实验5 数据库程序设计

一、 实验目的：

1. 设计并实现一个具有入库、查询、借书、还书、借书证管理等基本功能的图书管理系统。
2. 通过本次设计加深对数据库的了解，同时提高对数据库的使用能力与自身的编程能力。

二、实验平台：

1. 开发工具：Visual Basic 6.0

   Visual Basic 6.0由Microsoft开发的编程设计软件，提供基于Windows系统的可视化编程环境。运用了向对象程序设计方法，将程序和数据封装为对象。开发人员可以通自带的工具箱画出窗口、菜单、按钮等不同类型的对象，并为每个对象设置属性。该软件具有以下特性：

   - **事件驱动的编程机制：**

     VB 6.0的事件驱动编程是针对用户触发某个对象的相关事件进行编码，每个事件都可以驱动一段程序的运行，开发人员只要编写响应用户动作的代码。

   - **结构化的程序设计语言：**

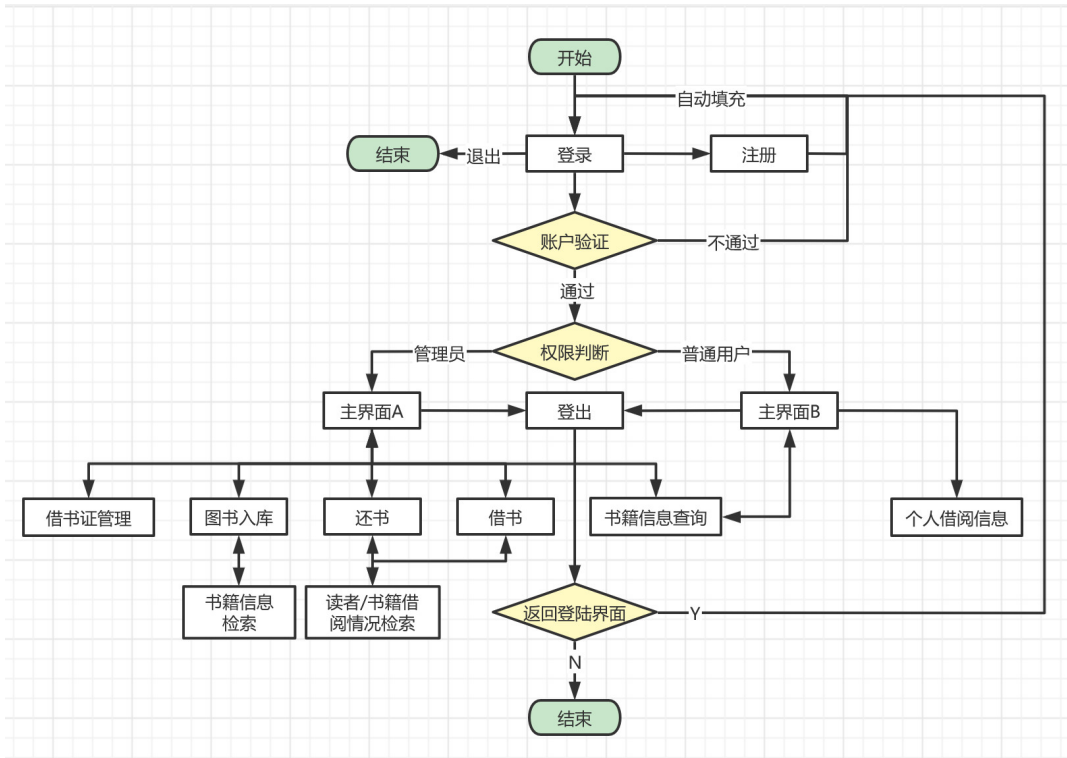   VB 6.0具有丰富的数据类型和众多的内部函数，采用模块化和结构化程序设计语言。

   - **强大的数据库功能：**

     VB 6.0可利用数据控件可以访问多种数据库系统。本次实验中调用了Microsoft ActiveX Data Objects 6.1 Libreary提供的接口对以关系或非关系数据库中的数据进行访问。本次实验主要通过该库提供的：_ConnectionPtr接口创建数据连接；_RecordsetPtr接口对返回的结果记录集进行游标控制等操作，以实现输入有效性判断、查询结果逐行输出等功能。

2. 操作系统：Windows 10

3. 数据库管理系统：MySQL 8.0.28

4. 数据库界面管理工具：Navicat for MySQL 15.0.26

三、总体流程设计：

本系统包括登录、注册、借阅信息查询、书籍信息查询、借书证管理、图书入库、借书、还书八大功能模块。系统处理流程见下图：

程序整体流程图

系统初始时可选择登录／用户注册（仅普通用户）功能，登陆后根据用户权限显示对应的主界面。

- 普通用户可使用功能：书籍信息查询、个人借阅信息**显示**、
- 管理员可使用功能：　书籍信息查询、个人借阅信息**查询**、借书证管理、图书入库、借书、还书
- 交叉功能为：　　　　书籍信息查询

四、数据表设计：

所有字段均为 Not NULL

1. 图书信息表 book

字段名	数据类型	主建	说明
bookname	varchar(255)		书名
author	varchar(255)		作者
pub_year	int		出版年份
publisher	varchar(255)		出版社
ISBN	varchar(255)	是	国际标准书号
price	decimal(10)		价格
storage	int		库存量（总量-借出量）>= 0
b_No	varchar(25)	是	图书编号

2. 借阅关系表 borrow

字段名	数据类型	主键	说明
c_no	varchar(10)	是	读者证编号
b_no	varchar(25)	是	图书编号

外键约束：

字段名	被引用表	被引用字段	说明
c_no	card	c_no	级联删除
b_no	book	b_No	级联删除

3. 读者信息表 card

字段名	数据类型	主键	说明
c_no	varchar(10)	是	读者证编号
reader_name	varchar(50)		读者姓名
tel	varchar(11)		联系方式
expiration_time	date		读者证过期时间

4. 注册用户信息表 user

字段名	数据类型	主键	说明
name	varchar(255)	是	用户名
password	varchar(255)		密码
type	int		用户类型 1-管理员 2-普通用户
card	varchar(10)	是	读者证编号，UNIQUE

外键约束：

字段名	被引用表	被引用字段	说明
card	card	c_no	级联删除

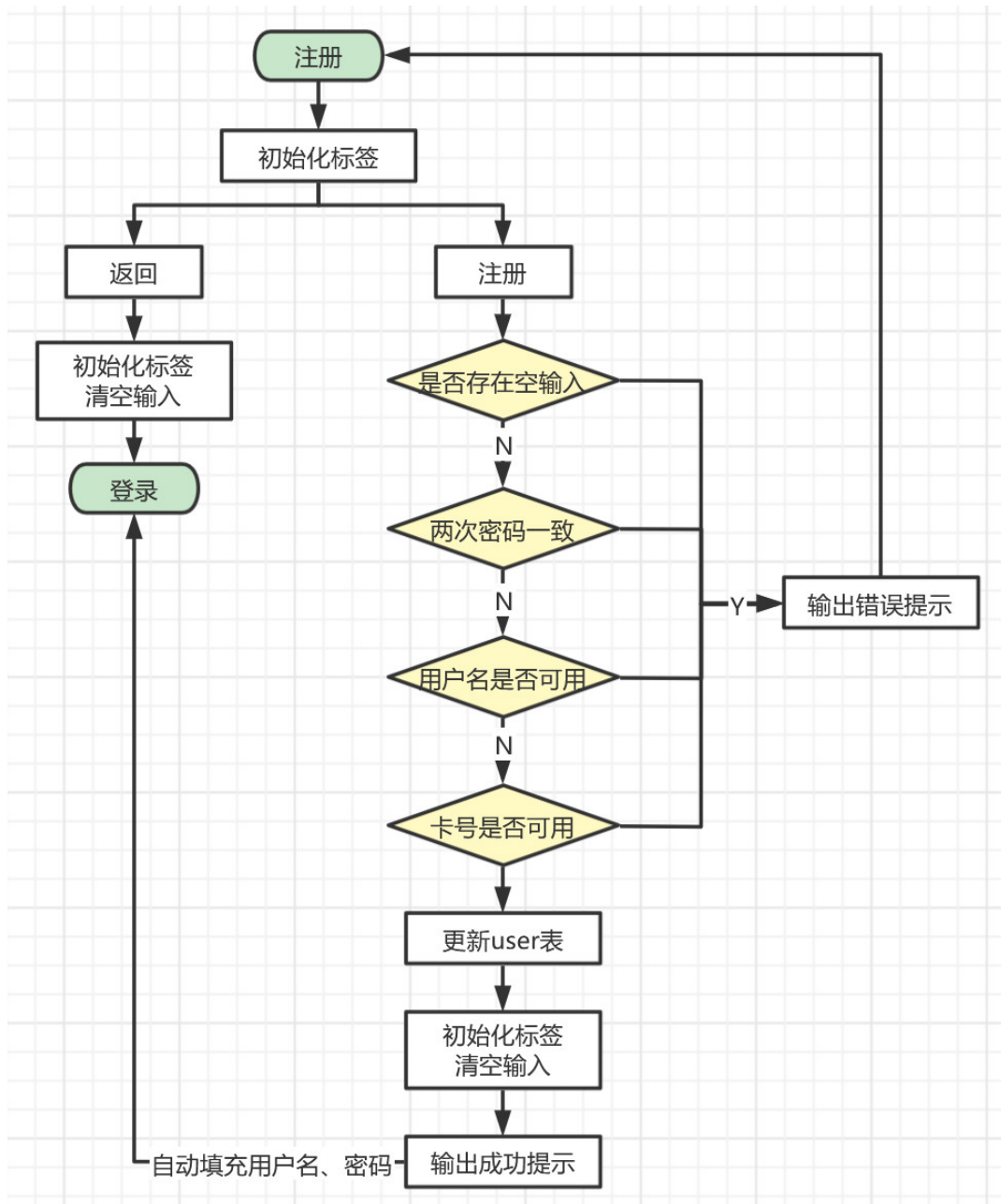# 五、各功能模块设计：

1. 注册

使用：

- 点击 "返回"，直接返回主界面
- 根据提示输入用户名、密码、读者编号后，点击"注册"按钮
- 注册成功将显示提示；随后将跳回登录界面，并自动填充用户名密码

说明：

- 在此页面注册的用户仅具有普通用户权限
- 要求用户名 **唯一、非空、非重**，以作为登录凭证
- 要求两次输入密码 **一致、非空**，均以 * 显示
- 要求读者编号 **已存在**于card表中，且**尚未注册**（仅限持卡且尚未注册的读者进行注册）
- 用户名与读者编号一一对应，同一读者编号仅能注册一次（card字段已添加唯一性约束）

注册页面(显示所有标签)

注册页面工作流程

功能代码：

```
Private Sub C_Return_Click()
    F_SignIn.Hide
    Login.Show
    Call textclear
    Call inilabel
End Sub

Private Sub C_SignIn_Click()
    '初始化错误提示
    Call inilabel

    Dim na, pa, repa As String
    na = nam.Text
```

```vb
    pa = pass.Text
    repa = rep.Text

    Dim l_na, l_pa, l_repa, len_card As Integer
    l_na = Len(na)
    l_pa = Len(pa)
    l_repa = Len(repa)
    l_card = Len(card.Text)

    Dim isErr As Integer
    isErr = 0

    '检测输入是否为空
    If l_na = 0 Then
        L1.Caption = "用户名不可为空"
        L1.Visible = True
        isErr = 1
    End If
    If l_pa = 0 Then
        L2.Caption = "密码不可为空"
        L2.Visible = True
        isErr = 1
    End If
    If l_repa = 0 Then
        L3.Caption = "请重复密码"
        L3.Visible = True
        isErr = 1
    End If
    If l_card = 0 Then
        Label5.Caption = "读者编号不可为空"
        Label5.Visible = True
        isErr = 1
    End If

    If isErr = 1 Then Exit Sub '有空则退出

    '检测两次密码是否一致
    If pass.Text <> rep.Text Then
        L3.Caption = "两次输入密码不一致"
        L3.Visible = True
        Exit Sub
    End If

    '检查用户名可用性
    '建立连接
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open
    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
```

```vb
        rs.CursorLocation = 3
        '验证用户信息
        rs.Open "SELECT name FROM user WHERE name='" & nam.Text & "'"
        Dim size As Integer
        size = rs.RecordCount
        If size <> 0 Then
            L1.Caption = "用户名已被占用"
            L1.Visible = True
            rs.Close
            conn.Close
            Exit Sub
        End If
        '检查卡号是否存在
        Dim rs2 As New ADODB.Recordset
        Set rs2.ActiveConnection = conn
        rs2.CursorLocation = 3
        rs2.Open "SELECT c_no FROM card WHERE c_no='" & card.Text & "'"
        size = rs2.RecordCount
        If size = 0 Then
            Label5.Caption = "编号不存在"
            Label5.Visible = True
            rs2.Close
            conn.Close
            Exit Sub
        End If
        '用户名可用，插入 - type = 2
        rs.Close

        Dim rs1 As New ADODB.Recordset
        Set rs1.ActiveConnection = conn
        rs1.CursorLocation = 3

        rs1.Open "INSERT INTO user VALUES('" & nam.Text & "','" & pass.Text
& "', 2, '" & card.Text & "')"
        success.Visible = True
        conn.Close
        success.Visible = True
        Timer1.Enabled = True
End Sub

Private Sub Form_Load()'初始化错误提示
        Call inilabel
End Sub

Private Sub Timer1_Timer() '返回登录页面，自动填充
        F_SignIn.Hide
        Login.Show
        Login.I_Uname.Text = nam.Text
        Login.I_Upass.Text = pass.Text
        Call textclear
        Call inilabel
        Timer1.Enabled = False
```

```
End Sub

Function textclear() As Integer'清空所有文本框
    nam.Text = ""
    pass.Text = ""
    rep.Text = ""
    card.Text = ""
End Function

Function inilabel() As Integer'隐藏所有标签
    L1.Visible = False
    L2.Visible = False
    L3.Visible = False
    Label5.Visible = False
    success.Visible = False
End Function
```
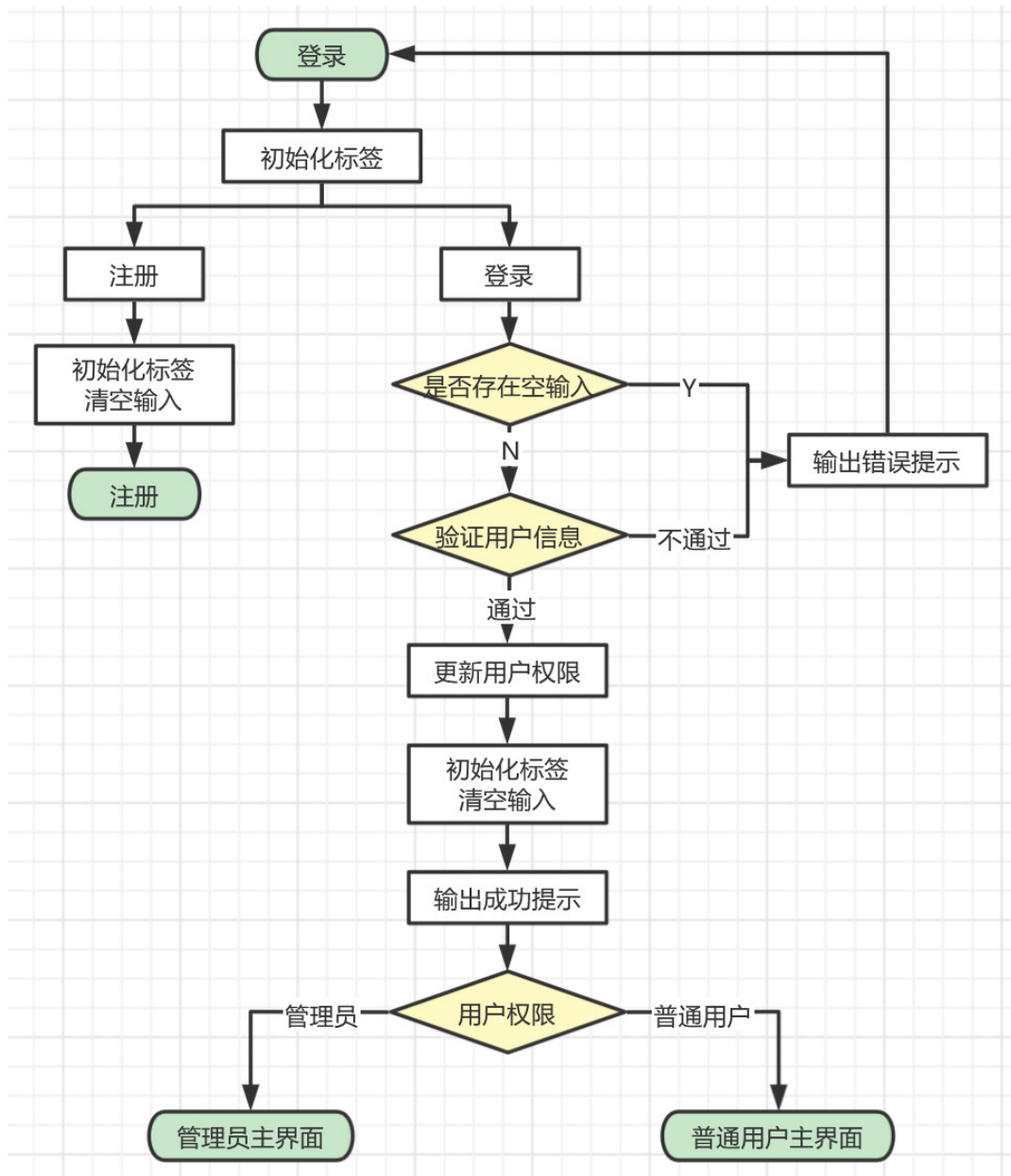
2. 登录

使用：

- 点击 "注册"，直接前往注册页面
- 根据提示输入用户名、密码后，点击 "点击登录" 按钮
- 若登录成功将显示提示，并自动跳转至与账号权限对应的用户主界面

说明：

登录页面(显示所有标签)

登录页面工作流程

功能代码：

```vb
Public user_type As Integer '用户类型：0-stu；1-admin
Public u_name As String '用户名

Private Sub Create_Click() '跳转至用户界面
    Login.Hide
    F_SignIn.Show
    Call inilabel
    Call textclear
End Sub

'美招看到一定大为欣慰吧，VB居然有文艺复兴的一天
Private Sub Form_Load()
    user_type = 0 '重置用户状态
End Sub
```

```vb
Private Sub C_Login_Click() '单击登录按钮
    Call inilabel

    Dim u_pass As String '密码

    u_name = I_Uname.Text
    u_pass = I_Upass.Text

    Dim len_u_name As Integer
    len_u_name = Len(u_name)

    '用户名为空
    If (len_u_name = 0) Then
        W_Uname.Caption = "用户名不可为空！"
        W_Uname.Visible = True
    End If

    Dim len_u_pass As Integer
    len_u_pass = Len(u_pass)

    '密码为空
    If (len_u_pass = 0) Then
        W_Upass.Caption = "密码不可为空！"
        W_Upass.Visible = True
    End If

    'name/password中一项为空则直接返回
    If (len_u_name = 0 Or len_u_pass = 0) Then
        Exit Sub
    End If
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    '验证用户信息
    rs.Open "SELECT * FROM user WHERE name='" & u_name & "' AND
password='" & u_pass & "'"
    Dim size As Integer
    size = rs.RecordCount


    If size = 0 Then
        W_Upass.Caption = "账号或密码错误！"
        W_Upass.Visible = True
    Else
```

```vb
            '登录有效，区分用户类型 admin / user
            user_type = rs.Fields("type")
            'Label3.Caption = "usertype=" & Str(user_type)
            C_Login.Caption = "登录成功"
            Timer1.Enabled = True
        End If

        rs.Close
        conn.Close '断开连接
End Sub

Private Sub Timer1_Timer()
    Call inilabel
    Call textclear
    Login.Hide
    If user_type = 1 Then
        Main_Admin.Show
    Else
        Main_User.Show
    End If
    Timer1.Enabled = False
    C_Login.Caption = "点击登录"
End Sub

Function inilabel() As Intege
    '将错误提示初始化为不可见
    W_Uname.Visible = False
    W_Upass.Visible = False
End Function

Function textclear() As Integer
    '清空文本框
    I_Uname.Text = ""
    I_Upass.Text = ""
End Function
```
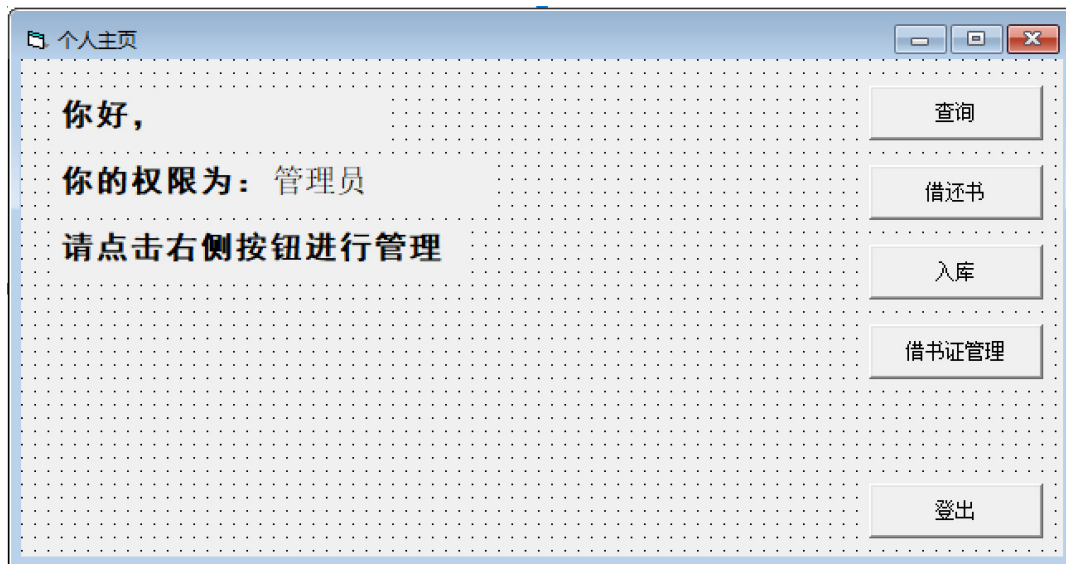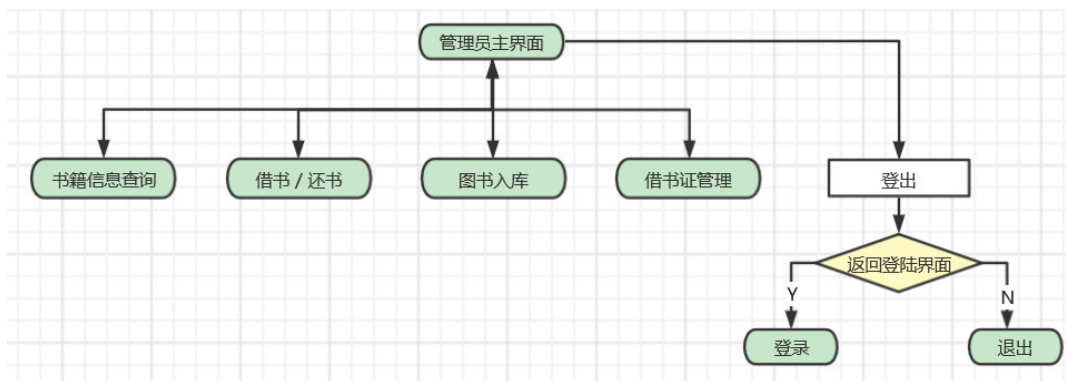
3. 管理员主界面

使用：

- 点击 "查询" / "借还书" / "入库" / "借书证管理" 按钮即可前往相应界面。
- 点击 "登出" 可选择：1. 返回 登录 界面；2. 退出程序

说明：

- 本界面将显示 用户名 与 用户权限
- 直接关闭页面将不能恢复登录状态

管理员主界面

管理员主界面工作流程

功能代码：

```vb
Private Sub Form_Load()
    Label1.Caption = Login.u_name '在主页显示用户名
End Sub

Private Sub c_query_Click() '前往图书查询界面
    'Main_Admin.Hide
    F_Query.Show
End Sub

Private Sub C_Borrow_Click() '前往借还书界面
    'Main_Admin.Hide
    F_BorR.Show
End Sub


Private Sub C_Load_Click() '前往入库界面
    'Main_Admin.Hide
    Call F_Load.inilabel
    Call F_Load.display_all
    F_Load.Show
```

```vb
End Sub

Private Sub C_Manage_Click() '前往借书证管理界面
    'Main_Admin.Hide
    F_Manage.Show
End Sub

Private Sub C_Logout_Click() '登出按钮
    Login.user_type = 0
    '关闭所有子页面
    F_BorR.Hide
    F_Load.Hide
    F_Manage.Hide
    F_Query.Hide
    neo_reader.Hide

    Dim logout_status, tmp
    logout_status = MsgBox("要返回登录界面吗？", vbYesNo, "图书管理系统")

    If logout_status = vbYes Then
        Main_Admin.Hide
        Login.Show
        Login.user_type = 0
    Else
        tmp = MsgBox("感谢使用，已成功登出！", vbInformation, "图书管理系统")
        Main_Admin.Hide
        End
    End If
End Sub
```

4. 普通用户主界面

使用：

- 点击 "查询" 按钮即可前往书籍信息查询界面。
- 点击 "登出" 可选择：1. 返回 登录 界面；2. 退出程序

说明：

- 本界面将显示 用户名 、 用户权限 、 读者证编号 、 当前借阅数
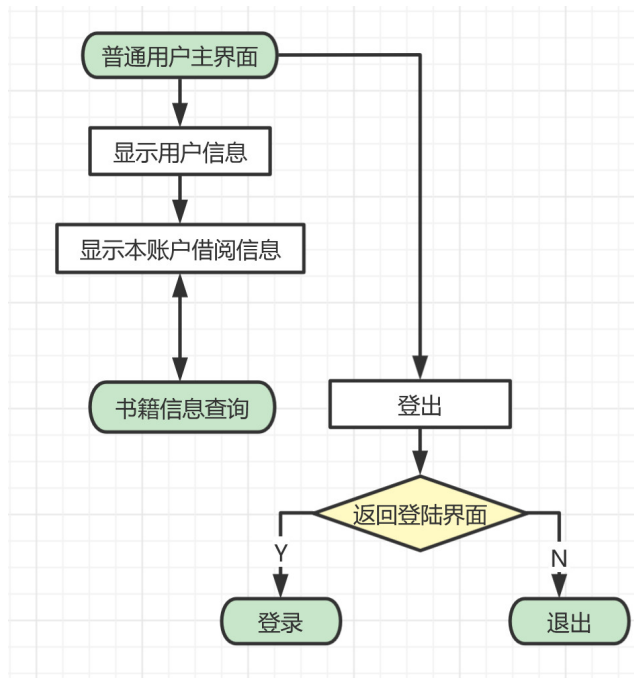- List 表格中将显示当前借阅的 书名 、作者
- 直接关闭页面将不能恢复登录状态

普通用户主界面

普通用户主界面工作流程

功能代码：

```
Public uid As String

Private Sub C_Logout_Click() '登出按钮
    Login.user_type = 0
      '关闭所有子页面
    F_Query.Hide

    Dim logout_status, tmp
    logout_status = MsgBox("要返回登录界面吗？", vbYesNo, "图书管理系统")

    If logout_status = vbYes Then
        Main_User.Hide
```

```vb
        Login.Show
        Login.user_type = 0
    Else
        tmp = MsgBox("感谢使用，已成功登出！", vbInformation, "图书管理系统")
        Main_User.Hide
        End
    End If
End Sub

Private Sub c_query_Click() '前往图书查询界面
    F_Query.Show
End Sub

Private Sub Form_Load()
    Label1.Caption = Login.u_name '在主页显示用户名
    '获取读者卡号
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    '验证用户信息
    rs.Open "SELECT card FROM user WHERE name='" & Login.u_name & "'"
    uid = rs.Fields("card")
    cardid.Caption = uid
    rs.Close

    Dim rs1 As New ADODB.Recordset
    Set rs1.ActiveConnection = conn
    rs1.CursorLocation = 3
    rs1.Open "SELECT * FROM borrow WHERE c_no='" & uid & "'"
    '统计借阅数量
    Dim ct_book As Integer
    ct_book = rs1.RecordCount
    n_book.Caption = Str(ct_book)

    List1(0).Clear
    List1(1).Clear

    Dim cur_book As String
    Dim sql_book_info As ADODB.Recordset


    '输出书本信息
    Dim i As Integer
    For i = 1 To ct_book Step 1
        cur_book = rs1.Fields("b_no")
```

```
        Set sql_book_info = New ADODB.Recordset
        Set sql_book_info.ActiveConnection = conn
        sql_book_info.Open "SELECT * FROM book WHERE b_No='" & cur_book
& "'"

        List1(0).AddItem sql_book_info.Fields("bookname")
        List1(1).AddItem sql_book_info.Fields("author")
        sql_book_info.Close

        rs1.MoveNext
    Next

    rs1.Close
    conn.Close
End Sub
```
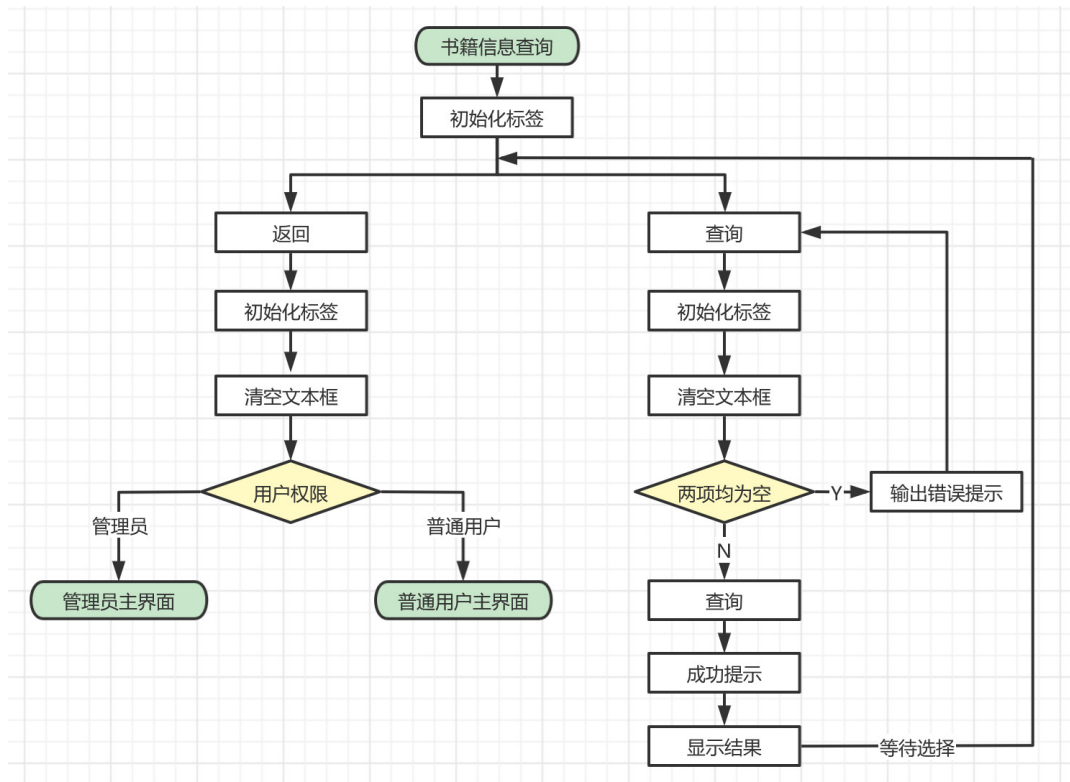
5. 书籍信息查询界面

使用：

- 在右侧输入 待查书名、待查作者名 后，点击"查询"，即可在左侧显示搜索结果

说明：

- 书名与作者名中**至少有一项**不为空
- 搜索结果为书名检索与作者名检索结果的**并集**
- 输入的书名/作者名为最终呈现结果的**字串**，即所有**包含**指定字符串的结果均会被输出

书籍信息查询界面

书籍信息查询界面工作流程

功能代码：

```vb
Private Sub C_BackMain_Click() '返回主界面
    Call inilabel
    Call formclear
    T_bname.Text = ""
    T_author.Text = ""

    F_Query.Hide
    If Login.user_type = 1 Then
        Main_Admin.Show
    Else
        Main_User.Show
    End If
End Sub

Private Sub c_query_Click()
    Call inilabel
    Call formclear

    '检测，至少有一个不为空
    If Len(T_bname.Text) = 0 And Len(T_author.Text) = 0 Then
        L_blank.Caption = "至少有一项不为空"
        L_blank.Visible = True
        Exit Sub
    End If

    Dim conn As New ADODB.Connection
```

```vb
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    rs.Open "SELECT * FROM book WHERE bookname LIKE '%" & T_bname.Text &
"%' AND author LIKE '%" & T_author.Text & "%'"
    Dim size As Integer
    size = rs.RecordCount

    '未找到符合结果
    If size = 0 Then
        L_blank.Caption = "未找到结果"
        L_blank.Visible = True
        conn.Close
        Exit Sub
    End If

    '找到结果，显示
    'L_success.Caption = Str(size)
    L_success.Visible = True

    Dim i As Integer
    For i = 1 To size
        List1(0).AddItem rs.Fields("bookname")
        List1(1).AddItem rs.Fields("author")
        List1(2).AddItem rs.Fields("publisher")
        List1(3).AddItem rs.Fields("pub_year")
        List1(4).AddItem rs.Fields("price") & "￥"
        List1(5).AddItem rs.Fields("storage")
        rs.MoveNext
    Next

    conn.Close
End Sub

Function inilabel() As Integer '初始化标签显示
    L_blank.Visible = False
    L_success.Visible = False
End Function

Private Sub Form_Load()
    Call inilabel
End Sub

Function formclear() As Integer '清空所有list
    Dim i As Integer
    For i = 0 To 5 Step 1
```

```
        List1(i).Clear
    Next
End Function
```

6. 借书 / 还书界面

使用：

- 在左侧输入 读者编号、图书编号，并点击相应按钮即可进行 借书/还书 操作
- 借书 / 还书 操作成功后，list列表中将自动更新显示**完成操作后**该读者的借阅情况
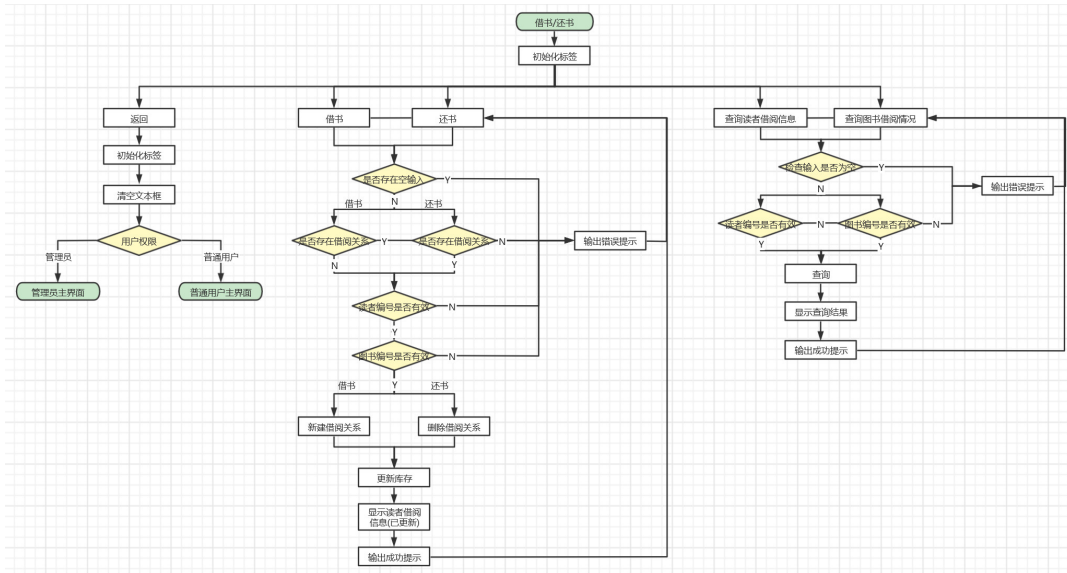- 在右侧输入 读者编号 / 图书编号，并点击相应按钮后，该 读者/图书 的借阅情况将在list列表中显示

说明：

- **不允许**进行以下两种操作：
    - 读者不可重复借阅同一本书
    - 不允许对**不存在的借阅关系**进行还书操作

  若进行操作，系统将显示相应错误提示

- 对读者编号进行查询时，label"反馈结果"将显示该读者的借阅总数
- 对图书进行查询时，label"反馈结果"将显示该书的余量与借出量
- 添加/删除 借书关系时，将自动对 **图书库存** 新进行更新

借书 / 还书 页面

借书 / 还书 界面工作流程

功能代码：

```vb
Private Sub C_BackMain_Click() '返回主界面
    Call ini(0)
    F_BorR.Hide
    If Login.user_type = 1 Then
        Main_Admin.Show
    Else
        Main_User.Show
    End If
End Sub

Function ini(n_box As Integer) As Integer
    '清空文本框内容
    If (n_box <> 1) Then
        in_reader.Text = ""
        in_book.Text = ""
    End If
    If (n_box <> 2) Then out_reader.Text = ""
    If (n_box <> 3) Then out_book.Text = ""
    '初始化标签状态
    Label5.Visible = False
    Label6.Visible = False
    Label7.Visible = False
    Label8.Visible = False
    Label9.Visible = False
    Label10.Visible = False
    l_output.Caption = "反馈结果："
    List1.Clear
End Function

Private Sub Command1_Click() '插入单条借阅信息
    Call ini(1)
    Dim isErr As Integer
```

```vb
    isErr = 0

    If Len(in_reader.Text) = 0 Then
        Label7.Caption = "输入不可为空"
        Label7.Visible = True
        isErr = 1
    End If


    If Len(in_book.Text) = 0 Then
        Label8.Caption = "输入不可为空"
        Label8.Visible = True
        isErr = 1
    End If
    '有空输入则退出
    If isErr = 1 Then Exit Sub

    '检查借阅信息是否存在
    Dim ck As Integer
    ck = checkcase()
    If ck = 1 Then
        Label8.Caption = "借阅信息已存在"
        Label8.Visible = True
        Exit Sub
    End If

    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    '验证读者编号是否有效
    Dim check_reader As New ADODB.Recordset
    Set check_reader.ActiveConnection = conn
    check_reader.CursorLocation = 3

    check_reader.Open "SELECT * FROM card WHERE c_no='" & in_reader.Text
& "'"
    If check_reader.RecordCount = 0 Then
        Label7.Caption = "读者编号不存在"
        Label7.Visible = True
        check_reader.Close
        conn.Close
        Exit Sub
    End If

    '验证图书编号是否有效
    Dim check_book As New ADODB.Recordset
    Set check_book.ActiveConnection = conn
    check_book.CursorLocation = 3
```

```vb
        check_book.Open "SELECT * FROM book WHERE b_No='" & in_book.Text &
"'"
    If check_book.RecordCount = 0 Then
        Label8.Caption = "图书编号不存在"
        Label8.Visible = True
        check_book.Close
        conn.Close
        Exit Sub
    ElseIf check_book.Fields("storage") = "0" Then
        Label8.Caption = "图书库存不足"
        Label8.Visible = True
        check_book.Close
        conn.Close
        Exit Sub
    End If

    '输出成功提示
    Label9.Visible = True
    '向borrow插入借书记录
    Dim neo_borrow As New ADODB.Recordset
    Set neo_borrow.ActiveConnection = conn
    neo_borrow.CursorLocation = 3
    neo_borrow.Open "INSERT INTO borrow VALUES ('" & in_reader.Text &
"','" & in_book.Text & "')"

    'book中库存-1
    Dim alter_storage As New ADODB.Recordset
    Set alter_storage.ActiveConnection = conn
    alter_storage.CursorLocation = 3
    alter_storage.Open "UPDATE book SET storage=storage-1 WHERE b_No='"
& in_book.Text & "'"
    conn.Close
    Call showborrow
End Sub

Private Sub Command2_Click() '读者借阅情况
    Call ini(2)
    If Len(out_reader.Text) = 0 Then
        Label5.Caption = "输入不可为空"
        Label5.Visible = True
        Exit Sub
    End If
    '检查编号是否有效
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3
```

```vb
    '验证用户信息
    rs.Open "SELECT * FROM card WHERE c_no='" & out_reader.Text & "'"
    If rs.RecordCount = 0 Then
        Label5.Caption = "读者编号不存在"
        Label5.Visible = True
        rs.Close
        conn.Close
        Exit Sub
    End If

    Dim rs1 As New ADODB.Recordset
    Set rs1.ActiveConnection = conn
    rs1.CursorLocation = 3

    rs1.Open "SELECT b_no FROM borrow WHERE c_no='" & out_reader.Text &
"'"
    Dim size As Integer
    size = rs1.RecordCount

    l_output.Caption = "编号为" & out_reader.Text & "的读者共借阅了" &
Str(size) & "本书"

    Dim cur_bookno As String '当前图书编号
    Dim sql_book_info As ADODB.Recordset
    '在list中显示该编号读者借阅的图书编号+书名
    For i = 1 To size Step 1
        cur_bookno = rs1.Fields("b_no")

        Set sql_book_info = New ADODB.Recordset
        Set sql_book_info.ActiveConnection = conn
        sql_book_info.Open "SELECT * FROM book WHERE b_No='" &
cur_bookno & "'"
        List1.AddItem sql_book_info.Fields("b_No") & "  " &
sql_book_info.Fields("bookname")
        sql_book_info.Close

        rs1.MoveNext
    Next
End Sub

Private Sub Command3_Click() '给定图书编号，输出借阅数、余量、读者编号
    Call ini(3)
    If Len(out_book.Text) = 0 Then
        Label6.Caption = "输入不可为空"
        Label6.Visible = True
        Exit Sub
    End If

    '检查编号是否有效
    Dim conn As New ADODB.Connection
```

```vb
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    '验证用户信息
    rs.Open "SELECT * FROM book WHERE b_No='" & out_book.Text & "'"
    If rs.RecordCount = 0 Then
        Label6.Caption = "图书编号不存在"
        Label6.Visible = True
        rs.Close
        conn.Close
        Exit Sub
    End If

    '编号有效
    Dim rs1 As New ADODB.Recordset
    Set rs1.ActiveConnection = conn
    rs1.CursorLocation = 3

    rs1.Open "SELECT c_no FROM borrow WHERE b_no='" & out_book.Text &
"'"
    Dim size As Integer
    size = rs1.RecordCount

    l_output.Caption = "编号为" & out_book.Text & "的图书共借出" &
Str(size) & "本，余" & rs.Fields("storage") & "本"

    '在list中显示所有读者编号
    For i = 1 To size Step 1
        List1.AddItem "借阅读者" & Str(i) & " :" & rs1.Fields("c_no")
        rs1.MoveNext
    Next

End Sub

Private Sub Command4_Click() '还书
    Call ini(1)
    Dim isErr As Integer
    isErr = 0

    If Len(in_reader.Text) = 0 Then
        Label7.Caption = "输入不可为空"
        Label7.Visible = True
        isErr = 1
    End If

    If Len(in_book.Text) = 0 Then
```

```vb
            Label8.Caption = "输入不可为空"
            Label8.Visible = True
            isErr = 1
        End If

        '有空输入则退出
        If isErr = 1 Then Exit Sub

        '检查借阅信息是否存在
        Dim ck As Integer
        ck = checkcase()
        If ck = 0 Then
            Label8.Caption = "借阅信息不存在"
            Label8.Visible = True
            Exit Sub
        End If


        '建立连接
        Dim conn As New ADODB.Connection
        conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
        conn.Open
        '删除borrow中的借阅关系
        Dim del_bor As New ADODB.Recordset
        Set del_bor.ActiveConnection = conn
        del_bor.CursorLocation = 3
        del_bor.Open "DELETE FROM borrow WHERE b_no='" & in_book.Text & "'
AND c_no='" & in_reader.Text & "'"
        'book中storage+1
        Dim add_sto As New ADODB.Recordset
        Set add_sto.ActiveConnection = conn
        add_sto.CursorLocation = 3
        add_sto.Open "UPDATE book SET storage=storage+1 WHERE b_No='" &
in_book.Text & "'"
        conn.Close
        Label10.Visible = True
        Call showborrow
End Sub

Private Sub Form_Load()
        Call ini(0)
End Sub

Function showborrow() As Integer
        Dim conn As New ADODB.Connection
        conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
        conn.Open '建立连接
          '显示读者当前借阅信息
```

```vb
    Dim cur As New ADODB.Recordset
    Set cur.ActiveConnection = conn
    cur.CursorLocation = 3

    cur.Open "SELECT b_no FROM borrow WHERE c_no='" & in_reader.Text &
"'"
    Dim size As Integer
    size = cur.RecordCount

    l_output.Caption = "编号为" & in_reader.Text & "的读者目前共借阅了" &
Str(size) & "本书"

    Dim cur_bookno As String '当前图书编号
    Dim sql_book_info As ADODB.Recordset
    '在list中显示该编号读者借阅的图书编号+书名
    For i = 1 To size Step 1
        cur_bookno = cur.Fields("b_no")

        Set sql_book_info = New ADODB.Recordset
        Set sql_book_info.ActiveConnection = conn
        sql_book_info.Open "SELECT * FROM book WHERE b_No='" &
cur_bookno & "'"
        List1.AddItem sql_book_info.Fields("b_No") & "   " &
sql_book_info.Fields("bookname")
        sql_book_info.Close

        cur.MoveNext
    Next
    conn.Close
End Function

Function checkcase() As Integer
    '建立连接
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open

    '判断是否存在借阅关系
    Dim check_group As New ADODB.Recordset
    Set check_group.ActiveConnection = conn
    check_group.CursorLocation = 3
    check_group.Open "SELECT * FROM borrow WHERE b_no='" & in_book.Text
& "' AND c_no='" & in_reader.Text & "'"

    If check_group.RecordCount = 0 Then '借阅信息不存在
        checkcase = 0
    Else
        checkcase = 1
    End If
```
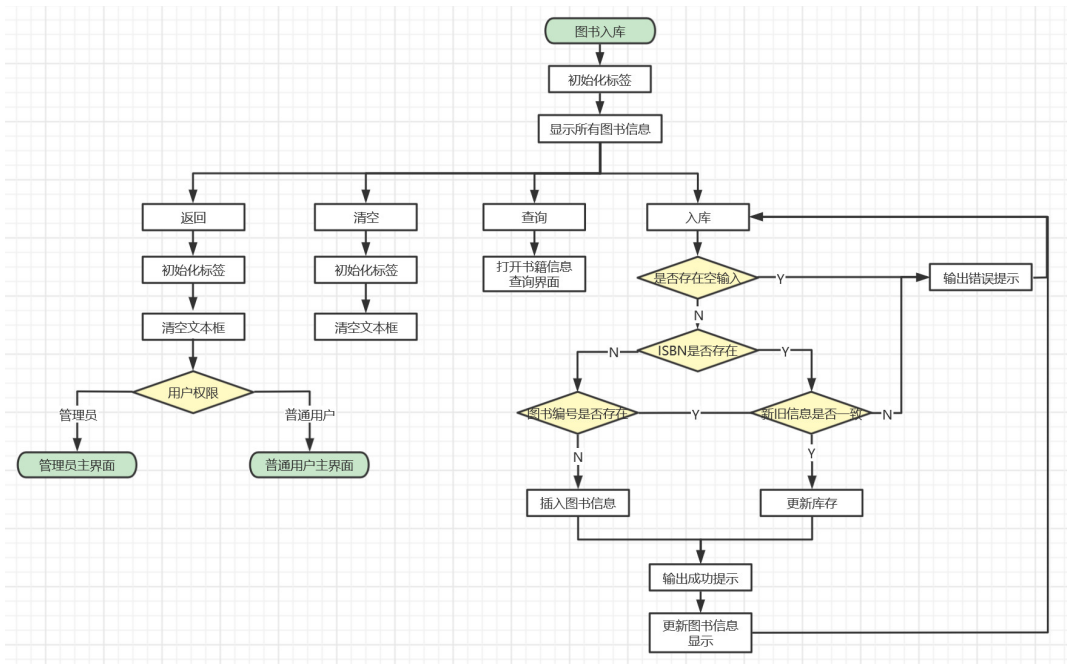
```
        conn.Close
End Function
```

7. 图书入库界面

使用：

- 在左侧文本框中输入书籍的相关信息后，点击"入库"，即可实现图书入库
- 入库成功后，右侧的list将会显示更新后的书籍信息
- 点击"清空"即可清空左侧文本框
- 点击"查询"将打开书籍信息查询界面

说明：

- 图书的ISBN与图书编号一一对应
- 不允许图书信息为空
- 若入库的书籍已存在，将只更新库存值

图书入库页面(显示所有标签)

图书入库界面工作流程

功能代码：

```vb
Function display_all() As Integer
    Call listrefresh '清空显示
    '建立连接
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=662258;Option=3"
    conn.Open

    Dim display As New ADODB.Recordset
    Set display.ActiveConnection = conn
    display.CursorLocation = 3
    display.Open "SELECT * FROM book ORDER BY b_No"
    Dim size As Integer
    size = display.RecordCount
    For i = 1 To size Step 1
        List1(0).AddItem display.Fields("b_No")
        List1(1).AddItem display.Fields("bookname")
        List1(2).AddItem display.Fields("author")
        List1(3).AddItem display.Fields("publisher")
        List1(4).AddItem display.Fields("ISBN")
        List1(5).AddItem display.Fields("storage")

        display.MoveNext
    Next
End Function


Private Sub C_BackMain_Click() '返回主界面
    Call listrefresh
```

```vb
        Call textclear
        F_Load.Hide
        If Login.user_type = 1 Then
            Main_Admin.Show
        Else
            Main_User.Show
        End If
End Sub

Function inilabel() As Integer
        Label15.Visible = False
        Label16.Visible = False
End Function

Function listrefresh() As Integer '清空list数组
        For i = 0 To 5 Step 1
            List1(i).Clear
        Next
End Function

Function textclear() As Integer
        bname.Text = ""
        author.Text = ""
        p_year.Text = ""
        pub.Text = ""
        isbn.Text = ""
        price.Text = ""
        numb.Text = ""
        bno.Text = ""
End Function

Private Sub Command1_Click() '图书入库
        Call inilabel
        Dim isblank As Integer
        '检查是否缺项
        If Len(bname.Text) = 0 Then isblank = 1
        If Len(author.Text) = 0 Then isblank = 1
        If Len(p_year.Text) = 0 Then isblank = 1
        If Len(isbn.Text) = 0 Then isblank = 1
        If Len(price.Text) = 0 Then isblank = 1
        If Len(numb.Text) = 0 Then isblank = 1
        If Len(bno.Text) = 0 Then isblank = 1

        If isblank = 1 Then
            Label15.Caption = "存在空项"
            Label15.Visible = True
            Exit Sub
        End If

        '检查isbn是否存在
        '建立连接
        Dim conn As New ADODB.Connection
```

```vb
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open

    Dim ck_isbn As New ADODB.Recordset
    Set ck_isbn.ActiveConnection = conn
    ck_isbn.CursorLocation = 3
    ck_isbn.Open "SELECT * FROM book WHERE ISBN='" & isbn.Text & "'"

    If ck_isbn.RecordCount = 0 Then '图书不存在，直接插入记录
        '校验图书编号是否被占用
        Dim ck_bno As New ADODB.Recordset
        Set ck_bno.ActiveConnection = conn
        ck_bno.CursorLocation = 3
        ck_bno.Open "SELECT * FROM book WHERE b_No='" & bno.Text & "'"
        If ck_bno.RecordCount = 1 Then
            Label15.Caption = "图书编号已被占用"
            Label15.Visible = True
            conn.Close
            Exit Sub
        End If

        Dim neo_book As New ADODB.Recordset
        Set neo_book.ActiveConnection = conn
        neo_book.CursorLocation = 3
        neo_book.Open "INSERT INTO book VALUES ('" & bname.Text & "','"
& author.Text & "','" & p_year.Text & "','" & pub.Text & "','" &
isbn.Text & "','" & price.Text & "','" & numb.Text & "','" & bno.Text &
"')"
        conn.Close
        Label16.Visible = True
        Exit Sub
    Else '图书编号已存在，验证信息
        Dim check_info As New ADODB.Recordset
        Set check_info.ActiveConnection = conn
        check_info.CursorLocation = 3
        check_info.Open "SELECT * FROM book WHERE bookname='" &
bname.Text & "' AND author='" & author.Text & "' AND pub_year='" &
p_year.Text & "' AND publisher='" & pub.Text & "' AND ISBN='" &
isbn.Text & "' AND price='" & price.Text & "' AND b_No='" & bno.Text &
"'"
        If check_info.RecordCount = 1 Then '校验通过,增加库存
            Dim add_sto As New ADODB.Recordset
            Set add_sto.ActiveConnection = conn
            add_sto.CursorLocation = 3
            add_sto.Open "UPDATE book SET storage=storage+'" & numb.Text
& "' WHERE b_No='" & bno.Text & "'"
            Label16.Visible = True
            conn.Close
            Call display_all '刷新显示
        Else
```

```
                Label15.Caption = "输入信息冲突"
                Label15.Visible = True
                conn.Close
                Exit Sub
            End If
        End If
End Sub


Private Sub Command2_Click() '打开书籍信息查询界面
    F_Query.Show
End Sub


Private Sub Command3_Click() '清空输入
    Call textclear
End Sub


Private Sub Form_Load()
    Call inilabel
    Call display_all
End Sub
```
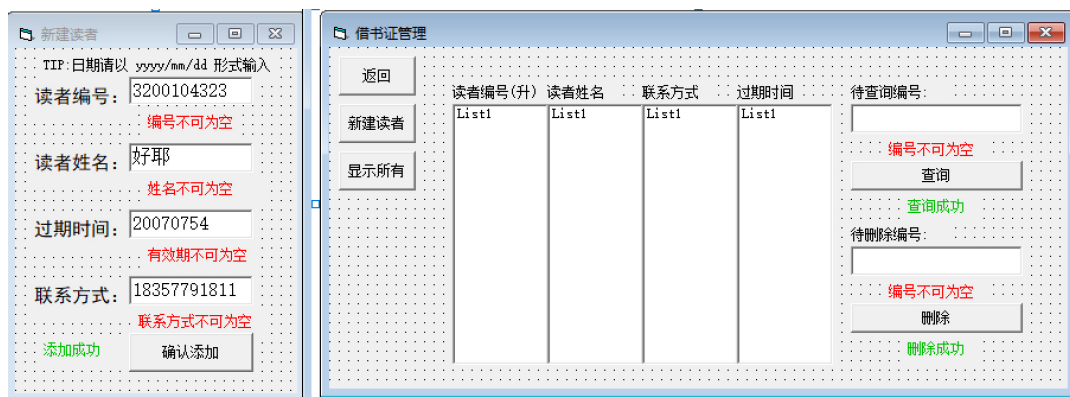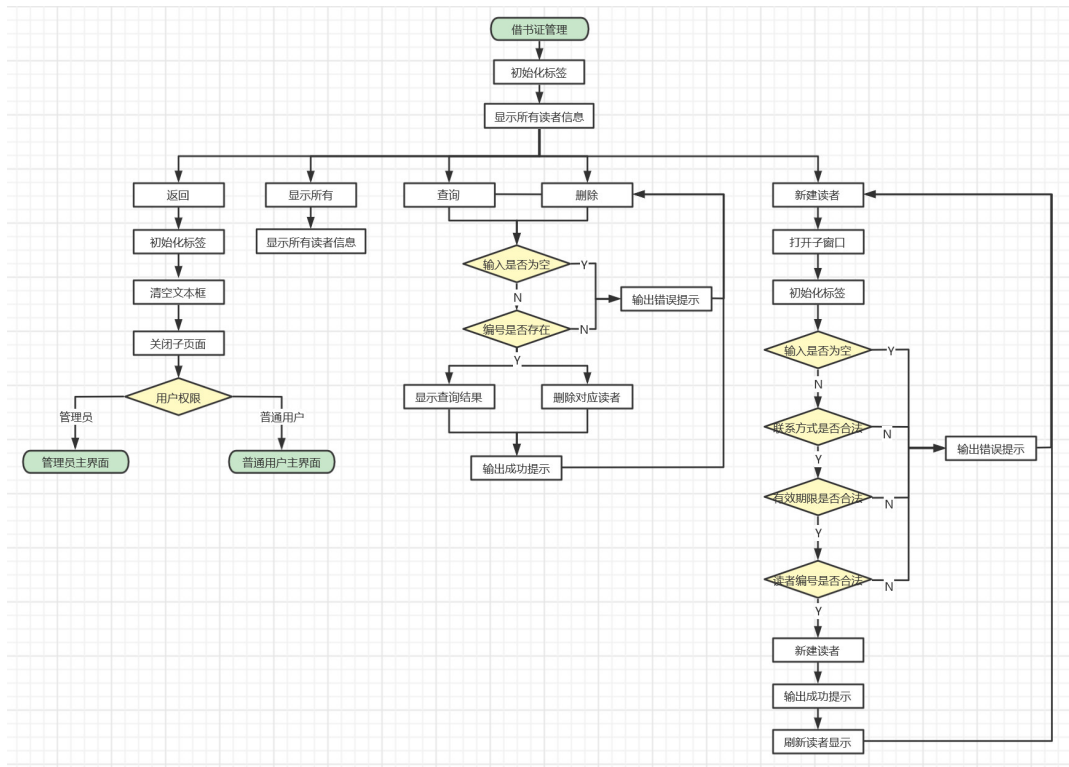
8. 借书证管理界面

使用：

- 打开界面将自动按 读者编号 升序显示所有借书证信息
- 点击"新建读者"将展开新建读者界面
- 填入读者信息并点击"确认添加"将新建借书证，且list列表将显示插入后的所有借书证信息
- 点击"查询"/"删除"即可对相应编号的借书证进行操作
- 点击"显示所有"，list列表将按 读者编号 升序显示所有借书证信息

说明：

- 读者编号唯一确定借书证

借书证管理界面(显示所有标签)

借书证管理界面工作流程

功能代码：

```vb
'新建读者子窗口
Private Sub Create_Reader_Click() '新建读者
    '初始化错误提示
    W_No.Visible = False
    W_N.Visible = False
    W_T.Visible = False
    W_Tel.Visible = False
    L_Success.Visible = False

    Dim c_no, name, time, tel As String
    Dim l_c_no, L_Name, L_Time, L_Tel As Integer
    l_c_no = Len(T_No.Text)
    L_Name = Len(T_Name.Text)
    L_Time = Len(T_Time.Text)
    L_Tel = Len(T_Tel.Text)

    Dim isError As Integer
    isError = 0

    If l_c_no = 0 Then
        W_No.Caption = "编号不可为空"
        W_No.Visible = True
        isError = 1
    End If

    If L_Name = 0 Then
        W_N.Caption = "姓名不可为空"
```

```vb
            W_N.Visible = True
            isError = 1
        End If

        If L_Time = 0 Then
            W_T.Caption = "有效期不可为空"
            W_T.Visible = True
            isError = 1
        End If

        If L_Tel = 0 Then
            W_Tel.Caption = "联系方式不可为空"
            W_Tel.Visible = True
            isError = 1
        End If

        '判断电话号码的有效性
        If L_Tel <> 11 Then
            W_Tel.Caption = "无效联系方式"
            W_Tel.Visible = True
            Exit Sub
        ElseIf Not IsNumeric(T_Tel.Text) Then '出现非数字字符
            W_Tel.Caption = "非法联系方式"
            W_Tel.Visible = True
            isError = 1
        End If

        If Not IsDate(T_Time.Text) Then
            W_T.Caption = "非法日期"
            W_T.Visible = True
            isError = 1
        End If

        If isError = 0 Then
            '验证卡号可用性
            Dim sql_check_no As String
            sql_check_no = "SELECT c_no FROM card WHERE c_no='" & T_No.Text
& "'"
            Dim conn As New ADODB.Connection
            conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode
Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
            conn.Open '建立连接

            Dim rs As New ADODB.Recordset
            Set rs.ActiveConnection = conn
            rs.CursorLocation = 3
            rs.Open sql_check_no
            Dim size As Integer
            size = rs.RecordCount
            If size > 0 Then
```

```vb
            W_No.Caption = "卡号已占用"
            W_No.Visible = True
            rs.Close
            conn.Close
            Exit Sub
        End If

        rs.Close

        Dim rs1 As New ADODB.Recordset
        Set rs1.ActiveConnection = conn
        rs1.CursorLocation = 3

        '卡号合法，插入
        Dim sql As String
        sql = "INSERT INTO card VALUES ('" & T_No.Text & "','" &
T_Name.Text & "','" & T_Tel.Text & "','" & T_Time.Text & "')"
        rs1.Open sql
        L_Success.Visible = True '提示插入成功
        conn.Close '关闭连接
        Call F_Manage.ref '刷新显示
    Else '存在非法输入
        Exit Sub
    End If
End Sub
'主窗口
Public ordermode As Integer

Private Sub C_BackMain_Click() '返回主界面
    F_Manage.Hide
    neo_reader.Hide
    If Login.user_type = 1 Then
        Main_Admin.Show
    Else
        Main_User.Show
    End If
End Sub

Private Sub C_Del_Click()
    Label5.Visible = False
    Label6.Visible = False

    Dim len_no, len_na, len_tel, len_ti As Integer
    len_no = Len(T_Del.Text)
    If len_no = 0 Then
        Label5.Caption = "编号不可为空"
        Label5.Visible = True
        Exit Sub
    End If

    Dim conn As New ADODB.Connection
```

```vb
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    rs.Open "SELECT * FROM card WHERE c_no='" & T_Del.Text & "'"
    Dim size As Integer
    size = rs.RecordCount

    If size = 0 Then
        Label5.Caption = "该编号不存在"
        Label5.Visible = True
        rs.Close
        conn.Close
        Exit Sub
    End If
    rs.Close

    Dim rs1 As New ADODB.Recordset
    Set rs1.ActiveConnection = conn
    rs1.CursorLocation = 3
    rs1.Open "DELETE FROM card WHERE c_no='" & T_Del.Text & "'"
    conn.Close
    Label6.Visible = True
    Call ref
End Sub

Private Sub C_New_Click() '打开新建读者窗口
    neo_reader.Show
End Sub

Private Sub C_Search_Click()

    Label2.Visible = False
    Label3.Visible = False

    Dim len_no, len_na, len_tel, len_ti As Integer
    len_no = Len(T_No.Text)
    If len_no = 0 Then
        Label2.Caption = "编号不可为空"
        Label2.Visible = True
        Exit Sub
    End If

    List1(0).Clear
    List1(1).Clear
    List1(2).Clear
    List1(3).Clear
```

```vb
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    rs.Open "SELECT * FROM card WHERE c_no='" & T_No.Text & "'"
    Dim size As Integer
    size = rs.RecordCount

    If size = 0 Then
        Label2.Caption = "该编号不存在"
        Label2.Visible = True
        rs.Close
        conn.Close
        Exit Sub
    End If

    List1(0).AddItem rs.Fields("c_no")
    List1(1).AddItem rs.Fields("reader_name")
    List1(2).AddItem rs.Fields("tel")
    List1(3).AddItem rs.Fields("expiration_time")

    Label3.Visible = True
    rs.Close
    conn.Close
End Sub

Private Sub Form_Load()
    Call hidelabel
    Call ref
End Sub


Function hidelabel() As Integer
    Label2.Visible = False
    Label3.Visible = False
    Label5.Visible = False
    Label6.Visible = False
    hidelabel = 1
End Function
Function ref() As Integer
    '清空list
    List1(0).Clear
    List1(1).Clear
    List1(2).Clear
    List1(3).Clear
```

```
    Dim conn As New ADODB.Connection
    conn.ConnectionString = "Driver={MySQL ODBC 8.0 Unicode Driver};Data
Source=VBmySQL;Server=localhost;Database=booksys;User=root;Password=6622
58;Option=3"
    conn.Open '建立连接

    Dim rs As New ADODB.Recordset
    Set rs.ActiveConnection = conn
    rs.CursorLocation = 3

    rs.Open "SELECT * FROM card ORDER BY c_no"
    Dim size As Integer
    size = rs.RecordCount

    For i = 1 To size Step 1
        List1(0).AddItem rs.Fields("c_no")
        List1(1).AddItem rs.Fields("reader_name")
        List1(2).AddItem rs.Fields("tel")
        List1(3).AddItem rs.Fields("expiration_time")
        rs.MoveNext
    Next
    ref = 1
End Function

Private Sub printall_Click()
    Call hidelabel
    Call ref
End Sub
```

六、实验心得：

拿VB写的过程中，一般路过的某同学瞟了一眼，感叹到："都2022年了，还有人在写VB！"

然而惨痛的事实是：因为本人实在太菜了，用速成的VUE和NodeJS搭的前后端一直合不起来。眼看着验收日期步步逼近，绝望的翻开了高中的课程笔记，随后发现 —— 原来我用VB连过ACCESS啊！

改一改我一定能连上MySQL！

于是乎，某个发布于1999年的软件在2022年出现在了64位操作系统上，为了配合这个古董还特地翻出了32位的MySQL ODBC驱动和32位的运行库组件包。

然后UI上就是真的一言难尽，将XP时代朴实到令人恐慌的界面特性表现得淋漓尽致。信息的多栏显示本来想用ListView组件实现，但由于软件版本问题，最后还是用魔性的list数组实现了，使界面变得更加草率。

无论如何，嵌入式SQL语句还是很香的，虽然VB的ADODB语法要求与使用NodeJS连接MySQL相比阴间了一些，但并不妨碍我们利用其与用户进行交互，得到一个粗糙但可以动态变化的图书馆里系统。

此外，VB对外部错误的捕捉支持不太好，不能用resume next保持程序运行，并在程序内输出错误提示，每次操作失败就会直接退出exe。使得编程过程中不得不对数据库进行多次查询以对用户输入进行预检，保证操作成功，十分令人头大。

总之：VB很友好，界面很拉跨，下次一定整WEB开发。