1. **Program structure and flow:**

First, create the UI controls widgets:

*GroupLetters(RadioButtonGroup)*

*dept\_input(TextInput)*

*title\_input(TextInput))*

*options(RadioGroup)*

*button\_refresh(Button)*

*Group\_choices(RadioButtonGroup)*

*Department\_choices(RadioButtonGroup)*

*Text\_Instruction(Paragraph)*

Then, connect SOL server to get the data from the data base.

Next, define the callback functions, which allows user to control the widgets. For example, on\_click(), on\_change().

On Tab1(Course Info):

Part1: Select by letter. Click the letter button to select Course Title.

Part2: Select by text input. Input the text and choose (begins…, contains.., ends…) the title and department. What’s more, user can refresh the selected result by refresh button.

On Tab2(Statistics):

By using the drag button to select the department.

The program will show the students’ GPA count statistics by year.

1. **Python objects:**

Global objects:

idx1: indicate the title text input box

idx2: indicate the department input box

idxc: a variable to store index of widgets

content1: the content in the title text input box

content2: the content in the title text input box

1. **Functions:**

connectSQLServer(): connect to the SQL Server.

Tab1:

choose(idx): choose the widgets

title\_choose(idx=-1): choose the title text input box

dept\_choose(idx=-1): choose the department text input box

title\_change(attr,old,new): change the text input(title)

dept\_change(attr,old,new): change the text input(department)

data\_show(idx): after letter is selected, show the data.

refresh(): refresh the data, give a updated results

Tab2:

select\_change(attr, old, new): Click the department, the chart will refresh, it will show the GPA count by year.

check(grade, count): return 0 if student’s grade is missing

1. **Output:**









