mysqlExecute.mysqlQuery("SELECT username FROM
264                 UserList WHERE userId = " + userId);
265                 if(currentUsername == null){
266                     throw new SQLException();
267                 }
268                 currentUsername.next();
269                 if(newUsername.equals(currentUsername.
270                     getString(1))){
271                     System.out.println("Cannot change
272                         the username if the new username is equal to the
273                         current username.");
274                     continue;
275                 }
276                 if (newUsername.equals(
277                     confirmPassword)) {
278                     if(mysqlExecute.mysqlUpdate(
279                         "UPDATE UserList SET username = '" + newUsername
280                         + "' WHERE userId = " + userId + ";") == -1){
281                         throw new SQLException();
282                     }
283                     System.out.println("Username
284                         successfully changed.");
285                     return;
286                 } else {
287                     System.out.println("New Username
288                         does not match; please try again.");
289                 }
290             }
291         public void changePassword(int userId) throws
292             NoSuchAlgorithmException, SQLException {
293             if(userId == 1){
294                 System.out.println("You cannot modify/
295                     change anything about Administrator's account on
296                     the client version.");
297                 return;
298             }
299             while (true) {
300                 System.out.println("Please enter your
301                     current password for security check.");

```

```

288         String currentPasswdCheck = Sha256Hash
289             .doubleSHA256(keyboard.nextLine());
290         ResultSet currentPassword =
291             mysqlExecute.mysqlQuery("SELECT password FROM
292             UserList WHERE userId = " + userId);
293         if(currentPassword == null){
294             throw new SQLException();
295         }
296         currentPassword.next();
297         if(!currentPasswdCheck.equals(
298             currentPassword.getString(1))){
299             System.out.println("Security check
300             failed; please enter valid password.");
301             return;
302         }
303         System.out.println("Please enter your
304         new password:");
305         String newPassword = Sha256Hash.
306             doubleSHA256(keyboard.nextLine());
307         System.out.println("Please confirm (
308             retype) your new password:");
309         String confirmPassword = Sha256Hash
310             .doubleSHA256(keyboard.nextLine());
311         if(newPassword.equals(confirmPassword.
312             getString(1))){
313             System.out.println("Cannot change
314             the password if the new password is equal to the
315             current password.");
316             continue;
317         }
318         if (newPassword.equals(
319             confirmPassword)) {
320             System.out.println("Please enter
321             your new password hint:");
322             String passwordHint = keyboard.
323                 nextLine();
324             if(mysqlExecute.mysqlUpdate(
325                 "UPDATE UserList SET password = '" + newPassword
326                 + "' , passwordHint = '" + passwordHint + "'"
327                 + " WHERE userId = " + userId + ";") == -1){
328                 throw new SQLException();
329             }
330             System.out.println("Password
331             successfully changed.");

```

```

313             return;
314         } else {
315             System.out.println("New Password
316             does not match; Please try again.");
317         }
318     }
319     public void printTasks(int userId, String
320     username) throws SQLException,
321     InterruptedException {
320         if (userId == 1) {
321             System.out.println("You cannot modify/
322             change anything about Administrator's account on
323             the client version.");
322         }
324
325         ArrayList<Integer> interestScheduleIds =
326             new ArrayList<>();
326         ResultSet scheduleList = mysqlExecute.
327             mysqlQuery("SELECT taskId, manualScheduleName,
328             manualScheduleDate, interestScheduleId FROM
329             TaskList WHERE userId = " + userId);
327         if (scheduleList == null) {
328             throw new SQLException();
329         }
330         scheduleList.next();
331         while (scheduleList.getString(4) != null){
332             interestScheduleIds.add(scheduleList.
333                 getInt(4));
333             scheduleList.next();
334             if(scheduleList.isAfterLast()) {
335                 break;
335             }
336         }
337     }
338     scheduleList.previous();
339
340
341     System.out.println("Schedules added by "
342     + username + ":" );
342     while(scheduleList.next()){
343         System.out.println("\tTask ID " +
344             scheduleList.getString(1) + ":" + scheduleList.
345             getString(2) + " in " + scheduleList.getString(3)

```

```
343 });
344 }
345
346     System.out.println("Schedules added based
on " + username + "'s interest:");
347     Thread printInterestSchedulesThread = new
Thread(()-> { try { printInterestSchedules(
interestScheduleIds); } catch (SQLException
exception) { exception.printStackTrace(); } });
348     printInterestSchedulesThread.start();
349     printInterestSchedulesThread.join();
350 }
351 private void printInterestSchedules(ArrayList<
Integer> eventIds) throws SQLException {
352     for(int i = 0; i<eventIds.size(); i++) {
353         ResultSet interestSchedule =
mysqlExecute.mysqlQuery("SELECT eventName,
eventDate FROM InterestSchedule WHERE eventId = "
+ eventIds.get(i) + ";");
354         if (interestSchedule == null) {
355             throw new SQLException();
356         }
357         interestSchedule.next();
358         System.out.println("\t" + (i+1) + ". "
+ interestSchedule.getString(1) + " in " +
interestSchedule.getString(2));
359     }
360 }
361 }
```