**实 验 报 告**

**课程名称：** **移动应用开发**

**学 院： 计算机科学与工程学院**

**专 业：计算机科学与技术** **班 级： 5班**

**姓 名： 尹浩男 学 号：201801051827**

**年 月 日**

**山 东 科 技 大 学 教 务 处 制**

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**页**

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| **组 别** |  | **姓 名** | **尹浩男** | **同组实验者** |  |
| **实验项目**  **名称** | 数据存储 | | **实验日期** |  | |
| **教师评语** |  | | | | |
| **实验成绩：** | | | **指导教师（签名）：**  **年 月 日** | | |
| 一、实验目的  * 熟练掌握Android中基于文件和数据库的数据管理功能。  二、实验内容  * 设计实现一个管理学生及其选修的课程、课程成绩的Android APP。APP的基本功能包括：（1）用户登录成功后可以使用APP，登录APP所使用的用户名、密码存储在文件中；（2）学生信息、课程信息、学生选课结果及成绩存储在SQLite数据库中，并提供学生添加、删除、修改、浏览（点击某个学生后，呈现学生选修的课程及其成绩）功能，以及学生成绩的添加、删除和修改功能。  三、实验要求  * 实现上述的基本功能要求。在此基础上，可以进一步优化界面，也可以进一步添加其他功能。 * 实验报告提交内容：1）结合系统界面（截图）介绍APP功能；2）核心实现代码（Java或Kotlin代码）和布局文件等。  四、实验代码4.0 项目代码文件组织 如上图所示这里entity层相当于数据库中的创建表，room底层会帮我们去封装相应的sql，database就是数据库，而dao层就是对表的增删改查操作，repository层专门负责处理数据，这里使用了异步来对数据库进行操作，viewmodel层是进行函数接口的提供，它调用repository层的接口，而真正对数据进行处理的是adapter下的一系列代码。 4.1实验截图          4.2实验思路 总体的实验思路是使用安卓的room框架(Room提供了SQLite之上的一层抽象, 既允许流畅地访问数据库, 也充分利用了SQLite.)实现对数据库的操作，并配合上viewmodel的双向绑定(让视图更新操作更加方便，我还是用来了liveData这种特殊的数据结构，它的obseve方法十分有用)，使用它来实时的更新视图，将后台的数据放到对应的位置，让用户看到，这里使用了三个表，student表，course表和sc表，分别对应学生表课程表和选课表。 4.3 实验代码4.3.1 Entity的代码 如下代码 room会完成orm的转换，通过在数据库中维护一张和student类中完全一样的属性来对数据进行增删改查，通过注解的方式实现主键，外键等数据库约束的声明  Student 的代码  @Entity(tableName = "student")  class Student(      @PrimaryKey(autoGenerate = true) var sno: Int? = 0,      @ColumnInfo(name = "sname") var sname:String? = "",      @ColumnInfo(name = "ssex") var ssex:String? = "",      @ColumnInfo(name = "sage") var sage:Int? = 18  )  Sc的代码  @Entity(tableName = "sc",      primaryKeys = ["sno","cno"]   )  class Sc (      @ColumnInfo(name = "sno")      var sno: Int = 0,      @ColumnInfo(name = "cno")      var cno : Int,      @ColumnInfo(name = "cname")      var cname : String,      @ColumnInfo(name = "grade")      var grade : Int = 100  )  Course的代码  @Entity(tableName = "course")  class Course (      @PrimaryKey(autoGenerate = true)      var cno: Int = 0,      @ColumnInfo(name = "cname")      var cname : String = "",      @ColumnInfo(name = "ccredit")      var ccredit: String = ""  ) 4.3.2dao层 专门负责对于数据表的增删改查四种操作，  StudentDao  @Dao  interface StudentDao {      @Insert      fun insertStudent(vararg arg: Student)      @Update      fun updateStudent(vararg arg: Student)      @Query("DELETE FROM student WHERE sno = :sno ")      fun deleteStudentBySno(vararg sno:Int?)      @Query("DELETE FROM student")      fun deleteAllStudents()      @Query("SELECT \* FROM student ORDER BY sno DESC ")      fun getAllStudentsLive(): LiveData<List<Student>>      @Update()      fun updateStudent(student:Student)  } 4.3.3 Repository层 获取数据的层 就举一个studentRepository的例子  里边出现了AsyncTask 这个类他是专门用于异步请求的  解释一下为什么需要通过四个内部类来实现 因为主线程不去做数据交互的事情  因为耗时 会让用户感到卡顿 所以 利用异步来去做就比较合适  // StudentRepository 这个类是专门负责数据处理的   很重要  class StudentRepository(var context: Context){      private var allStudentsLive:LiveData<List<Student>>      private var studentDao:StudentDao      init {          val wordDatabase: StudentDatabase = StudentDatabase.getStudentDatabase(context)!!          studentDao = wordDatabase.getStudentDao()          allStudentsLive = studentDao.getAllStudentsLive()      }      fun getAllStudentsLive():LiveData<List<Student>>{          return allStudentsLive      }      fun insertStudents(vararg param: Student){          InsertAsyncTask(studentDao).execute(\*param)      }      fun updateStudents(vararg param: Student){          UpdateAsyncTask(studentDao).execute(\*param)      }      fun deleteAllStudents(){          DeleteAllAsyncTask(studentDao).execute()      }      fun deleteStudentBySno(sno: Int){          DeleteBySnoAsyncTask(studentDao).execute(sno)      }        class DeleteBySnoAsyncTask(var studentDao: StudentDao): AsyncTask<Int, Void, Void>() {          override fun doInBackground(vararg params: Int?): Void? {              studentDao.deleteStudentBySno(\*params)              return null          }      }      class InsertAsyncTask(var studentDao: StudentDao): AsyncTask<Student, Void, Void>() {          override fun doInBackground(vararg params: Student): Void? {              studentDao.insertStudent(\*params)              return  null          }      }      class UpdateAsyncTask(var studentDao: StudentDao): AsyncTask<Student, Void, Void>() {          init {              this.studentDao = studentDao          }          override fun doInBackground(vararg param: Student): Void? {              studentDao.updateStudent(\*param)              return null          }      }      class DeleteAllAsyncTask(var studentDao: StudentDao): AsyncTask<Void, Void, Void>() {          override fun doInBackground(vararg params: Void?): Void? {              studentDao.deleteAllStudents()              return null          }      }  } 4.3.4 ViewModel层 负责抽象接口的封装 举个例子 studentViewModel  class StudentVIewModel(application: Application) : AndroidViewModel(application) {      private var allStudentsLive:LiveData<List<Student>>      private var studentRepository: StudentRepository = StudentRepository(context = application)      fun getAllStudentsLive():LiveData<List<Student>>{          return allStudentsLive      }      init {          allStudentsLive = studentRepository.getAllStudentsLive()      }      fun insertStudents(vararg param: Student){          studentRepository.insertStudents(\*param)      }      fun updateStudents(vararg param: Student){          studentRepository.updateStudents(\*param)      }      fun deleteAllStudents(){          studentRepository.deleteAllStudents()      }      fun deleteStudentBySno(sno: Int){          studentRepository.deleteStudentBySno(sno)      }  } 4.3.5 Adapter层 这个层是直接和前端打交道的层 ，主要是用于recycleview的填充数据等操作，获取按钮监听点击事件等等  StudentAdapter  class StudentAdapter(val application: Application, val StudentList: LiveData<List<Student>>): RecyclerView.Adapter<StudentAdapter.MyViewHolder>() {      var allStudents :List<Student> = ArrayList<Student>()      private var studentViewModel: StudentVIewModel =          ViewModelProvider.AndroidViewModelFactory(application).create(StudentVIewModel::class.java)      fun setAllStudents( abc : ArrayList<Student>){          allStudents =  abc      }      override fun onCreateViewHolder(parent: ViewGroup, viewType: Int): MyViewHolder {          val layoutInflater: LayoutInflater = LayoutInflater.from(parent.context)          val itemView:View = layoutInflater.inflate(R.layout.cell\_card\_student, parent, false)          return MyViewHolder(itemView)      }      override fun onBindViewHolder(holder: MyViewHolder, position: Int) {          val student: Student = allStudents.get(position)          holder.textViewSno.text = (position + 1).toString()          holder.textViewSname.text = student.sname          holder.textViewSsex.text = student.ssex          holder.textViewSage.text = student.sage.toString()          val thisContext = holder.itemView.context          holder.itemView.setOnClickListener {              ScActivity.actionStart(thisContext,student.sno!!,student.sname!!,student.ssex!!,student.sage!! )          }          holder.modify\_student\_btn.setOnClickListener {              val dialogView: View = LayoutInflater.from(thisContext).inflate(R.layout.add\_student\_dialog, null)              val snameEditText = dialogView.findViewById<EditText>(R.id.snameEditText)              val ssexEditText = dialogView.findViewById<EditText>(R.id.ssexEditText)              val sageEditText = dialogView.findViewById<EditText>(R.id.sageEditText)              snameEditText.setText(student.sname.toString())              ssexEditText.setText(student.ssex.toString())              sageEditText.setText(student.sage.toString())              AlertDialog.Builder(thisContext).setView(dialogView).apply {// 弹出对话框 如果点击确认会启动 answerActivity                  setTitle("修改学生信息")                  setCancelable(false)                  setPositiveButton("确定", DialogInterface.OnClickListener { dialogInterface, i ->                      val studentUpdateTemp = Student(student.sno,snameEditText.text.toString(),ssexEditText.text.toString(),sageEditText.text.toString().toInt())                      studentViewModel.updateStudents(studentUpdateTemp)                      Toast.makeText(thisContext,"修改学生信息成功", Toast.LENGTH\_SHORT).show()  //                    studentViewModel.deleteAllStudents()                  })                  setNegativeButton("取消", DialogInterface.OnClickListener { dialogInterface, i ->                  })                  show()              }          }          holder.delete\_student\_btn.setOnClickListener {              AlertDialog.Builder(thisContext).apply {// 弹出对话框 如果点击确认会启动 answerActivity                  setTitle("删除确认")                  setCancelable(false)                  setPositiveButton("确定", DialogInterface.OnClickListener { dialogInterface, i ->                      studentViewModel.deleteStudentBySno(student.sno!!)                      Toast.makeText(thisContext,"删除学生信息成功", Toast.LENGTH\_SHORT).show()                  })                  setNegativeButton("取消", DialogInterface.OnClickListener { dialogInterface, i ->                  })                  show()              }          }      }      override fun getItemCount(): Int {          return  allStudents.size      }      inner class MyViewHolder(itemView: View) : RecyclerView.ViewHolder(itemView){          var textViewSno:TextView = itemView.findViewById(R.id.textView\_course\_sno)          var textViewSname:TextView = itemView.findViewById(R.id.textView\_student\_sname)          var textViewSsex:TextView = itemView.findViewById(R.id.textView\_student\_ssex)          var textViewSage:TextView = itemView.findViewById(R.id.textView\_student\_sage)          var modify\_student\_btn:FloatingActionButton = itemView.findViewById(R.id.modify\_student\_btn)          var delete\_student\_btn:FloatingActionButton = itemView.findViewById(R.id.delete\_student\_btn)      }  } 4.3.6 layout          核心代码Activity\_student <?xml version="1.0" encoding="utf-8"?>  <FrameLayout xmlns:android="http://schemas.android.com/apk/res/android"      xmlns:app="http://schemas.android.com/apk/res-auto"      xmlns:tools="http://schemas.android.com/tools"      android:layout\_width="match\_parent"      android:layout\_height="match\_parent"      tools:context=".activity.MainActivity">      <androidx.recyclerview.widget.RecyclerView          android:id="@+id/wordRecyclerView"          android:layout\_width="match\_parent"          android:layout\_height="match\_parent" />      <com.google.android.material.floatingactionbutton.FloatingActionButton          android:id="@+id/add\_student\_btn"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:layout\_gravity="bottom|center"          android:layout\_marginBottom="15dp"          android:clickable="true"          android:src="@drawable/white\_add" />  </FrameLayout> Activity\_sc <?xml version="1.0" encoding="utf-8"?>  <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schemas.android.com/apk/res/android"      xmlns:app="http://schemas.android.com/apk/res-auto"      xmlns:tools="http://schemas.android.com/tools"      android:layout\_width="match\_parent"      android:layout\_height="match\_parent"      tools:context=".activity.ScActivity">      <androidx.constraintlayout.widget.Guideline          android:id="@+id/guideline"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:orientation="horizontal"          app:layout\_constraintGuide\_percent="0.35" />      <ImageView          android:id="@+id/imageView"          android:layout\_width="140dp"          android:layout\_height="150dp"          android:background="@drawable/touxiang"          app:layout\_constraintBottom\_toTopOf="@+id/guideline"          app:layout\_constraintEnd\_toEndOf="parent"          app:layout\_constraintHorizontal\_bias="0.129"          app:layout\_constraintStart\_toStartOf="parent"          app:layout\_constraintTop\_toTopOf="parent"          app:layout\_constraintVertical\_bias="0.575" />      <TextView          android:id="@+id/textView10"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:layout\_marginTop="32dp"          android:text="学号："          android:textColor="#000000"          android:textSize="18sp"          app:layout\_constraintBottom\_toTopOf="@+id/textView7"          app:layout\_constraintEnd\_toEndOf="parent"          app:layout\_constraintHorizontal\_bias="0.588"          app:layout\_constraintStart\_toStartOf="parent"          app:layout\_constraintTop\_toTopOf="parent" />      <TextView          android:id="@+id/textView9"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:text="年龄："          android:textColor="#000000"          android:textSize="18sp"          app:layout\_constraintBottom\_toTopOf="@+id/guideline"          app:layout\_constraintStart\_toStartOf="@+id/textView8"          app:layout\_constraintTop\_toBottomOf="@+id/textView8" />      <TextView          android:id="@+id/textView8"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:text="性别："          android:textColor="#000000"          android:textSize="18sp"          app:layout\_constraintBottom\_toTopOf="@+id/textView9"          app:layout\_constraintStart\_toStartOf="@+id/textView7"          app:layout\_constraintTop\_toBottomOf="@+id/textView7" />      <TextView          android:id="@+id/textView7"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:text="姓名："          android:textColor="#000000"          android:textSize="18sp"          app:layout\_constraintBottom\_toTopOf="@+id/textView8"          app:layout\_constraintStart\_toStartOf="@+id/textView10"          app:layout\_constraintTop\_toBottomOf="@+id/textView10" />      <TextView          android:id="@+id/textView\_course\_sno"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:layout\_marginTop="32dp"          android:text="TextView"          app:layout\_constraintBottom\_toTopOf="@+id/textView\_course\_sname"          app:layout\_constraintEnd\_toEndOf="parent"          app:layout\_constraintHorizontal\_bias="0.815"          app:layout\_constraintStart\_toStartOf="parent"          app:layout\_constraintTop\_toTopOf="parent" />      <TextView          android:id="@+id/textView\_course\_sname"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:text="TextView"          app:layout\_constraintBottom\_toTopOf="@+id/textView\_course\_ssex"          app:layout\_constraintStart\_toStartOf="@+id/textView\_course\_sno"          app:layout\_constraintTop\_toBottomOf="@+id/textView\_course\_sno" />      <TextView          android:id="@+id/textView\_course\_ssex"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:text="TextView"          app:layout\_constraintBottom\_toTopOf="@+id/textView\_course\_ssage"          app:layout\_constraintStart\_toStartOf="@+id/textView\_course\_sname"          app:layout\_constraintTop\_toBottomOf="@+id/textView\_course\_sname" />      <TextView          android:id="@+id/textView\_course\_ssage"          android:layout\_width="wrap\_content"          android:layout\_height="wrap\_content"          android:text="TextView"          app:layout\_constraintBottom\_toTopOf="@+id/guideline"          app:layout\_constraintStart\_toStartOf="@+id/textView\_course\_ssex"          app:layout\_constraintTop\_toBottomOf="@+id/textView\_course\_ssex" />      <FrameLayout          android:layout\_width="match\_parent"          android:layout\_height="0dp"          app:layout\_constraintBottom\_toBottomOf="parent"          app:layout\_constraintTop\_toTopOf="@+id/guideline">          <androidx.recyclerview.widget.RecyclerView              android:id="@+id/recyclerViewOfCourse"              android:layout\_width="match\_parent"              android:layout\_height="match\_parent" />          <com.google.android.material.floatingactionbutton.FloatingActionButton              android:id="@+id/add\_course\_btn"              android:layout\_width="wrap\_content"              android:layout\_height="wrap\_content"              android:layout\_gravity="bottom|center"              android:layout\_marginBottom="15dp"              android:clickable="true"              android:contentDescription="TODO"              app:srcCompat="@drawable/white\_add" />      </FrameLayout>  </androidx.constraintlayout.widget.ConstraintLayout> cell\_card\_student <?xml version="1.0" encoding="utf-8"?>  <LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"      xmlns:app="http://schemas.android.com/apk/res-auto"      xmlns:tools="http://schemas.android.com/tools"      android:layout\_width="match\_parent"      android:layout\_height="wrap\_content"      android:clickable="true"      android:orientation="vertical">      <androidx.cardview.widget.CardView          android:layout\_width="match\_parent"          android:layout\_height="wrap\_content"          android:layout\_marginStart="8dp"          android:layout\_marginLeft="8dp"          android:layout\_marginTop="8dp"          android:layout\_marginEnd="8dp"          android:layout\_marginRight="8dp"          android:layout\_marginBottom="0dp"          app:cardBackgroundColor="@color/design\_default\_color\_on\_primary"          app:cardElevation="2dp"          app:cardUseCompatPadding="true">          <androidx.constraintlayout.widget.ConstraintLayout              android:background="?attr/selectableItemBackground"              android:layout\_width="match\_parent"              android:layout\_height="match\_parent">              <androidx.constraintlayout.widget.Guideline                  android:id="@+id/guideline7"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:orientation="vertical"                  app:layout\_constraintGuide\_percent="0.1" />              <androidx.constraintlayout.widget.Guideline                  android:id="@+id/guideline8"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:orientation="vertical"                  app:layout\_constraintGuide\_percent="0.6" />              <TextView                  android:id="@+id/textView\_course\_sno"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:text="1"                  app:layout\_constraintBottom\_toBottomOf="parent"                  app:layout\_constraintEnd\_toStartOf="@+id/guideline7"                  app:layout\_constraintStart\_toStartOf="parent"                  app:layout\_constraintTop\_toTopOf="parent" />              <TextView                  android:id="@+id/textView\_student\_sname"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:layout\_marginTop="8dp"                  android:text="TextView"                  android:textSize="28sp"                  app:layout\_constraintBottom\_toTopOf="@+id/textView\_student\_ssex"                  app:layout\_constraintEnd\_toStartOf="@+id/guideline8"                  app:layout\_constraintHorizontal\_bias="0.041"                  app:layout\_constraintStart\_toStartOf="@+id/guideline7"                  app:layout\_constraintTop\_toTopOf="parent" />              <TextView                  android:id="@+id/textView\_student\_ssex"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:layout\_marginTop="8dp"                  android:layout\_marginBottom="8dp"                  android:text="TextView"                  app:layout\_constraintBottom\_toBottomOf="parent"                  app:layout\_constraintStart\_toStartOf="@+id/textView\_student\_sname"                  app:layout\_constraintTop\_toBottomOf="@+id/textView\_student\_sname" />              <TextView                  android:id="@+id/textView\_student\_sage"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:layout\_marginTop="8dp"                  android:text="TextView"                  app:layout\_constraintBottom\_toBottomOf="parent"                  app:layout\_constraintEnd\_toStartOf="@+id/guideline8"                  app:layout\_constraintHorizontal\_bias="0.118"                  app:layout\_constraintStart\_toEndOf="@+id/textView\_student\_ssex"                  app:layout\_constraintTop\_toBottomOf="@+id/textView\_student\_sname"                  app:layout\_constraintVertical\_bias="0.0" />              <com.google.android.material.floatingactionbutton.FloatingActionButton                  android:id="@+id/modify\_student\_btn"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:clickable="true"                  android:contentDescription="TODO"                  app:backgroundTint="#CDDC39"                  app:layout\_constraintBottom\_toBottomOf="parent"                  app:layout\_constraintEnd\_toEndOf="parent"                  app:layout\_constraintHorizontal\_bias="0.2"                  app:layout\_constraintStart\_toStartOf="@+id/guideline8"                  app:layout\_constraintTop\_toTopOf="parent"                  app:srcCompat="@drawable/white\_edit" />              <com.google.android.material.floatingactionbutton.FloatingActionButton                  android:id="@+id/delete\_student\_btn"                  android:layout\_width="wrap\_content"                  android:layout\_height="wrap\_content"                  android:layout\_marginEnd="16dp"                  android:layout\_marginRight="16dp"                  android:clickable="true"                  app:layout\_constraintBottom\_toBottomOf="parent"                  app:layout\_constraintEnd\_toEndOf="parent"                  app:layout\_constraintHorizontal\_bias="1.0"                  app:layout\_constraintStart\_toEndOf="@+id/modify\_course\_btn"                  app:layout\_constraintTop\_toTopOf="parent"                  app:srcCompat="@drawable/white\_delete" />          </androidx.constraintlayout.widget.ConstraintLayout>      </androidx.cardview.widget.CardView>  </LinearLayout> | | | | | |