College of Information Systems and Technology Management

2nd Semester A.Y. 2023-2024

ICC 0104-1 DSA

GROUP 4

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SOURCE CODE

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <windows.h>


typedef struct STUDREC {
    char No[13];
    char Name[25];
    char Cyr[10];
    float GWA;
    struct STUDREC *next;
    struct STUDREC *prev;
} STUDREC;

STUDREC *head = NULL;
STUDREC *tail = NULL;

void gotoxy(short x, short y);
void createStudentRecord();
void displayTopToBottom();
void displayBottomToTop();
void addRecordAtHead();
void addRecordAtEnd();
void addRecordBeforeSpecific();
void addRecordAfterSpecific();
void deleteRecordAtHead();
void deleteRecordAtTail();
void deleteRecordUsingSpecific();
void deleteRecordBeforeSpecific();
void deleteRecordAfterSpecific();

int main() {
    int choice;
    char ch;

    do {
        printf("Main Menu:\n");
        printf("1. Create a Student Record\n");
        printf("2. Display Student Records (Top to Bottom)\n");
        printf("3. Display Student Records (Bottom to Top)\n");
```

```c
printf("4. Add a Student Record at the Head\n");
printf("5. Add a Student Record at the End\n");
printf("6. Add a Record Before a Specific Student Number\n");
printf("7. Add a Record After a Specific Student Number\n");
printf("8. Delete a Record at the Head\n");
printf("9. Delete a Record at the Tail\n");
printf("10. Delete a Record Using a Specific Student Number\n");
printf("11. Delete a Record Before a Specific Student Number\n");
printf("12. Delete a Record After a Specific Student Number\n");
printf("13. Exit\n");

printf("Enter your choice: ");
scanf("%d", &choice);

switch (choice) {
    case 1:
        createStudentRecord();
        break;
    case 2:
        displayTopToBottom();
        break;
    case 3:
        displayBottomToTop();
        break;
    case 4:
        addRecordAtHead();
        break;
    case 5:
        addRecordAtEnd();
        break;
    case 6:
        addRecordBeforeSpecific();
        break;
    case 7:
        addRecordAfterSpecific();
        break;
    case 8:
        deleteRecordAtHead();
        break;
    case 9:
        deleteRecordAtTail();
        break;
```

```
            case 10:
                deleteRecordUsingSpecific();
                break;
            case 11:
                deleteRecordBeforeSpecific();
                break;
            case 12:
                deleteRecordAfterSpecific();
                break;
            case 13:
                exit(0);
                break;
            default:
                printf("Invalid choice! Please enter a valid option.\n");
        }

        printf("\nPress any key to continue...");
        getchar();
        getchar();
        system("cls");

    } while (1);

    return 0;
}

void createStudentRecord() {
                if (head!=NULL) {
                        printf("You already have a record created!");
                        return;
                }

    char choice;
    do {
        STUDREC *newStudent = (STUDREC *)malloc(sizeof(STUDREC));
        printf("\nEnter Student Number: ");
        scanf("%12s", newStudent->No);
        printf("Enter Student Name: ");
        getchar();
        fgets(newStudent->Name, sizeof(newStudent->Name), stdin);
        newStudent->Name[strcspn(newStudent->Name, "\n")] = '\0';
        printf("Enter Student Cyr: ");
```

```c
        fgets(newStudent->Cyr, sizeof(newStudent->Name), stdin);
        newStudent->Cyr[strcspn(newStudent->Name, "\n")] = '\0';
        printf("Enter Student GWA: ");
        scanf("%f", &newStudent->GWA);

        newStudent->next = NULL;
        newStudent->prev = NULL;

        if (head == NULL) {
            head = newStudent;
            tail = newStudent;
        } else {
            tail->next = newStudent;
            newStudent->prev = tail;
            tail = newStudent;
        }

        printf("\nDo you want to add more student records? (Y/N): ");
        scanf(" %c", &choice);

    } while (choice == 'Y' || choice == 'y');
}

void displayTopToBottom() {
    if (head == NULL) {
        printf("\nNo student records found!\n");
        return;
    }
                system("cls");
    int row = 0;

    STUDREC *current = head;
    printf("Student Records (Top to Bottom): ");
    gotoxy(0,2+row);  printf("Student Number");
    gotoxy(30,2+row);        printf("Student Name");
    gotoxy(60,2+row);        printf("Student Cyr");
    gotoxy(90,2+row);        printf("Student GWA");

    while (current != NULL) {
        gotoxy(0,3+row); printf("%s", current->No);
        gotoxy(30,3+row); printf("%s", current->Name);
        gotoxy(60,3+row); printf("%s", current->Cyr);
```

```c
        gotoxy(90,3+row); printf("%.2f", current->GWA);
                        row++;
        current = current->next;
    }
}

void displayBottomToTop() {
    if (tail == NULL) {
        printf("\nNo student records found!\n");
        return;
    }
    system("cls");
                int row = 0;

    STUDREC *current = tail;

    printf("Student Records (Bottom to Top):");
    gotoxy(0,2+row);  printf("Student Number");
    gotoxy(30,2+row);         printf("Student Name");
    gotoxy(60,2+row);         printf("Student Cyr");
    gotoxy(90,2+row);         printf("Student GWA");

    while (current != NULL) {
        gotoxy(0,3+row); printf("%s", current->No);
        gotoxy(30,3+row); printf("%s", current->Name);
        gotoxy(60,3+row); printf("%s", current->Cyr);
        gotoxy(90,3+row); printf("%.2f", current->GWA);
                        row++;
        current = current->prev;
    }
}

void addRecordAtHead() {
        STUDREC *newStudent = (STUDREC *)malloc(sizeof(STUDREC));
        printf("\nEnter Student Number: ");
        scanf("%12s", newStudent->No);
        printf("Enter Student Name: ");
        getchar();
        fgets(newStudent->Name, sizeof(newStudent->Name), stdin);
        newStudent->Name[strcspn(newStudent->Name, "\n")] = '\0';
        printf("Enter Student Cyr: ");
        fgets(newStudent->Cyr, sizeof(newStudent->Name), stdin);
```

```c
            newStudent->Cyr[strcspn(newStudent->Name, "\n")] = '\0';
            printf("Enter Student GWA: ");
            scanf("%f", &newStudent->GWA);

    newStudent->next = head;
    newStudent->prev = NULL;

    if (head != NULL) {
        head->prev = newStudent;
    }

    head = newStudent;

    printf("\nStudent record added at the head.\n");
}

void addRecordAtEnd() {
    STUDREC *newStudent = (STUDREC *)malloc(sizeof(STUDREC));
    printf("\nEnter Student Number: ");
    scanf("%12s", newStudent->No);
    printf("Enter Student Name: ");
    getchar();
    fgets(newStudent->Name, sizeof(newStudent->Name), stdin);
    newStudent->Name[strcspn(newStudent->Name, "\n")] = '\0';
    printf("Enter Student Cyr: ");
    fgets(newStudent->Cyr, sizeof(newStudent->Name), stdin);
    newStudent->Cyr[strcspn(newStudent->Name, "\n")] = '\0';
    printf("Enter Student GWA: ");
    scanf("%f", &newStudent->GWA);

    newStudent->next = NULL;
    newStudent->prev = tail;

    if (tail != NULL) {
        tail->next = newStudent;
    }

    tail = newStudent;

    if (head == NULL) {
        head = tail;
    }
```

```c
    printf("\nStudent record added at the end.\n");
}

void addRecordBeforeSpecific() {
    char studentNo[13];
    printf("\nEnter the student number before which you want to add a record: ");
    scanf("%s", studentNo);

    STUDREC *current = head;
    while (current != NULL) {
        if (strcmp(current->No, studentNo) == 0) {
            STUDREC *newStudent = (STUDREC *)malloc(sizeof(STUDREC));
            printf("\nEnter Student Number: ");
                                scanf("%12s", newStudent->No);
                                printf("Enter Student Name: ");
                                getchar();
                                fgets(newStudent->Name, sizeof(newStudent->Name),
stdin);
                                newStudent->Name[strcspn(newStudent->Name, "\n")] =
'\0';

                                printf("Enter Student Cyr: ");
                                fgets(newStudent->Cyr, sizeof(newStudent->Name),
stdin);
                                newStudent->Cyr[strcspn(newStudent->Name, "\n")] =
'\0';

                                printf("Enter Student GWA: ");
                                scanf("%f", &newStudent->GWA);

            newStudent->next = current;
            newStudent->prev = current->prev;

            if (current->prev != NULL) {
                current->prev->next = newStudent;
            } else {
                head = newStudent;
            }

            current->prev = newStudent;

            printf("\nStudent record added before student number %s.\n", studentNo);
            return;
```

```c
    }
    current = current->next;
  }

  printf("\nStudent number %s not found!\n", studentNo);
}

void addRecordAfterSpecific() {
  char studentNo[13];
  printf("\nEnter the student number after which you want to add a record: ");
  scanf("%s", studentNo);

  STUDREC *current = head;
  while (current != NULL) {
    if (strcmp(current->No, studentNo) == 0) {
      STUDREC *newStudent = (STUDREC *)malloc(sizeof(STUDREC));
      printf("\nEnter Student Number: ");
                          scanf("%12s", newStudent->No);
                          printf("Enter Student Name: ");
                          getchar();
                          fgets(newStudent->Name, sizeof(newStudent->Name),
stdin);
                          newStudent->Name[strcspn(newStudent->Name, "\n")] =
'\0';

                          printf("Enter Student Cyr: ");
                          fgets(newStudent->Cyr, sizeof(newStudent->Name),
stdin);
                          newStudent->Cyr[strcspn(newStudent->Name, "\n")] =
'\0';

                          printf("Enter Student GWA: ");
                          scanf("%f", &newStudent->GWA);

      newStudent->next = current->next;
      newStudent->prev = current;

      if (current->next != NULL) {
        current->next->prev = newStudent;
      } else {
        tail = newStudent;
      }

      current->next = newStudent;
```

```c
            printf("\nStudent record added after student number %s.\n", studentNo);
            return;
        }
        current = current->next;
    }

    printf("\nStudent number %s not found!\n", studentNo);
}

void deleteRecordAtHead() {
    if (head == NULL) {
        printf("\nNo student records found!\n");
        return;
    }

    STUDREC *temp = head;
    head = head->next;
    if (head != NULL) {
        head->prev = NULL;
    } else {
        tail = NULL;
    }
    free(temp);

    printf("\nRecord at the head deleted.\n");
}

void deleteRecordAtTail() {
    if (tail == NULL) {
        printf("\nNo student records found!\n");
        return;
    }

    STUDREC *temp = tail;
    tail = tail->prev;
    if (tail != NULL) {
        tail->next = NULL;
    } else {
        head = NULL;
    }
    free(temp);
```

```c
        printf("\nRecord at the tail deleted.\n");
}

void deleteRecordUsingSpecific() {
    char studentNo[13];
    printf("\nEnter the student number you want to delete: ");
    scanf("%s", studentNo);

    STUDREC *current = head;
    while (current != NULL) {
        if (strcmp(current->No, studentNo) == 0) {
            if (current == head) {
                deleteRecordAtHead();
                printf("\nRecord with student number %s deleted.\n", studentNo);
                return;
            } else if (current == tail) {
                deleteRecordAtTail();
                printf("\nRecord with student number %s deleted.\n", studentNo);
                return;
            } else {
                current->prev->next = current->next;
                current-> next->prev = current->prev;
                free(current);
                printf("\nRecord with student number %s deleted.\n", studentNo);
                return;
            }
        }
        current = current->next;
    }

    printf("\nStudent number %s not found!\n", studentNo);
}

void deleteRecordBeforeSpecific() {
    char studentNo[13];
    printf("\nEnter the student number before which you want to delete a record: ");
    scanf("%s", studentNo);

    STUDREC *current = head;
    while (current != NULL) {
        if (strcmp(current->No, studentNo) == 0) {
```

```c
            if (current->prev == NULL) {
                printf("\nNo record found before student number %s.\n", studentNo);
                return;
            } else {
                STUDREC *temp = current->prev;
                if (temp == head) {
                    deleteRecordAtHead();
                    printf("\nRecord before student number %s deleted.\n", studentNo);
                    return;
                } else {
                    current->prev = temp->prev;
                    temp->prev->next = current;
                    free(temp);
                    printf("\nRecord before student number %s deleted.\n", studentNo);
                    return;
                }
            }
        }
        current = current->next;
    }

    printf("\nStudent number %s not found!\n", studentNo);
}

void deleteRecordAfterSpecific() {
    char studentNo[13];
    printf("\nEnter the student number after which you want to delete a record: ");
    scanf("%s", studentNo);

    STUDREC *current = head;
    while (current != NULL) {
        if (strcmp(current->No, studentNo) == 0) {
            if (current->next == NULL) {
                printf("\nNo record found after student number %s.\n", studentNo);
                return;
            } else {
                STUDREC *temp = current->next;
                if (temp == tail) {
                    deleteRecordAtTail();
                    printf("\nRecord after student number %s deleted.\n", studentNo);
                    return;
                } else {
```

```
            current->next = temp->next;
            temp->next->prev = current;
            free(temp);
            printf("\nRecord after student number %s deleted.\n", studentNo);
            return;
         }
       }
     }
     current = current->next;
   }

   printf("\nStudent number %s not found!\n", studentNo);
}

void gotoxy(short x, short y) {
   COORD pos = {x, y};
   SetConsoleCursorPosition(GetStdHandle(STD_OUTPUT_HANDLE), pos);
}
```

ALGORITHMS

Deletion of node before a Value:

Set Flag = 0

Set Previous = NULL

Set current = START

While (current != NULL)

{

   If (current->SN[0] == studentNumber)

   {

      If (current->prev != NULL and current->prev->prev != NULL)

      {

         Set nodeToDelete = current->prev

         Set current->prev = nodeToDelete->prev

         Set nodeToDelete->prev->next = current

         Free(nodeToDelete)

```
        Display "Student Record before Student Number (studentNumber) deleted
successfully."
    }
    Else
    {
        Display "No Student Record to delete before Student Number (studentNumber)."
    }
    Set Flag = 1
    Break
  }
  Set current = current->next
}

If (Flag == 0)
{
  Display "Student Number (studentNumber) not found in the list."
}
```

Deletion of node after a value

```
Find the node with value X
  temp = HEAD

While temp is not NULL and temp->data is not X
  temp = temp->next

If temp is NULL or temp->next is NULL
  Exit (No deletion possible)

Set nodeToDelete = temp->next

If nodeToDelete->next is not NULL
  nodeToDelete->next->prev = temp

Set temp->next = nodeToDelete->next

Free nodeToDelete
```

SAMPLE OUTPUTS

1. Create a Student Record

```
C:\Group 4\doubly.exe                    ×    +    ∨

8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 1

Enter Student Number: 202334061
Enter Student Name: Janiella Jalvador
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 1.00

Do you want to add more student records? (Y/N): Y

Enter Student Number: 202334055
Enter Student Name: Sabrina Riego
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 1.50

Do you want to add more student records? (Y/N): Y

Enter Student Number: 202334077
Enter Student Name: Tala Carpenter
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 1.50

Do you want to add more student records? (Y/N): N

Press any key to continue...
```

2. Display Student Records (Top to Bottom)

```
C:\Group 4\doubly.exe                    ×    +    ∨

Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334055               Sabrina Riego         BSCS 1-1             1.50
202334077               Tala Carpenter        BSCS 1-1             1.50
Press any key to continue...
```

3. Display Student Records (Bottom to Top)

```
C:\Group 4\doubly.exe                    ×    +    ∨

Student Records (Bottom to Top):

Student Number          Student Name          Student Cyr          Student GWA
202334077               Tala Carpenter        BSCS 1-1             1.50
202334055               Sabrina Riego         BSCS 1-1             1.50
202334061               Janiella Jalvador     BSCS 1-1             1.00
Press any key to continue...
```

4. Add a Student Record at the Head

```
C:\Group 4\doubly.exe                    ×    +    ∨

Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 4

Enter Student Number: 202334012
Enter Student Name: Ariana Grande
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 2.00

Student record added at the head.

Press any key to continue...
```

```
C:\Group 4\doubly.exe       ×    +    ∨

Student Records (Top to Bottom):

Student Number           Student Name          Student Cyr          Student GWA
202334012                Ariana Grande         BSCS 1-1             2.00
202334061                Janiella Jalvador     BSCS 1-1             1.00
202334055                Sabrina Riego         BSCS 1-1             1.50
202334077                Tala Carpenter        BSCS 1-1             1.50
Press any key to continue...
```
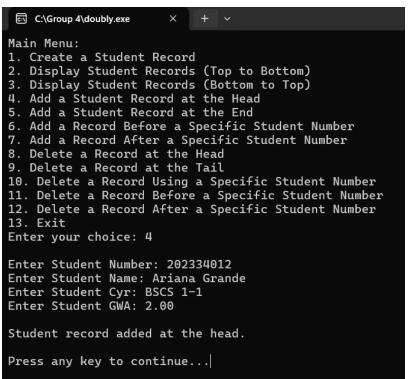
5. Add a Student Record at the End

```
C:\Group 4\doubly.exe          ×    +    ∨

Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 5

Enter Student Number: 202334013
Enter Student Name: Bini Maloi
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 1.50

Student record added at the end.

Press any key to continue...
```

```
C:\Group 4\doubly.exe          ×    +    ∨

Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334012               Ariana Grande         BSCS 1-1             2.00
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334055               Sabrina Riego         BSCS 1-1             1.50
202334077               Tala Carpenter        BSCS 1-1             1.50
202334013               Bini Maloi            BSCS 1-1             1.50
Press any key to continue...
```
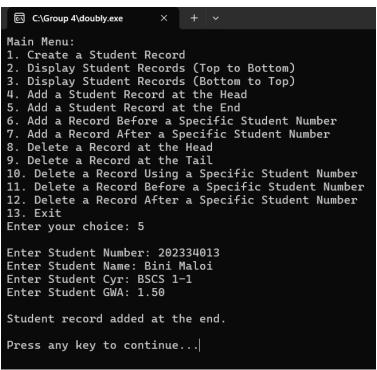
6. Add a Record Before a Specific Student Number

```
C:\Group 4\doubly.exe                ×    +    ∨
Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 6

Enter the student number before which you want to add a record: 202334061

Enter Student Number: 202334014
Enter Student Name: Daniel Ceasar
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 2.50

Student record added before student number 202334061.

Press any key to continue...
```

```
C:\Group 4\doubly.exe                ×    +    ∨
Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334012               Ariana Grande         BSCS 1-1             2.00
202334014               Daniel Ceasar         BSCS 1-1             2.50
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334055               Sabrina Riego         BSCS 1-1             1.50
202334077               Tala Carpenter        BSCS 1-1             1.50
202334013               Bini Maloi            BSCS 1-1             1.50
Press any key to continue...
```

7. Add a Record After a Specific Student Number

```
Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 7

Enter the student number after which you want to add a record: 202334055

Enter Student Number: 202334018
Enter Student Name: Jennie Kim
Enter Student Cyr: BSCS 1-1
Enter Student GWA: 1.00

Student record added after student number 202334055.

Press any key to continue...
```

```
Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334012               Ariana Grande         BSCS 1-1             2.00
202334014               Daniel Ceasar         BSCS 1-1             2.50
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334055               Sabrina Riego         BSCS 1-1             1.50
202334018               Jennie Kim            BSCS 1-1             1.00
202334077               Tala Carpenter        BSCS 1-1             1.50
202334013               Bini Maloi            BSCS 1-1             1.50
Press any key to continue...
```

8. Delete a Record at the Head

```
Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 8

Record at the head deleted.

Press any key to continue...
```

```
Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334014               Daniel Ceasar         BSCS 1-1             2.50
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334055               Sabrina Riego         BSCS 1-1             1.50
202334018               Jennie Kim            BSCS 1-1             1.00
202334077               Tala Carpenter        BSCS 1-1             1.50
202334013               Bini Maloi            BSCS 1-1             1.50
Press any key to continue...
```

9. Delete a Record at the Tail

```
Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 9

Record at the tail deleted.

Press any key to continue...
```

```
Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334014               Daniel Ceasar         BSCS 1-1             2.50
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334055               Sabrina Riego         BSCS 1-1             1.50
202334018               Jennie Kim            BSCS 1-1             1.00
202334077               Tala Carpenter        BSCS 1-1             1.50
Press any key to continue...
```

10. Delete a Record Using a Specific Student Number

```
Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 10

Enter the student number you want to delete: 202334055

Record with student number 202334055 deleted.

Press any key to continue...
```

```
Student Records (Top to Bottom):

Student Number          Student Name          Student Cyr          Student GWA
202334014               Daniel Ceasar         BSCS 1-1             2.50
202334061               Janiella Jalvador     BSCS 1-1             1.00
202334018               Jennie Kim            BSCS 1-1             1.00
202334077               Tala Carpenter        BSCS 1-1             1.50
Press any key to continue...
```

11. Delete a Record Before a Specific Student Number

```
Main Menu:
1. Create a Student Record
2. Display Student Records (Top to Bottom)
3. Display Student Records (Bottom to Top)
4. Add a Student Record at the Head
5. Add a Student Record at the End
6. Add a Record Before a Specific Student Number
7. Add a Record After a Specific Student Number
8. Delete a Record at the Head
9. Delete a Record at the Tail
10. Delete a Record Using a Specific Student Number
11. Delete a Record Before a Specific Student Number
12. Delete a Record After a Specific Student Number
13. Exit
Enter your choice: 11

Enter the student number before which you want to delete a record: 202334061

Record at the head deleted.

Record before student number 202334061 deleted.

Press any key to continue...
```

```
Student Records (Top to Bottom):

Student Number          Student Name            Student Cyr             Student GWA
202334061               Janiella Jalvador       BSCS 1-1                1.00
202334018               Jennie Kim              BSCS 1-1                1.00
202334077               Tala Carpenter          BSCS 1-1                1.50
Press any key to continue...
```

12. Delete a Record After a Specific Student Number