Program Design Final Project-

Data Base

NBA Data Comparison

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- Introduction section

Background of this project:

When we are discussing the topic for the final project, some teammates talk about NBA has a lot of data to each player.

Since completing the final project with the application of database, we need a lot of data to implement it.

So, we have the idea to analyze and make some function to these data. In one purpose to complete the final project, and the other purpose is to deal with the data which we are interesting in.

Functions' simple introduction:

There are mainly 9 functions we made for this project, listed sequentially below:

1.Add:

Add a datum into database.

2.Delete:

Delete a datum from databas.

3.Compare:

Compare each different item types between two data.

4.Search:

Print the target you want know about in the database.

5.Sort (in ascend):

Sorting depend on given item form in ascendance.

6.Sort (in descend):

Sorting depend on given item form in descendance.

7.Traverse:

Print out the database in two different ways.

8.Personal_analysis:

Solve the confusion for the same player with many different team names or data.

9.Exit:

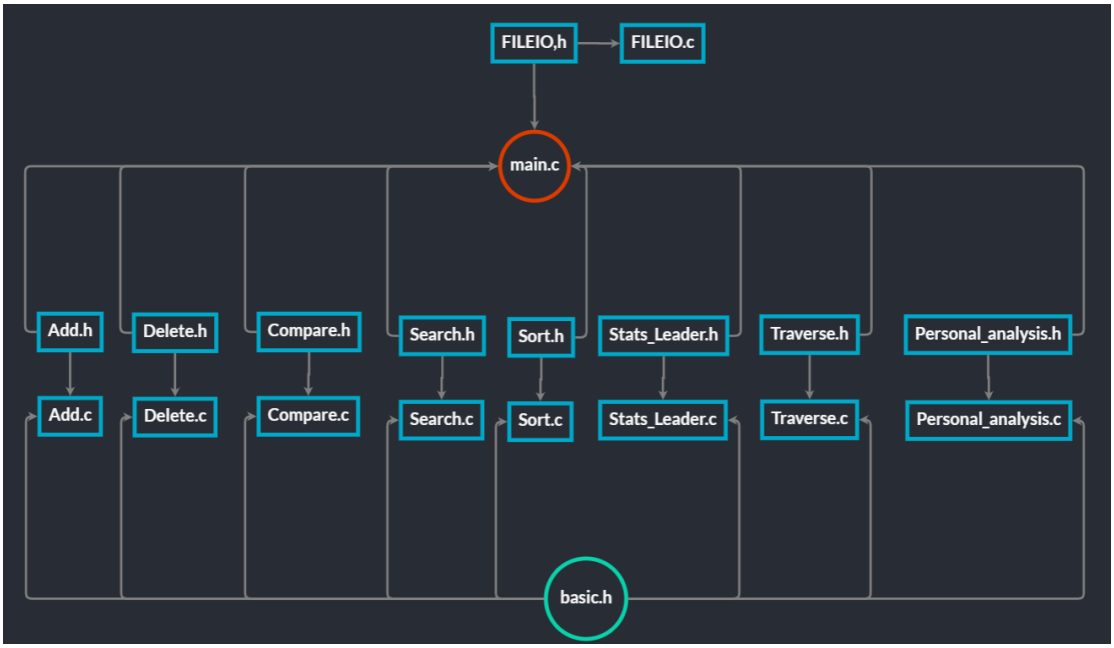
Leave and terminates the program.

- Program Design section

In this section, we are going to introduce the structure of our program and relationship between each files.

Due to the complicate relationship between all files, we cannot explain them in words, so we will present in the form of a diagram as below.

The arrow means the file is imported into the one which point to.



- Basic Part section

Data Type and Data Structure

1.at least basic data types:

We used int,float,char,pointer,structure,function

2.at least a string type

Use char[] as the string type

3.at least one of structure, union, or enumeration

We defined structure in file “basic.h”

4.link list for database

Read a txt file to form a database inlinked list form

Operation

(Add,Delete,Traverse,Search,Sort*2,File I/O)

Add:Add a new item to the database system.

And the program must print an error message,
if the item is already in the database.
1.How to use
example: Add(list , new_member);
2.Type

```
voidAdd(struct item *, struct item *);
```

Type function: void
Type parameters:Both are struct item * (include from “basic.h”)
3.each means of parameters

```
voidAdd(struct item *head, struct item *new_member){
    /*(the former is the address point to the head of the database
```

```
    ,the latter is who you want to add into)*/
    struct item *origin;
    origin = head;       // record the original place
```

4.Function Main Body 1:secure valid input

```
if (head ==NULL) {  // check if the list is empty
        printf("the list is empty.\n");
        return;
    }
```

5.Function Main Body 2:secure no repeat players

Use for loop traversing every each member, then use strcmp to identify if total_name and team is the same to the target.

If the item is already in the database, print the message "the item is already in the database.".

Then return, refrain from doing the following code behind.

```
for (head=origin; head !=NULL; head =head->next) {
        if (strcmp(new_member->total_name, head->total_name)==0
&&strcmp(new_member->team, head->team)==0) {
            head = origin;
            printf("the item is already in the database.\n");
            return;
        }
    }
```

6.Function Main Body 3:add to the last one of the database

Use for loop until encountering NULL, add the new_member

```
for (head=origin; head !=NULL; head =head->next) {
        if (head->next==NULL) {            // add to the last
            head->next= new_member;
            head = origin;
            return;
        }
    }
}
```

Delete:Delete a given item from the database.

And the program must print an error message,

if there is no matching item to be deleted in the database.

1.How to use

example: list=Delete(list,"target_name");

Then scanf the target team.

2.Type

```
struct item *Delete(struct item *head, char*Name)
```

Type function: struct item *(include from “basic.h”)

Type parameters:struct item * and char *

3.each means of parameters

```
struct item *Delete(struct item *head, char*Name) {
    /*(the former is the address point to the head of the database
    ,the latter is who you want to delete)*/
    struct item *origin;
    charTeam[32];//the target team
    origin = head;       // record the original place
```

4.Function Main Body 1: secure valid input

```
if (head ==NULL) {  // check if the list is empty
        printf("the list is empty.\n");
        returnorigin;
    }
```

5.Function Main body 2:use search function to show the same names in teams

show the same names in teams,

Then,ask for the target team in which the member is

```
Search(&head, "NAME", Name);      //Firstly print the same names in teams
    printf("which team :");
    scanf("%s", Team);                    //Then enter  the target team
```

6.Function Main Body 3:delete the target under 3 conditions if the item is already in the database.

Condition I:delete the first one and return brand new head.

```
if (strcmp(Name, origin->total_name)==0&&strcmp(Team, origin->team)==0) {
    struct item *temp;
    temp =head->next;
    free(head);
    head =head->next;
    return head;
    }
```

Condition II & III:delete the middle one & delete the last one

Use for loop traversing every each member, and then stop at the previous one which target is the next one to strcmp() determine if next->total_name &next->team is the same to target.

Declare another list for target->next

Use free() to delete

If delete the middle one, connect with temp

Then return,avoid to print the message about no matching player to delete.

```
    for (head = origin; head !=NULL; head =head->next) {
        if (strcmp(Name, head->next->total_name) ==0&&strcmp(Team, head->next->team) ==0) {
            struct item *temp;
            if (head->next->next!=NULL) {  // delete the middle one
                temp =head->next->next;
                free(head->next);
                head->next= temp;
            } else {  // delete the last one
                free(head->next);
                head->next=NULL;
            }
            returnorigin;
        }
    }
```

Condition IV: No matching player to delete and return

```
    printf("there is no matching item to be deleted in the database.\n");
    returnorigin;
}
```

Sort*2: sort ascend or descend data which you choose

1.How to use

example: Sort_ascending(&list , PTS),Sort_descending(&list , FG)

2.Type

```
void Sort_ascending(struct item **HEAD, char data[10])
```

Type function: void

Type parameters: First is struct item * (include from “basic.h”),the other is string

3.each means of parameters

```
struct item *head = *HEAD, *cur = *HEAD, *cur_pre = NULL, *cmp = NULL, *cmp_pre = NULL;
    int num = 0;
    int val = 0;
```

head, cur: address point to the head of database

cur_pre:address point to the cur’sprevious node

cmp: address point to node compare to cur

cmp_pre:address point to the cmp’sprevious node

val: choose which datayou want to sort

num: calculate the time you sort

4.Function Main Body 1:calculate amounts of player for sorting

```
while (head != NULL) {
        num++;
        head = head->next;
}
```

5.Function Main Body 2:give each datum a number for switch

```
if(strcmp(data,"PTS")==0){
        val = 1;
}
else if(strcmp(data,"REB")==0){
        val = 2;
}
else if(strcmp(data,"AST")==0){
        val = 3;
}
else if(strcmp(data,"STL")==0){
        val = 4;
}
else if(strcmp(data,"BLK")==0){
        val = 5;
}
else {
        val = 6;
}
```

6.Function Main Body 3:error message

```
for (int i = 0; i < num - 1; i++) {

cmp = cur->next;
cmp_pre = cur;

while (cmp != NULL) {
        switch(val){
                case 1:
                        if (cmp->PTS < cur->PTS) {

                                //swap
                                struct item *temp;

                                if (cur_pre != NULL) {
                                        cur_pre->next = cmp;
                                }
                                else {
                                        *HEAD = cmp;
                                }

                                if (cmp_pre != NULL) {
                                        cmp_pre->next = cur;
                                }
                                else {
                                        *HEAD = cur;
                                }

                                temp = cur->next;
                                cur->next = cmp->next;
                                cmp->next = temp;

                                //指回原本位置
                                temp = cur;
                                cur = cmp;
                                cmp = temp;

                        }
                        break;
```

```
            }


        cmp_pre = cmp;
        cmp = cmp->next;
    }

    cur_pre = cur;
    cur = cur->next;

}
```

Use for loop get the “first” item of list and start comparing to forward, exchange when meeting smaller one until the end of list.
Then get “second” item of list, and so on, until the front item of list.
(find smallest one from “n”, and then get smallest one from”n-1”, and so on.)

Serach:Given certain information about the item, the program needs to find and print the specific item.

1.How to use

Example:

search_list(&list, "NAME", "Stephen Curry");

search_list(&list, "TEAM", "LAL");

search_list(&list, "POS", "C");

2.Type

```
voidSearch(structitem **HEAD, char *type, char *goal)
```

function type: void

function parameters: linked-list and two strings

3.each means of parameters

```
intsearch = 0;
structitem *temp = *HEAD;
```

search: record if the target has been find

temp: store head of list temporary

4.

Function Main Body 1

```
if (!strcmp(type, "NAME")) {

    while (temp != NULL) {

        if (!strcmp(temp->total_name, goal)) {
            search = 1;
            printf("\nNAME      \tTEAM\tPOS\tPTS\tREB\tAST\tSTL\tBLK\tFG%%\n\n");
            printf("%s\t%s\t%c\t%d\t%d\t%d\t%d\t%d\t%f\n", temp->total_name, temp->team, temp->POS, temp->PTS, temp->REB, tem
        }

        temp = temp->next;
    }
```

Determine item types(NAME ,TEAM, POS), and then traverse from head, if found let search equals to 1 and print out all target data.

Function Main Body 2

```
if (!search) {
    printf("Not Found\n");
}
```

If search = 0, print “Not Found”

Traverse:Print all items in the database in a specific format.

1. How to use:

Example: Traverse(&list);

2. Type:

```
voidTraverse(structitem **HEAD)
```

function type: void

function parameter: linked-list

3. each means of parameter

```
structitem *temp = *HEAD;
```

temp: store head of list for temporary

4.

FunctionMain Body 1

```
if (temp == NULL) {
    printf("the list is null\n");
    return;
}
```

If list is empty, report error and return nothing.

FunctionMain Body 2

```
printf("NAME                \t\tTEAM\tPOS\tPTS\tREB\tAST\tSTL\tBLK\tFG%%\n");
while (temp != NULL) {
    printf("%-25s\t%s\t%c\t%d\t%d\t%d\t%d\t%d\t%.2f\n", temp->total_name, temp->team, temp->POS, temp->PTS, temp->REB, temp->

    temp = temp->next;
}
```

Print out from head in certain form.

File IO:read data from txt file, and then store it in linked list form, rewrite the txt file after termination of the program.

Open and read txt file, use _BUILD function to make linked list, then close txt file after linked list construction.

```c
/*file read*/
FILE *fp;
fp = fopen(FILE_NAME, "r");
if (fp == NULL)
{
    printf("Can't open %s\n", FILE_NAME);
    exit(EXIT_FAILURE);
}
list=_BUILD(fp);
fclose(fp); // close file
```

_BUILD function:read in data from txt file until EOF, malloc a struct for each rowand store them.

```c
while(fscanf( fp, "%[^\t] %c %s %f %d %d %d %d %d\r\n", player, &pos, team, &fg, &reb, &ast, &stl, &blk, &pts)!=EOF ){
    struct item *node = malloc(sizeof(struct item));

    strcpy(node->total_name, player);
    node->POS = pos;
    strcpy(node->team, team);
    node->FG = fg;
    node->REB = reb;
    node->AST = ast;
    node->STL = stl;
    node->BLK = blk;
    node->PTS = pts;
```

Link new structure to list, then return list to main

```c
    if(list==NULL){
        node->next = NULL;
    }
    else{
        node->next = list;
    }
    list = node;
}
return list;
```

Open txt file, then use _update_fileto write data in.

```c
/*file write*/
FILE *fp_w;
fp_w = fopen(FILE_NAME, "w");
_update_file(fp_w,&list);
```

_update_file function:use fprintf to write data into txt file

```
void _update_file(FILE *fp,struct item **HEAD) {
    struct item *temp = *HEAD;

    if (temp == NULL) {
        printf("the list is null\n");
        return;
    }

    while (temp != NULL) {

        fprintf(fp,"%s\t%c\t%s\t%f\t%d\t%d\t%d\t%d\t%d\n", temp-

        temp = temp->next;
    }

}
```

```
\t%d\n", temp->total_name, temp->POS, temp->team, temp->FG, temp->REB, temp->AST, temp->STL, temp->BLK, temp->PTS);
```

- Advance Part section

1. Use advance data structure(not done)

2. Implement the searching or sorting algorithms based on the advanced data structures.(not done)

3. Interface(not done)

4. Useful extra functions

Compare: compare two players data.

And the program must print an error message,
If the player doesn't exited in the database.
1.How to use
example: Compare(list , player1,player2);
2.Type

```
void Compare(struct item *head, char *player1, char *player2)
```

Type function: void
Type parameters: First is struct item * (include from "basic.h"),the other two are string
3.each means of parameters

```
struct item *p,*q,*temp;
int val = 0;
int search1 = 0,search2 = 0;
p = head;
q = head;
temp = head;
char Team1[10];
char Team2[10];
```

p,q, temp: address point to the head of database, which used to find player you want.
val: check the player exit in database
search1, search2 : check the player1, player2 have be found in database
Team1, Team2: select the team you want to compare(player season Transfers)
4.Function Main Body 1:secure valid input

```c
if (head == NULL) {  // check if the list is empty
        printf("the list is empty.\n");
        return;
}
```

5.Function Main Body 2:find player1&player2

```c
while(temp != NULL){
       if (!strcmp(temp->total_name, player1)) {
       search1 = 1;
       printf("\nNAME      \tTEAM\tPOS\tPTS\tREB\tAST\tSTL\tBLK\tFG%%\n\n");
       printf("%s\t%s\t%c\t%d\t%d\t%d\t%d\t%d\t%f\n", temp->total_name, temp->team, temp->POS, temp->PTS, temp->REB, temp->AST, temp->STL, temp->BLK, temp->FG);
       printf("\n");
   }

   temp = temp->next;
}
if(search1 != 0){
       printf("Which team data do you want to know for %s? :",player1);
       scanf("%s",Team1);
}
else{
       val = 1;
       printf("Can not find %s in this list.\n",player1);
       printf("Please input correct player name.\n");
}
```

```c
temp = head;
//Search(&head, "NAME", player2);
while(temp != NULL){
       if (!strcmp(temp->total_name, player2)) {
       search2 = 1;
       printf("\nNAME      \tTEAM\tPOS\tPTS\tREB\tAST\tSTL\tBLK\tFG%%\n\n");
       printf("%s\t%s\t%c\t%d\t%d\t%d\t%d\t%d\t%f\n", temp->total_name, temp->team, temp->POS, temp->PTS, temp->REB, temp->AST, temp->STL, temp->BLK, temp->FG);
       printf("\n");
   }

   temp = temp->next;
}
if(search2 != 0){
       printf("Which team data do you want to know for %s? :",player2);
       scanf("%s",Team2);
}
else{
       val = 1;
       printf("Can not find %s in this list.\n",player2);
       printf("Please input correct player name.\n");
}
```

Use while loop searching target player, if found(search1 or search2 equals to 1), choose a team for player to compare

6.Function Main Body 3:error message

```c
if(val == 1){
        printf("\n");
        printf("Because input Name doesn't exist, so we can not compare!\n");
}
```

7.Function Main Body 4:find two players

```c
else{
       while (strcmp(p->total_name,player1) != 0 && strcmp(p->team,Team1) != 0 && p != NULL) {
              p = p->next;
       }
       while (strcmp(q->total_name,player2) != 0 && strcmp(q->team,Team2) != 0 && q != NULL) {
              q = q->next;
       }
       printf("\t%s\tvs\t%s\n",player1,player2);
```

Use while loop searching target name, print out players

8.Function Main Body 5:compare two players

```
printf("PTS\t");
if (p->PTS > q->PTS) {
        printf("%d(win)\t\t%d(loss)\n",p->PTS,q->PTS);
}
else if (p->PTS < q->PTS) {
        printf("%d(loss)\t\t%d(win)\n",p->PTS,q->PTS);
}
else if (p->PTS == q->PTS) {
        printf("%d\ttie\t\t%d\n",p->PTS,q->PTS);
}
```

Compare two player depend on item type(PTS,BLK,AST,STL,FG,REB), then print out who is better.

Personal_analysis:Sort and Print the player in many teams.

If you are curious about the specific player,
and try to compare some datas between the different teams.
Beside,it will only show datas personally.
1.How to use:
Example: Personal_analysis(list,the_player's_name);
2.Type
The main function:

```
voidPersonal_analysis(struct item *, char*);
```

Type function: void
Type parameters:struct item * (include from "basic.h") and char *
The custom function:(check malloc() is safe)

```
voidbuild(struct item **)
```

Type function: void
Type parameters:struct item **
3.each means of parameters
The main part:

```
voidPersonal_analysis(struct item *head, char*Name){
    struct item *temp;//暫存用
    struct item*personal_datas;/*point to the head of the new link lists
                                 for same player in many teams */
    personal_datas =NULL;//initialize
    struct item*original;       // record the address of the head of personal_datas
    int count=0;// record the number of member of personal_datas
```

In a if loop about building a new link lists for same player in many teams:

```
    struct item *new_datas;// new member of personal_datas
    voidbuild(struct item **new_datas);
    build(&new_datas);
```

4.Function Main Bodt 1:building a new link lists for same player in many teams

Use while loop traversing every each member and use strcmp determine if total_name are the same with target.

Then use original record the last one data(head of personal_datas)

```
while (head!=NULL){
       if (!strcmp(head->total_name, Name)) {
           struct item *new_datas;
           build(&new_datas);
           strcpy(new_datas->total_name,head->total_name);
           strcpy(new_datas->team,head->team);
           new_datas->POS=head->POS;
           new_datas->PTS=head->PTS;
           new_datas->REB=head->REB;
           new_datas->AST=head->AST;
           new_datas->STL=head->STL;
           new_datas->BLK=head->BLK;
           new_datas->FG=head->FG;
           original=new_datas;
           new_datas->next= personal_datas;
           personal_datas = new_datas;
           count++;
       }
       head =head->next;
   }
   personal_datas=original;
```

5.FunctionMain Body 2:use count determine amount of teams

Condition I:less than two teams to analyze than print the message.

```
if(count==0){
       printf("there is no matching player to be analyzed in the database.\n");
   }
   elseif(count==1){
       printf("the player could not be analyzed in only one team.\n");
   }
```

Condition II:if this player has played for more than one team

```
elseif(count>1){
```

```
charcmp_data[10];// the data you want to compare
int opt=0;// the option to decide the Sort function to ascend or descend
printf("input PTS/AST/BLK/STL/REB/FG:");
```

Firstly, scanf and check the right cmp_data.

```
scanf("%s", cmp_data);
while(strcmp(cmp_data,"PTS")&&strcmp(cmp_data,"AST")&&strcmp(cmp_data,"BLK")
     &&strcmp(cmp_data,"STL")&&strcmp(cmp_data,"REB")&&strcmp(cmp_data,"FG")){
    printf("input PTS/AST/BLK/STL/REB/FG:");
    scanf("%s", cmp_data);
}
```

Simultaneously,scanf and check the right option.

```
printf("[1]Sort(ascend) [2]Sort(descend):");
scanf("%d", &opt);
while(opt!=1&&opt!=2){
    printf("[1]Sort(ascend) [2]Sort(descend):");
    scanf("%d", &opt);
}
```

Finally,use the sort function and Traverse function to show the personal_datas designed by user.

```
if(opt==1){
            Sort_ascending(&personal_datas, cmp_data);
            Traverse(&personal_datas);
        }
        if(opt==2){
            Sort_descending(&personal_datas, cmp_data);
            Traverse(&personal_datas);
        }
    }
}
```

State_leader function: print all data top5 player and print season leader.

1.How to use

example: Stats_leader(&list);

2.Type

```
void Stats_leader(struct item **HEAD)
```

Type function: void

Type parameters: struct item * (include from “basic.h”)

3.each means of parameters

```
struct item *p=*head;
int max;
int val = 0;
```

p: address point to the head of database

max: data maximum

val: parameter used for stop searching

4.Function Main Body 2: search and print highest point player

```
max = p->PTS;
while(p!=NULL){
	if(max < p->PTS){
		max = p->PTS;
	}
	p = p->next;
}
p = *head;
while(p!=NULL && val != 1){
	if(p->PTS != max){
		p = p->next;
	}
	else{
		val = 1;
	}
}
printf("SEASON POINT Leader: %s (%s) %d\n",p->total_name,p->team,p->PTS);
```

Use while loop search highest PTS, then print the player with it, and so on.

5.functionMain Body 2 (find the five highest player for each item type)

```
printf("\nPTS leader\nNAME                    \t\tPTS\n");
Sort_descending(HEAD, "PTS");

struct item *temp = *HEAD;
for (int i = 0; i < 5; i++) {

    printf("%-25s\t%d\n", temp->total_name, temp->PTS);

    temp = temp->next;
}
```

Sorting with sort and print five highest in each item.

- Program function instructions(github,README)

  Introduction

  How to use the program

  *suggestion
  you may print out the database first with function[7]:Traverse and choose [1] to see all of the database first*

  enter option 1~9 to execute the program
  1.Add:Add a new item to the database system.

  input 1, then input each item type for a player

  2.Delete:Delete a given item from the database.

input 2, then input a player's name, and then choose a team for the player

3.Compare: compare two players data.

input 3, then input first player's name, then input second player's name

then input the correct team for player1,player2

4.Search:Given certain information about the item, the program needs to find and print the specific item.

input 4, then input item type(NAME,TEAM,POS), then input datum for the item type

5.Sort(ascend):sort data in ascend form based on chosen item type

input 5, then input a item type

6.Sort(descned):sort data in descend form basd on chosen item type

inpur 6, then input a item type

7.Traverse:Print all items in the database in a specific format.

input 7,then input 1 for all database;2 for bestplayer and five highest for each item type

8.Personal_analysis:Sort and Print the player in many teams.

input 8,then input player's name,then input item type,and then choose ascend or descend form for data

9.Exit:terminate the program

input 9

- Demonstration section

Github repository :

https://github.com/v0103/final.git

*Choose branch ”fp”

NBA player data comparison
(終於找到五個人)

Work distribution

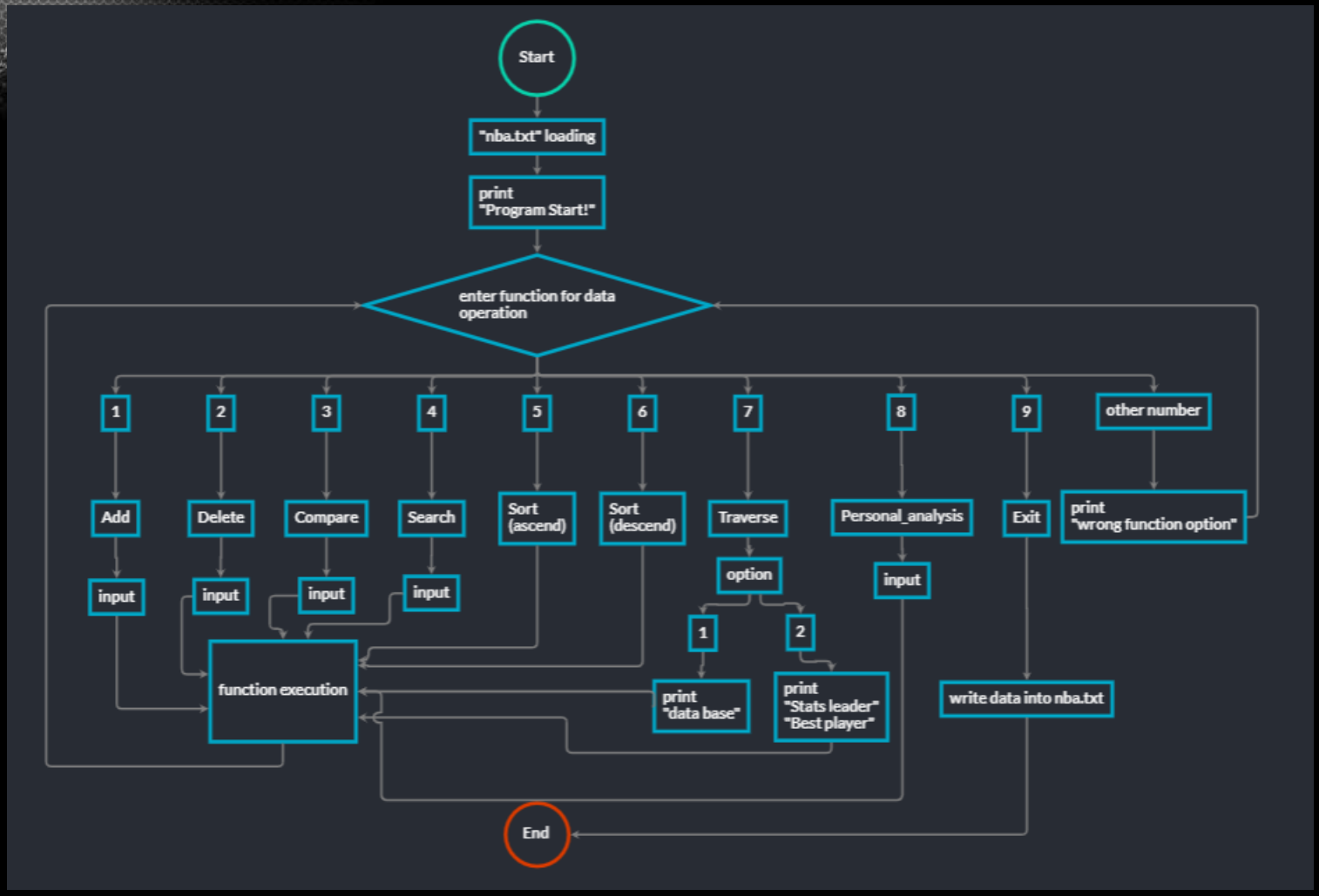
Member	Student ID
許家和	407210046
王宇軒	408420001
陳韋丞	408420069
周韋良	408420082
黃國琨	409220042

Database System Introduction

This database system is based on the purpose to compare each player's performance in NBA.

What we have done is to make a program that can deal with all the data we are interested in by controlling functions we made.

Program Design



Function Introduction

0.Background

1.Add

2.Delete

3.Compare

4.Search

5.Sort (ascend)

6.Sort (descend)

7.Traverse

8.Personal_analysis

9.Exit

0.nba.txt (~700 data) as database

Steven Adams	C	NOP	0.614	514	111	54	38	438	
Bam Adebayo	C	MIA	0.57	573	346	75	66	1197	
LaMarcus Aldridge		C	TOT	0.473	118	49	11	29	352
LaMarcus Aldridge		C	SAS	0.464	94	36	8	18	288
LaMarcus Aldridge		C	BRK	0.521	24	13	3	11	64
Jarrett Allen	C	TOT	0.618	631	106	32	90	806	
Jarrett Allen	C	BRK	0.677	125	20	7	19	134	
Jarrett Allen	C	CLE	0.609	506	86	25	71	672	
Deandre Ayton	C	PHO	0.626	727	99	41	81	997	
Udoka Azubuike	C	UTA	0.444	13	0	1	4	16	
Mo Bamba	C	ORL	0.472	265	35	14	58	367	
Aron Baynes	C	TOR	0.441	273	47	17	23	324	
Jordan Bell	C	TOT	0.318	24	7	3	5	15	
Jordan Bell	C	WAS	0.35	19	5	3	3	14	
Jordan Bell	C	GSW	0	5	2	0	2	1	
Khem Birch	C	TOT	0.497	387	89	48	50	482	
Khem Birch	C	ORL	0.45	243	53	32	28	255	
Khem Birch	C	TOR	0.556	144	36	16	22	227	
Goga Bitadze	C	IND	0.428	150	37	9	60	231	
Bismack Biyombo	C	CHO	0.587	347	81	17	74	331	
Marques Bolden	C	CLE	0.333	6	0	2	2	7	
Chris Boucher	C	TOR	0.514	404	63	35	111	818	
Tony Bradley	C	TOT	0.665	239	37	15	30	300	
Tony Bradley	C	PHI	0.68	104	17	6	13	109	
Tony Bradley	C	OKC	0.656	135	20	9	17	191	
Amida Brimah	C	IND	0.625	8	1	0	5	13	
Moses Brown	C	OKC	0.545	383	10	31	47	370	
Thomas Bryant	C	WAS	0.648	61	15	4	8	143	
Clint Capela	C	ATL	0.594	903	49	44	129	956	
Vernon Carey Jr.		C	CHO	0.5	27	2	1	5	46
Wendell Carter Jr.		C	TOT	0.503	443	104	35	42	606
Wendell Carter Jr.		C	CHI	0.512	250	69	18	24	348
Wendell Carter Jr.		C	ORL	0.493	193	35	17	18	258

0.Structure Item (Record Item Type)

```
struct item{
        int AST;//assist
        int BLK;//block
        int STL;//steal
        int REB;//rebound(board)
        float FG;//field goal
        char POS;//position
        int PTS;//total point
        char total_name[50];//total name
        char team[10];//team name
        struct item *next;
};
```

1.Add (database , new_member);

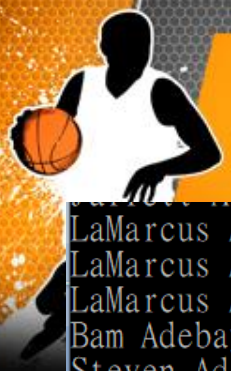
Function:

Add a new item to the database system.

How to use:

input 1, then input each item type for a player

Example



```
LaMarcus Aldridge               BRK     C       64      24      13      3       11      0.52
LaMarcus Aldridge               SAS     C       288     94      36      8       18      0.46
LaMarcus Aldridge               TOT     C       352     118     49      11      29      0.47
Bam Adebayo                     MIA     C       1197    573     346     75      66      0.57
Steven Adams                    NOP     C       438     514     111     54      38      0.61
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Persona
```

```
Jarrett Allen                   BRK     C       134     123     20      7       19      0.66
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:1
input a structure data for use.
item    player:Test
item    team:TST
item    AST:0
item    BLK:0
item    STL:0
item    REB:0
item    FG:0
item    POS:T
item    PTS:0
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:7
```

```
LaMarcus Aldridge               TOT     C       352     118     49      11      29      0.47
Bam Adebayo                     MIA     C       1197    573     346     75      66      0.57
Steven Adams                    NOP     C       438     514     111     54      38      0.61
Test                            TST     T       0       0       0       0       0       0.00
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Persona
```

2.Delete(database,target_name);

Function:

Delete a given item from the database.

How to use:

input 2, then input a player's name, and then choose the team for the player

Example

```
LaMarcus Aldridge               BRK     C       64      24      13      3       11      0.52
LaMarcus Aldridge               SAS     C       288     94      36      8       18      0.46
LaMarcus Aldridge               TOT     C       352     118     49      11      29      0.47
Bam Adebayo                     MIA     C       1197    573     346     75      66      0.57
Steven Adams                    NOP     C       438     514     111     54      38      0.61
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal
```

```
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:2
input a structure data for use.
item    player:Steven Adams

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%

Steven Adams    NOP     C       438     514     111     54      38      0.614000
which team :NOP
```

```
Jarrett Allen                   BRK     C       134     125     20      7       19      0.68
Jarrett Allen                   TOT     C       806     631     106     32      90      0.62
LaMarcus Aldridge               BRK     C       64      24      13      3       11      0.52
LaMarcus Aldridge               SAS     C       288     94      36      8       18      0.46
LaMarcus Aldridge               TOT     C       352     118     49      11      29      0.47
Bam Adebayo                     MIA     C       1197    573     346     75      66      0.57
```

3.Compare(database,player1,player2);

Function:

Compare two data between 2 players

How to use:

input 3, then input first player's name, then input second player's name then input the correct team for player1,player2 respectively

Example

```
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:3
input player1 name:
item    player:Jarrett Allen
input player2 name:
item    player:Bam Adebayo

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%
Jarrett Allen   CLE     C       672     506     86      25      71      0.609000

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%
Jarrett Allen   BRK     C       134     125     20      7       19      0.677000

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%
Jarrett Allen   TOT     C       806     631     106     32      90      0.618000

Which team data do you want to know for Jarrett Allen? :BRK

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%
Bam Adebayo     MIA     C       1197    573     346     75      66      0.570000

Which team data do you want to know for Bam Adebayo? :MIA
        Jarrett Allen   vs      Bam Adebayo
PTS     2(loss)         48(win)
AST     0(loss)         14(win)
REB     1(loss)         14(win)
BLK     0(loss)         2(win)
STL     1(loss)         7(win)
FG      0.250000(loss)          0.372000(win)
```

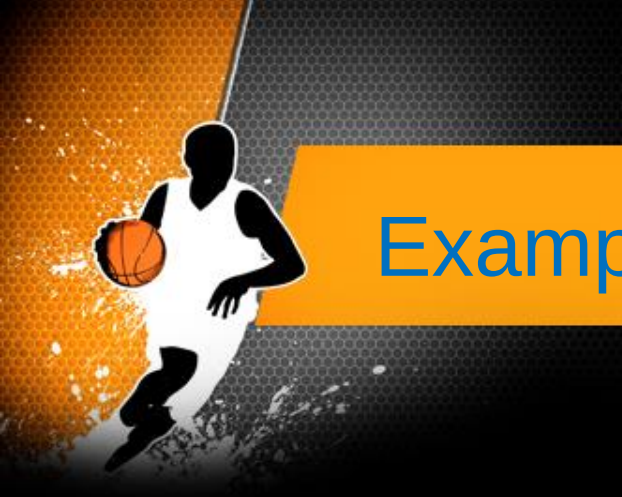
4.Search(item_type,datum);

Function:

Given certain information about the item, the program needs to find and print the specific item.

How to use

input 4, then input item type(NAME,TEAM,POS), then input datum for the item type



Example

```
DaMarcus Aldridge      101     C       552     118     49      11      29      0.475000
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:4
input item NAME/TEAM/POS:NAME
input actual name/team/pos:Jarrett Allen

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%

Jarrett Allen   CLE     C       672     506     86      25      71      0.609000

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%

Jarrett Allen   BRK     C       134     125     20      7       19      0.677000

NAME            TEAM    POS     PTS     REB     AST     STL     BLK     FG%

Jarrett Allen   TOT     C       806     631     106     32      90      0.618000
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:
```

5.6.Sort(database,item_type);

Function*2:

sort data in ascend or descend form

How to use

input 5/6, then input a item type

Example

Russell Westbrook WAS G 1445 750 763 89 23 0.44
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:6
input AST/BLK/STL/REB/FG/PTS:AST

NAME	TEAM	POS	PTS	REB	AST	STL	BLK	FG%
Russell Westbrook	WAS	G	1445	750	763	89	23	0.44
Chris Paul	PHO	G	1149	312	622	99	19	0.50
Nikola Jokic	DEN	C	1898	780	599	95	48	0.57
Trae Young	ATL	G	1594	245	594	53	12	0.44
Luka Doncic	DAL	G	1830	527	567	64	36	0.48
Draymond Green	GSW	F	444	449	558	105	52	0.45
Damian Lillard	POR	G	1928	283	505	62	17	0.45
James Harden	TOT	G	1083	348	475	53	33	0.47
Ja Morant	MEM	G	1204	252	465	57	13	0.45
T.J. McConnell	IND	G	596	256	456	128	23	0.56
Ricky Rubio	MIN	G	582	223	433	98	4	0.39
Julius Randle	NYK	F	1712	723	427	64	18	0.46
DeMar DeRozan	SAS	F	1316	259	422	56	15	0.50
De'Aaron Fox	SAC	G	1461	203	417	87	27	0.48
Domantas Sabonis	IND	F	1260	742	415	76	33	0.54
Ben Simmons	PHI	G	829	417	401	93	35	0.56
James Harden	BRK	G	885	307	392	46	27	0.47
Khris Middleton	MIL	F	1385	406	370	74	9	0.48
Jimmy Butler	MIA	F	1116	359	369	108	18	0.50
Stephen Curry	GSW	G	2015	345	363	77	8	0.48
Dejounte Murray	SAS	G	1051	473	363	101	7	0.45

7.Traverse(database);

Function:

Print all items in the database in a specific format.

How to use

input 7,then input 1 for all database;2 for bestplayer and five highest for each item type

Example

```
Ignas Brazdeikis                PHI     F       0       2       0       0       0       0.00
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:7
[1]print all [2]print stats leader:2


PTS leader
NAME                    PTS
Stephen Curry           2015
Damian Lillard          1928
Nikola Jokic            1898
Bradley Beal            1878
Luka Doncic             1830

REB leader
NAME                    REB
Rudy Gobert             960
Clint Capela            903
Nikola Vucevic          817
Enes Freedom            795
Nikola Jokic            780

AST leader
NAME                    AST
Russell Westbrook       763
Chris Paul              622
Nikola Jokic            599
Trae Young              594
Luka Doncic             567

SEASON POINT Leader: Stephen Curry (GSW) 2015
SEASON BLOCK Leader: Rudy Gobert (UTA) 190
SEASON ASSIST Leader: Russell Westbrook (WAS) 763
SEASON STEAL Leader: T.J. McConnell (IND) 128
SEASON REBOUND Leader: Rudy Gobert (UTA) 960
```

Example

SEASON REBOUND Leader: Rudy Gobert (UTA) 960

[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:7

[1]print all [2]print stats leader:1

NAME	TEAM	POS	PTS	REB	AST	STL	BLK	FG%
Patrick McCaw	TOR	F	5	3	4	2	0	1.00
Udonis Haslem	MIA	C	4	1	0	0	0	1.00
Gary Clark	DEN	F	119	0	0	0	0	1.00
Damian Jones	LAL	C	43	26	1	1	7	0.94
Gary Payton II	GSW	G	25	11	1	6	1	0.77
DeAndre Jordan	BRK	C	426	427	93	17	65	0.76
Tacko Fall	BOS	C	47	52	3	1	20	0.72
Robert Williams	BOS	C	417	358	94	43	91	0.72
Donta Hall	ORL	F	73	62	11	5	10	0.71
Norvel Pelle	NYK	C	11	11	1	1	6	0.71
Dewayne Dedmon	MIA	C	113	86	12	9	6	0.71
Chris Silva	MIA	F	30	25	6	1	5	0.69
Daniel Gafford	CHI	F	147	103	17	11	34	0.69
Daniel Gafford	TOT	F	380	231	29	26	75	0.68
Daniel Gafford	WAS	C	233	128	12	15	41	0.68
Damian Jones	TOT	C	183	121	29	11	29	0.68
Tyler Cook	DET	F	154	93	15	8	2	0.68
Tony Bradley	PHI	C	109	104	17	6	13	0.68
Jarrett Allen	BRK	C	134	125	20	7	19	0.68
Rudy Gobert	UTA	C	1015	960	89	40	190	0.68
Tyler Cook	TOT	F	156	95	17	8	2	0.67
Grant Riller	CHO	G	18	1	3	1	0	0.67
Tony Bradley	TOT	C	300	239	37	15	30	0.67
Damian Jones	SAC	C	118	77	24	9	17	0.66
Tony Bradley	OKC	C	191	135	20	9	17	0.66
Mitchell Robinson	NYK	C	256	252	17	35	45	0.65
Ivica Zubac	LAC	C	650	519	90	24	62	0.65
Thomas Bryant	WAS	C	143	61	15	4	8	0.65
Onyeka Okongwu	ATL	C	228	163	18	23	33	0.64
Derrick Favors	UTA	C	369	376	44	32	68	0.64
Richaun Holmes	SAC	C	869	504	101	39	96	0.64
Robin Lopez	WAS	C	642	272	55	15	44	0.63
Willie Cauley-Stein	DAL	C	280	236	35	21	43	0.63
Taj Gibson	NYK	C	241	250	36	31	49	0.63
Deandre Ayton	PHO	C	997	727	99	41	81	0.63
Rodions Kurucs	MIL	F	15	9	4	3	0	0.63

8.Personal_analysis(database);

Function:

Analyze the player’s data in each team he stayed .

How to use

input 8,then input player's name, then input item_type, and then choose ascend or descend form for data

Example

```
Steven Adams                    NOP     C       438     314     111     24      38      0.61
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:8
input player's name.
item    player:Jarrett Allen
input AST/BLK/STL/REB/FG:AST
[1]Sort(ascend) [2]Sort(descend):2
NAME                            TEAM    POS     PTS     REB     AST     STL     BLK     FG%
Jarrett Allen                   TOT     C       806     631     106     32      90      0.62
Jarrett Allen                   CLE     C       672     506     86      25      71      0.61
Jarrett Allen                   BRK     C       134     125     20      7       19      0.68
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:
```

9.Exit(database);

Function:

Terminates the program

How to use

input 9

Example

```
[1]Add [2]Delete [3]Compare [4]Search [5]Sort(ascend) [6]Sort(descend) [7]Traverse [8]Personal_analysis [9]exit:9
exit!
***Program Termination.***
```


END