CME 112- Programming Languages II

Week 11
File Operations
Random Access Files

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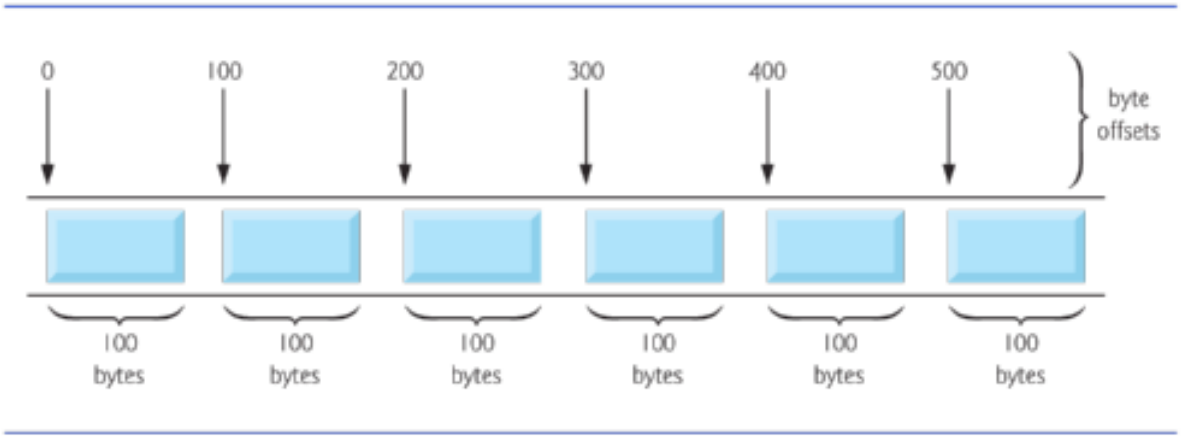
Bir insanı değerlendirmek için nelere sahip olmadığına değil, sahip olduklarıyla neler yaptığına bak.

Random Access Files

- Random access files
  - Access individual records without searching through other records
  - Instant access to records in a file
  - Data can be inserted without destroying other data
  - Data previously stored can be updated or deleted without overwriting
- Implemented using fixed length records
  - Sequential files do not have fixed length records



Random Access Files

- Data in random access files stored as "raw bytes" (unformatted)
  - All data of the same type (ints, for example) uses the same amount of memory
  - All records of the same type have a fixed length
  - Data not human readable

Creating Random Access Files

- Unformatted I/O functions
  - **fwrite**
    - Transfer bytes from a location in memory to a file
  - **fread**
    - Transfer bytes from a file to a location in memory
- Example:
  - **fwrite(&number, sizeof(int), 1, myPtr);**
    - **&number** – Location to transfer bytes from
    - **sizeof(int)** – Number of bytes to transfer
    - **1** – For arrays, number of elements to transfer
    - In this case, "one element" of an array is being transferred
    - **myPtr** – File to transfer to or from

Creating Random Access Files

- Writing struct data structure to the file
  - **fwrite(&myObject, sizeof (struct myStruct), 1, myPtr);**
  - **sizeof** – returns size in bytes of object in parentheses
- To write several array elements
  - Pointer to array as first argument
  - Number of elements to write as third argument

Creating Random Access Files


```c
#include <stdio.h>

struct musteri{
    int hesapNo;
    char soyad[25];
    char ad[20];
    double bakiye;
};

int main(void)
{
    int i;
    struct musteri bosMusteri = {0,"","",0.0};
    FILE *myPtr;
    if((myPtr = fopen("musteri.dat","w"))== NULL)
        printf("Dosya olusturulamadi\n");
    else
    {
        for(i=1;i<=100;i++)
        {
            fwrite(&bosMusteri,sizeof(struct musteri),1,myPtr);
        }
        fclose(myPtr);
    }
    return 0;
}
```

Writing to the Random Access Files

- **fseek :** Sets file position pointer to a specific position
- **fseek(pointer, offset, symbolic_constant);**
  - **pointer** –pointer to file
  - **offset** –file position pointer (0 is first location)
  - **symbolic_constant** –specifies where in file we are reading from.
    - ***SEEK_SET*** – seek starts at beginning of file
    - ***SEEK_CUR*** –seek starts at current location in file
    - ***SEEK_END*** –seek starts at end of file

Writing to the Random Access Files


```c
#include <stdio.h>

struct musteri{
    int hesapNo;
    char soyad[25];
    char ad[20];
    double bakiye;
};

int main(void)
{
    struct musteri hesapBilgi = {0,"","",0.0};
    FILE *myPtr;
    if((myPtr = fopen("musteri.dat","r+"))== NULL)
        printf("Dosya acilamadi\n");
    else
    {
        printf("Hesap no gir (1-100 arasi deger)\n"
            "Veri girisini bitirmek icin 0 gir");
        scanf("%d",&hesapBilgi.hesapNo);
        while(hesapBilgi.hesapNo!=0)
        {
            printf("Soyad Ad ve Bakiye gir\n?");
            fscanf(stdin,"%s%s%lf",hesapBilgi.soyad,
                hesapBilgi.ad,&hesapBilgi.bakiye);
```

Writing to the Random Access Files


```
26
27              fseek(myPtr,(hesapBilgi.hesapNo-1)*
28                  sizeof(struct musteri),SEEK_SET);
29
30              fwrite(&hesapBilgi,sizeof(struct musteri),1,myPtr);
31
32              printf("Hesap no gir\n?");
33              scanf("%d",&hesapBilgi.hesapNo);
34          }
35          fclose(myPtr);
36      }
37      return 0;
38  }
```

Reading from Random Access Files

- **fread**
  - Reads a specified number of bytes from a file into memory
- **fread(&client, sizeof (struct clientData), 1,myPtr);**
  - Can read several fixed-size array elements.
    - Provide pointer to array
    - Indicate number of elements to read
  - To read multiple elements, specify in third argument

Reading from Random Access Files


```c
#include <stdio.h>

struct musteri{
    int hesapNo;
    char soyad[25];
    char ad[20];
    double bakiye;
};

int main(void)
{
    struct musteri hesapBilgi = {0,"","",0.0};
    FILE *myPtr;
    if((myPtr = fopen("musteri.dat","r"))== NULL)
        printf("Dosya acilamadi\n");
    else
    {
        printf("%-10s%-16s%-11s%10s\n","HesapNo","Soyad","Ad","Bakiye");
        while(!feof(myPtr))
        {
            fread(&hesapBilgi,sizeof(struct musteri),1,myPtr);
            if(hesapBilgi.hesapNo!=0)
            printf("%-10d%-16s%-11s%10.2f\n",hesapBilgi.hesapNo,
                hesapBilgi.soyad,hesapBilgi.ad,hesapBilgi.bakiye);
        }
        fclose(myPtr);
    }
    getchar();
    return 0;
}
```

Sample Application

- This program
  - Demonstrates using random access files to achieve instant access processing of a bank's account information
- We will
  - Update existing accounts
  - Add new accounts
  - Delete accounts
  - Store a formatted listing of all accounts in a text file

Sample Application


```c
#include <stdio.h>

struct musteri{
    int hesapNo;
    char soyad[25];
    char ad[20];
    double bakiye;
};
int secimGir(void);
void textDosya(FILE *);
void kayitGuncelle(FILE *);
void yeniKayit(FILE *);
void kayitSil(FILE *);
void listele(FILE *);

int main(void)
{
    FILE *myPtr;
    int secim;
    if((myPtr = fopen("musteri.dat","r+"))== NULL)
        printf("Dosya acilamadi\n");
    else
    {
        while((secim = secimGir()) != 6)
        {
```

Sample Application


```
26              switch(secim)
27              {
28                  case 1:textDosya(myPtr);break;
29                  case 2:kayitGuncelle(myPtr);break;
30                  case 3:yeniKayit(myPtr);break;
31                  case 4:kayitSil(myPtr);break;
32                  case 5:listele(myPtr);break;
33              }
34          }
35          fclose(myPtr);
36      }
37  }
```

Sample Application


```
39  int secimGir()
40  {
41      int menuSecim;
42      printf("\n Secimini yap\n"
43          "1-musteri.dat dosyasinin icerigini\n"
44          "  formatli olarak \"hesaplar.dat\" dosyasina yaz\n"
45          "2-hesap guncelle\n"
46          "3-yeni hesap ekle\n"
47          "4-hesap sil\n"
48          "5-musteri.dat dosyasinin icerigini listele\n"
49          "6-cikis\n?");
50      scanf("%d",&menuSecim);
51      return menuSecim;
52  }
```

Sample Application


```
54  void textDosya(FILE *okuPtr)
55  {
56      FILE *yazPtr;
57      struct musteri hesapBilgi = {0,"","",0.0};
58      if((yazPtr = fopen("hesaplar.dat","w"))== NULL)
59          printf("Dosya acilamadi\n");
60      else
61      {
62          rewind(okuPtr);
63          fprintf(yazPtr,"%-10s%-16s%-11s%10s\n","HesapNo","Soyad","Ad","Bakiye");
64          while(!feof(okuPtr))
65          {
66              fread(&hesapBilgi,sizeof(struct musteri),1,okuPtr);
67              if(hesapBilgi.hesapNo!=0)
68              fprintf(yazPtr,"%-10d%-16s%-11s%10.2f\n",hesapBilgi.hesapNo,
69                  hesapBilgi.soyad,hesapBilgi.ad,hesapBilgi.bakiye);
70          }
71          fclose(yazPtr);
72      }
73  }
```

Sample Application


```
75  void kayitGuncelle(FILE *fPtr)
76  {
77      int hesapID;
78      double islemMiktari;
79      struct musteri hesapBilgi = {0,"","",0.0};
80      printf("Guncellenecek hesap no gir[1-100]:");
81      scanf("%d",&hesapID);
82      fseek(fPtr,(hesapID-1)*sizeof(struct musteri),SEEK_SET);
83      fread(&hesapBilgi,sizeof(struct musteri),1,fPtr);
84      if(hesapBilgi.hesapNo==0)
85          printf("%d nolu hesap için bilgi girilmemiş\n",hesapID);
86      else
87      {
88          printf("%-10d%-16s%-11s%10.2f\n\n",hesapBilgi.hesapNo,
89                  hesapBilgi.soyad,hesapBilgi.ad,hesapBilgi.bakiye);
90          printf("Hesaba yatacak (+) veya hesaptan cekilecek (-) tutari gir:");
91          scanf("%lf",&islemMiktari);
92          hesapBilgi.bakiye += islemMiktari;
93          printf("%-10d%-16s%-11s%10.2f\n\n",hesapBilgi.hesapNo,
94                  hesapBilgi.soyad,hesapBilgi.ad,hesapBilgi.bakiye);
95          fseek(fPtr,(hesapID-1)*sizeof(struct musteri),SEEK_SET);
96          fwrite(&hesapBilgi,sizeof(struct musteri),1,fPtr);
97      }
98  }
```

Sample Application


```
100 void kayitSil(FILE *fPtr)
101 {
102     struct musteri hesapBilgi, bosHesap = {0,"","",0.0};
103     int hesapID;
104     printf("Silinecek hesap no gir[1-100]:");
105     scanf("%d",&hesapID);
106     fseek(fPtr,(hesapID-1)*sizeof(struct musteri),SEEK_SET);
107     fread(&hesapBilgi,sizeof(struct musteri),1,fPtr);
108     if(hesapBilgi.hesapNo==0)
109         printf("Silinecek %d nolu hesap yok",hesapID);
110     else
111     {
112         fseek(fPtr,(hesapID-1)*sizeof(struct musteri),SEEK_SET);
113         fwrite(&bosHesap,sizeof(struct musteri),1,fPtr);
114     }
115 }
```

Sample Application


```
117 void yeniKayit(FILE *fPtr)
118 {
119     int hesapID;
120     struct musteri hesapBilgi = {0,"","",0.0};
121     printf("Yeni hesap no gir[1-100]:");
122     scanf("%d",&hesapID);
123     fseek(fPtr,(hesapID-1)*sizeof(struct musteri),SEEK_SET);
124     fread(&hesapBilgi,sizeof(struct musteri),1,fPtr);
125     if(hesapBilgi.hesapNo!=0)
126         printf("%d nolu hesap zaten mevcut\n",hesapID);
127     else
128     {
129         printf("Soyad, Ad ve bakiye gir:");
130         scanf("%s%s%lf",hesapBilgi.soyad,hesapBilgi.ad,&hesapBilgi.bakiye);
131         hesapBilgi.hesapNo = hesapID;
132         fseek(fPtr,(hesapID-1)*sizeof(struct musteri),SEEK_SET);
133         fwrite(&hesapBilgi,sizeof(struct musteri),1,fPtr);
134     }
135 }
```

Sample Application


```
137 void listele(FILE *fPtr)
138 {
139     struct musteri hesapBilgi = {0,"","",0.0};
140 
141     printf("%-10s%-16s%-11s%10s\n","HesapNo","Soyad","Ad","Bakiye");
142     while(!feof(fPtr))
143     {
144         fread(&hesapBilgi,sizeof(struct musteri),1,fPtr);
145         if(hesapBilgi.hesapNo!=0)
146         printf("%-10d%-16s%-11s%10.2f\n",hesapBilgi.hesapNo,
147             hesapBilgi.soyad,hesapBilgi.ad,hesapBilgi.bakiye);
148     }
149     fclose(fPtr);
150     getchar();
151 }
```

Homework

- Patient Following System
  - Define a struct included patient name, age, and a set of illness information.
  - Insert a number of patient.
  - Find any patient who has got some key data.
  - Delete a patient record.
  - Modify a patient record.
  - List all patients info

Next Week

- Bitwise Operations

References

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Thanks for listening

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Alan Mathison Turing
1912-1954
Father of Computer Science
Mathematician, Logician
Wartime Codebreaker
Victim of Prejudice

"Mathematics, rightly viewed, possesses not only truth but supreme beauty, a beauty cold and austere like that of sculpture." - *Bertrand Russell*