

**รายงานการทดลอง  
LAB 6 : Structure**

**เสนอ**  
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**จัดทำโดย**  
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Section 01  
Link Source Code : <https://github.com/gtfarng/LabIntroC>

รายงานนี้เป็นส่วนหนึ่งของรายวิชา 240-101 INTRO TO COMP PROGRAM  
ภาคการศึกษาที่ 2 ปีการศึกษา 2561  
ภาควิชาวิศวกรรมคอมพิวเตอร์ คณะวิศวกรรมศาสตร์  
มหาวิทยาลัยสงขลานครินทร์

**การทดลองที่ 6   
สตรัคเจอร์ (Structure)**

**วัตถุประสงค์**

- เพื่อให้เข้าใจการประกาศรูปแบบข้อมูล การประกาศตัวแปรและสามารถใช้งานข้อมูลแบบสตรัคเจอร์ในภาษาซีได้  
- สามรถใช้สตรัคเจอร์ร่วมกับฟังก์ชันได้ โดยการส่งผ่านข้อมูลให้ฟังก์ชันและส่งค่ากลับจากฟังก์ชันเป็นสตรัคเจอร์  
- สามารถใช้สตรัคเจอร์กับอาร์เรย์ได้ ทั้งการใช้อาร์เรย์ภายในสตรัคเจอร์และการใช้อาร์เรย์ของสตรัคเจอร์ได้

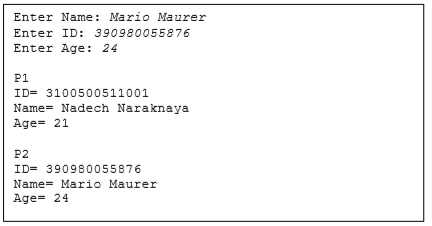
**การทดลองตอนที่ 1 : การประกาศ Structure และการประกาศชนิดข้อมูลแบบ Structure**

1. จงเขียนโปรแกรมในการเก็บรายละเอียดข้อมูลบุคคลโดยกำหนดโครงสร้างบุคคล (person) ให้มีสมาชิกดังนี้

* ID เก็บรหัสบัตรประชาชนเป็นข้อความจำนวน 13 ตัวอักษร
* Name เก็บชื่อและนามสกุลมีความยาวไม่เกิน 60 ตัวอักษร
* Age เก็บอายุเป็นตัวเลขจำนวนเต็ม

ให้ประกาศตัวแปร p1, p2 เป็นตัวแปรรูปแบบโครงสร้างข้อมูล person ให้มีค่าเริ่มต้น p1 มีชื่อว่า “Nadech Naraknaya”, อายุ 21 ปี, หมายเลขบัตรประชาชน 3-1005-00511-00-1 และ p2 รับค่าข้อมูลจากผู้ใช้ จากนั้นให้พิมพ์ข้อมูล p1 และ p2 ออกทางจอภาพ

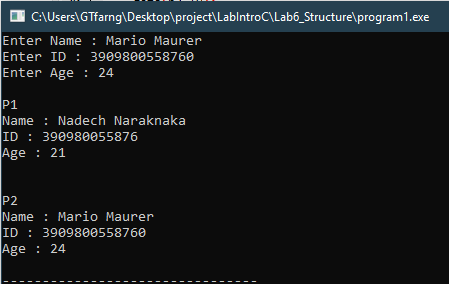
ตัวอย่างผลการทำงานของโปรแกรม



**Source code**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37. | |  | | --- | |  | | #include<stdio.h>  #include<string.h> | | int main() | | { | | struct | | { | | char name[60]; | | char id[13]; | | int Age; | | }p1,p2; | |  | | strcpy(p1.name,"Nadech Naraknaya"); | | strcpy(p1.id,"3100500511001"); | | p1.Age=21; | |  | | printf("Enter Name: "); | | gets(p2.name); | | printf("Enter ID: "); | | gets(p2.id); | | printf("Enter Age: "); | | scanf("%d",&p2.Age); | |  | | printf("P1\n"); | | printf("ID = %s\n",p1.id); | | printf("Name = %s\n",p1.name); | | printf("Age = %d\n",p1.Age); | |  | | printf("P2\n"); | | printf("ID = %s\n",p2.id); | | printf("Name = %s\n",p2.name); | | printf("Age = %d\n",p2.Age); | |  | | return 0; | | } | |

**ผลการรัน**



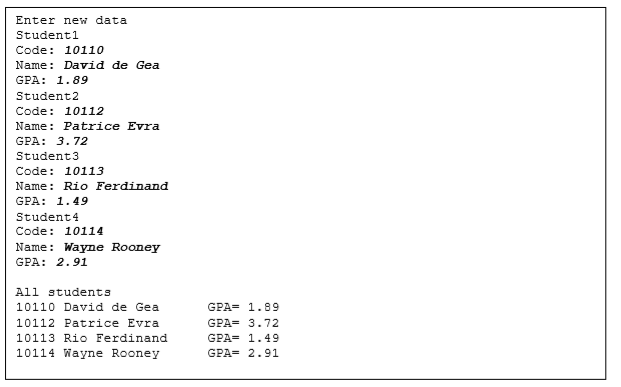
**การทดลองตอนที่ 2 : อาร์เรย์ของสตรัคเจอร์ ( Array of Structure )**

1. จงเขียนโปรแกรมเพื่อเก็บข้อมูลของนักศึกษาจำนวน 4 คน โดยนักศึกษาแต่ละคนเก็บข้อมูลดังต่อไปนี้

* stdcode สำหรับเก็บรหัสนักศึกษาเป็นข้อความจำนวน 10 ตัวอักษร
* Name สำหรับเก็บชื่อและนามสกุลนักศึกษามีความยาวไม่เกิน 60 ตัวอักษร
* gpa สำหรับเก็บค่าเกรดเฉลี่ยสะสมของนักศึกษา

ให้ประกาศตัวแปร stds เป็น array of structure เพื่อเก็บข้อมูลนักศึกษาทั้ง 4 คนนี้ โดยรับค่าข้อมูลนักศึกษาจากผู้ใช้และสุดท้ายให้พิมพ์ค่าข้อมูลของนักศึกษาทั้ง 4 คนออกจากจอภาพ ( ใช้ for loop ช่วยในการับค่านักศึกษา)

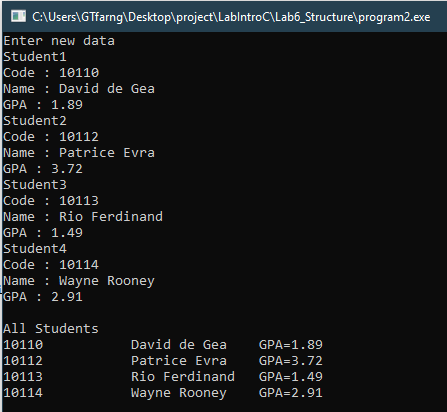
ตัวอย่างผลการทำงานของโปรแกรม



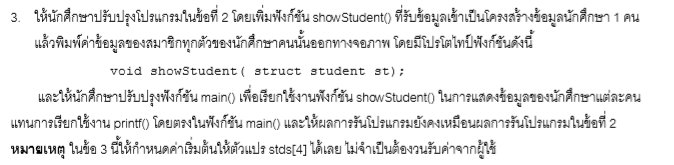
**Source code**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37.  38.  39.  40.  41.  42.  43.  44.  45.  46. | |  | | --- | |  | |  | |  | | #include<stdio.h>  #include<string.h> | |  | | typedef struct | | { | | char stdcode[11]; | | char name[60]; | | float gpa; | |  | | } student; | |  | | int main() | | { | | student stds[4]; | | int i; | |  | | printf("Enter new data\n"); | | for(i=0;i<4;i++) | | { | | fflush(stdin); | | printf("Student%d\n",i+1); | | printf("Code : ",i+1); | | gets(stds[i].stdcode); | | fflush(stdin); | | printf("Name : ",i+1); | | gets(stds[i].name); | | fflush(stdin); | | printf("GPA : ",i+1); | | scanf("%f",&stds[i].gpa); | | fflush(stdin); | |  | | } | |  | | printf("\n"); | | printf("All Students\n"); | |  | | for(i=0;i<4;i++) | | { | | printf("%10s\t%s\tGPA=%.2f\n",stds[i].stdcode,stds[i].name,stds[i].gpa); | | } | |  | | return 0; | | } | |

**ผลการรัน**



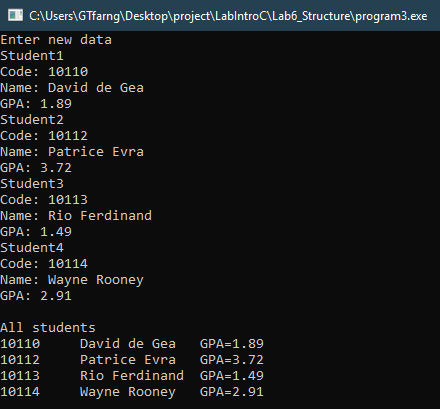
**การทดลองตอนที่ 3 : สตรัคเจอร์และฟังก์ชัน ( Structure and Function )**

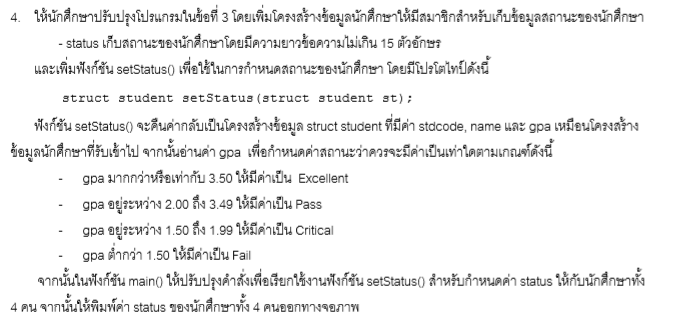


**Source code**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37.  38.  39.  40.  41.  42.  43.  44.  45.  46.  47.  48. | |  | | --- | |  | |  | |  | | #include<stdio.h>  #include<string.h> | | struct student | | { | | char stdcode[11]; | | char name[60]; | | float gpa; | | }; | |  | | void showStudent(struct student st); | |  | | int main () | | { | | struct student stds[4]; | | int i; | |  | | printf("Enter new data\n"); | | for(i=0;i<4;i++) | | { | | printf("Student%d\n",i+1); | | printf("Code: "); | | gets(stds[i].stdcode); | | fflush(stdin); | | printf("Name: "); | | gets(stds[i].name); | | fflush(stdin); | | printf("GPA: "); | | scanf("%f",&stds[i].gpa); | | fflush(stdin); | | } | |  | | printf("\nAll students\n"); | | for(i=0;i<4;i++) | | { | | showStudent(stds[i]); | | } | |  | |  | | return 0; | | } | | void showStudent(struct student st) | | { | | printf("%-9s %-15sGPA=%.2f\n",st.stdcode,st.name,st.gpa); | | } | |

**ผลการรัน**

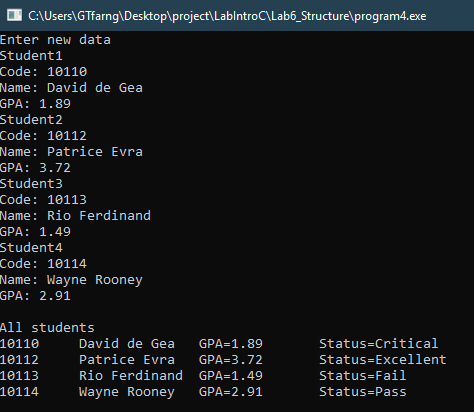




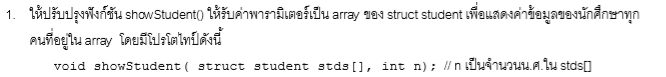
**Source code**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37.  38.  39.  40.  41.  42.  43.  44.  45.  46.  47.  48. | |  | | --- | |  | |  | | #include<stdio.h>  #include<string.h> | | struct student | | { | | char stdcode[11]; | | char name[60]; | | float gpa; | | char status[15]; | | }; | |  | | struct student setStatus(struct student st); | | void showStudent(struct student st); | | int main () | | { | | struct student stds[4]; | | int i; | |  | | printf("Enter new data\n"); | | for(i=0;i<4;i++) | | { | | printf("Student%d\n",i+1); | | printf("Code: "); | | gets(stds[i].stdcode); | | fflush(stdin); | | printf("Name: "); | | gets(stds[i].name); | | fflush(stdin); | | printf("GPA: "); | | scanf("%f",&stds[i].gpa); | | fflush(stdin); | | } | |  | | printf("\nAll students\n"); | | for(i=0;i<4;i++) | | { | | stds[i]=setStatus(stds[i]); | | showStudent(stds[i]); | | } | |  | | return 0; | | } | |  | | struct student setStatus(struct student st) | | { | | if(st.gpa>=3.50) | | strcpy(st.status,"Excellent"); | | else if(st.gpa>=2.00&&st.gpa<3.50) | | strcpy(st.status,"Pass"); | | else if(st.gpa>=1.50&&st.gpa<2.00) | | strcpy(st.status,"Critical"); | | else | | strcpy(st.status,"Fail"); | | return st; | | } | |  | | void showStudent(struct student st) | | { | | printf("%-9s %-15sGPA=%.2f\tStatus=%9s\n",  st.stdcode,st.name,st.gpa,st.status); | | } | |

**ผลการรัน**



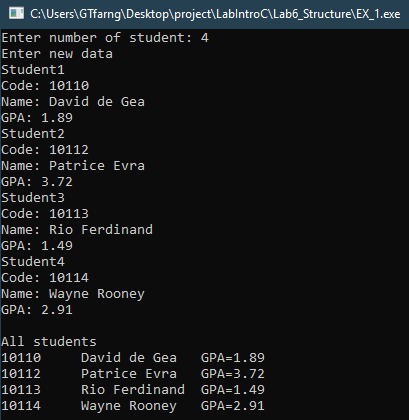
**แบบฝึกหัดเสริม**

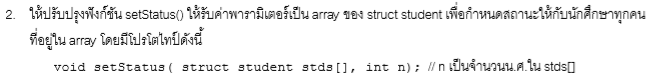


**Source code**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37.  38.  39.  40.  41.  42.  43.  44.  45.  46.  47.  48.  49.  50.  51.  52.  53.  54.  55. | |  | | --- | |  | |  | |  | | #include<stdio.h>  #include<string.h> | |  | | struct student  { | | char stdcode[11]; | | char name[60]; | | float gpa; | | char status[15]; | | }; | |  | | void showStudent(struct student stds[], int n); | | int main () | | { | | struct student stds[5]; | | int num,i; | |  | | printf("Enter number of student: "); | | scanf("%d",&num); | | fflush(stdin); | | printf("Enter new data\n"); | | for(i=0;i<num;i++) | | { | | printf("Student%d\n",i+1); | | printf("Code: "); | | gets(stds[i].stdcode); | | fflush(stdin); | | printf("Name: "); | | gets(stds[i].name); | | fflush(stdin); | | printf("GPA: "); | | scanf("%f",&stds[i].gpa); | | fflush(stdin); | | } | |  | | printf("\nAll students\n"); | | showStudent(stds,num); | |  | | return 0; | | } | |  | | void showStudent(struct student stds[], int n) | | { | | int i; | |  | | for(i=0;i<n;i++) | | { | | printf("%-9s %-15sGPA=%.2f\n",stds[i].stdcode,stds[i].name,stds[i].gpa); | | } | | } | |

**ผลการรัน**

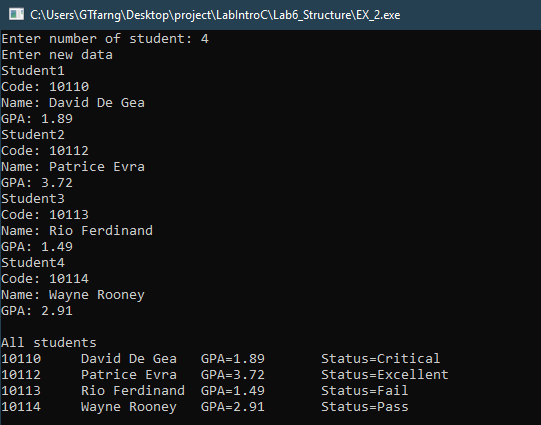


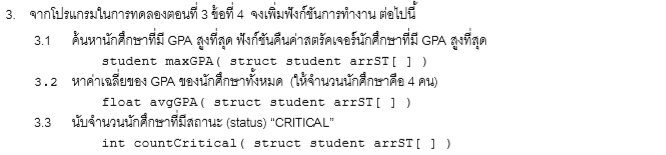


**Source code**

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| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37.  38.  39.  40.  41.  42.  43.  44.  45.  46.  47.  48.  49.  50.  51.  52.  53.  54.  55.  56.  57.  58.  59.  60.  61.  62.  63.  64.  65.  66.  67.  68.  69.  70.  71.  72.  73.  74.  75.  76.  77.  78. | |  | | --- | |  | |  | |  | | #include<stdio.h>  #include<string.h> | | | |  | | | | struct student | | | | { | | | | char stdcode[11]; | | | | char name[60]; | | | | float gpa; | | | | char status[15]; | | | | }; | | | |  | | | | void setStatus(struct student stds[], int n); | | | | void showStudent(struct student stds[], int n); | | | | int main () | | | | { | | | | struct student stds[5]; | | | | int num,i; | | | |  | | | | printf("Enter number of student: "); | | | | scanf("%d",&num); | | | | fflush(stdin); | | | | printf("Enter new data\n"); | | | | for(i=0;i<num;i++) | | | | { | | | | printf("Student%d\n",i+1); | | | | printf("Code: "); | | | | gets(stds[i].stdcode); | | | | fflush(stdin); | | | | printf("Name: "); | | | | gets(stds[i].name); | | | | fflush(stdin); | | | | printf("GPA: "); | | | | scanf("%f",&stds[i].gpa); | | | | fflush(stdin); | | | | } | | | |  | | | | printf("\nAll students\n"); | | | | setStatus(stds,num); | | | | showStudent(stds,num); | | | |  | | | | return 0; | | | | } | | | | void setStatus(struct student stds[], int n) | | | | { | | | | int i; | | | | for(i=0;i<n;i++) | | | | { | | | | if(stds[i].gpa>=3.50) | | | | strcpy(stds[i].status,"Excellent"); | | | | else if(stds[i].gpa>=2.00&&stds[i].gpa<3.50) | | | | strcpy(stds[i].status,"Pass"); | | | | else if(stds[i].gpa>=1.50&&stds[i].gpa<2.00) | | | | strcpy(stds[i].status,"Critical"); | | | | else | | | | strcpy(stds[i].status,"Fail"); | | | | }; | | | | } | | | |  | | | | void showStudent(struct student stds[], int n) | | | | { | | | | int i; | | for(i=0;i<n;i++) | | | { | | | printf("%-9s %-15sGPA=%.2f\tStatus=%-9s\n",  stds[i].stdcode,stds[i].name,stds[i].gpa,stds[i].status); | | | }  } | | |  |  | | | |

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**Source code**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10  11.  12.  13.  14.  15.  16.  17.  18.  19.  20.  21.  22.  22.  23.  24.  25.  26.  27.  28.  29.  30.  31.  32.  33.  34.  35.  36.  37.  38.  39.  40.  41.  42.  43.  44.  45.  46.  47.  48.  49.  50.  51.  52.  53.  54.  55.  56.  57.  58.  59.  60.  61.  62.  63.  64.  65.  66.  67.  68.  69.  70.  71.  72.  73.  74.  75.  76.  77.  78.  79.  80.  81.  82.  83.  84.  85.  86.  87.  88.  89.  90.  91.  92.  93.  94.  95.  96.  97.  98.  99.  100.  101.  102.  103.  104.  105.  106.  107.  108.  109.  110.  111.  112.  113.  114.  115.  116.  117.  118.  119.  120.  121.  122.  123.  124.  125.  126.  127.  128.  129.  130.  131.  132.  133.  134.  135.  136.  137.  138.  139.  140.  141.  142.  143.  144.  145.  146.  147.  148.  149.  150. | |  | | --- | |  | |  | |  | |  | | #include<stdio.h>  #include<string.h> | | | | #define max 4 | | | |  | | | | struct student | | | | { | | | | char stdcode[11]; | | | | char name[60]; | | | | float gpa; | | | | char status[15]; | | | | }; | | | |  | | | | void setStatus(struct student stds[], int n); | | | | void showStudent(struct student stds[], int n); | | | | struct student maxGPA(struct student stds[]); | | | | float avgGPA(struct student stds[]); | | | | int countCritical(struct student stds[]); | | | | int main () | | | | { | | | | struct student stds[max],maxstd; | | | | int num,cri,i; | | | | float avg; | | | | char maxgpa; | | | |  | | | | printf("Enter number of student: "); | | | | scanf("%d",&num); | | | | fflush(stdin); | | | | printf("Enter new data\n"); | | | | for(i=0;i<num;i++) | | | | { | | | | printf("Student%d\n",i+1); | | | | printf("Code: "); | | | | gets(stds[i].stdcode); | | | | fflush(stdin); | | | | printf("Name: "); | | | | gets(stds[i].name); | | | | fflush(stdin); | | | | printf("GPA: "); | | | | scanf("%f",&stds[i].gpa); | | | | fflush(stdin); | | | | } | | | |  | | | | printf("All students\n"); | | | | setStatus(stds,num); | | | | printf("-------------------------------------------------------------\n"); | | | | printf("student code name GPA Status\n"); | | | | printf("-------------------------------------------------------------\n"); | | | | showStudent(stds,num);  printf("-------------------------------------------------------------\n");  maxstd=maxGPA(stds); |  | | | |  | | |  | | | printf("Max GPA student is ID : %s, Name : %s, GPA : %.2f, and Status is %s\n",maxstd.stdcode,maxstd.name,maxstd.gpa,maxstd.status); | | | avg=avgGPA(stds); | | | printf("Average score is %.2f\n",avg); | | | cri=countCritical(stds); | | | printf("Critical= %d person\n",cri); | | |  | | | return 0; | | | } | | |  | | | void setStatus(struct student stds[], int n) | | | { | | | int i; | | | for(i=0;i<n;i++)  { | | | if(stds[i].gpa>=3.50) | | | strcpy(stds[i].status,"Excellent"); | | | else if(stds[i].gpa>=2.00&&stds[i].gpa<3.50) | | | strcpy(stds[i].status,"Pass"); | | | else if(stds[i].gpa>=1.50&&stds[i].gpa<2.00) | | | strcpy(stds[i].status,"Critical"); | | | else | | | strcpy(stds[i].status,"Fail"); | | | } | | | } | | |  | | | void showStudent(struct student stds[], int n) | | | { | | | int i; | | | for(i=0;i<n;i++) | | | { | | | printf("%-24s %-18s %-10.2f %s\n",stds[i].stdcode,stds[i].name,stds[i].gpa,stds[i].status); | | | } | | | } | | |  | | | struct student maxGPA(struct student stds[]) | | | { | | | int i; | | | float maxgpa=stds[0].gpa; | | | struct student maxstd=stds[0]; | | |  | | | for(i=0;i<max;i++) | | | { | | | if(stds[i].gpa>=maxgpa) | | | maxgpa=stds[i].gpa; | | | if(stds[i].gpa==maxgpa) | | | maxstd=stds[i]; | | | } | | | return maxstd; | | | } | | |  | | | float avgGPA(struct student stds[ ]) | | | { | | | int i; | | | float total=0,avg; | | |  | | | for(i=0;i<max;i++) | | | total+=stds[i].gpa; | | | avg=total/max; | | |  | | | return avg; | | | } | | |  | | | int countCritical(struct student stds[ ]) | | | { |  | | | | int i,ccri=0; | |  | | for(i=0;i<max;i++) | | { | | if(strcmp(stds[i].status,"Critical")==0) | | ccri++; | | } | |  | | return ccri; | | } | |  |  | | | |

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