IIT Bombay

Computer Programming

Dr. Deepak B Phatak
Dr. Supratik Chakraborty
Department of Computer Science and Engineering
IIT Bombay

Session: Directly Accessing and Updating Records in a File

Quick Recap

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- We wrote a program to create a binary file
  - Containing fixed length records
- Each record had values of four filed for one student
  - sroll, sname, sbatch, smarks

Overview

- In this session, We will use C++ functions to directly access and update records for students

Accessing records in a binary file on disk

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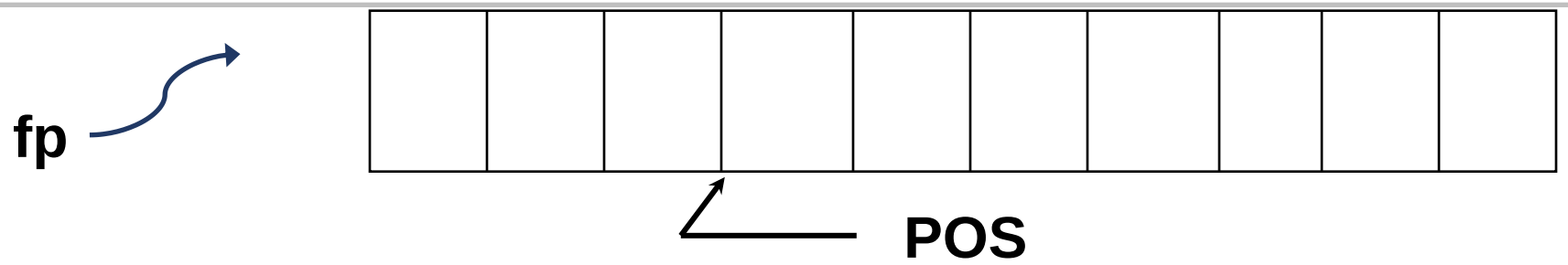

- A ‘position indicator’ is maintained by C++ for each file
  - Reading/writing will occur at this byte position
  - Indicator is automatically advanced by number of bytes read/written
- Current position can be found using a function ftell()

  long POS; POS = ftell(fp);
- One can set the indicator to any desired position, say P bytes

  fseek (fp, P, SEEK_SET); //Count from starting point

Some relevant C++ functions

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- For reading a record in struct variable S

  fread(&s, rec_size, 1, fp); // Note use of pointer to struct

- For writing one record from a struct variable

  fwrite(&s, rec_size, 1, fp);

- To reset internal pointer to beginning of file

  Rewind(fp);

Program to process studentdb

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```
#include <iostream>
#include <cstdio>
using namespace std;
 struct studentinfo{
    int roll;
    char name[30];
    int batch;
    float marks;
};
```

Program …

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```
int main() {
  struct studentinfo s;
  int r, recnum, rec_size, found =0; long POS;
  rec_size = sizeof(struct studentinfo);
  cout << "Size of each record is:  " <<rec_size<<endl;
```

Program …

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```
FILE *fp;
fp = fopen("studentdb", "rb+" );
if (fp == NULL){
   cout << "Could not open database file" << endl;
   return -1;
}
int count=0; found=0;
```

Program …

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```
  rewind(fp);
  cout << " ------------"<<endl;
  cout << "searching sequentially for marks of roll 10105";
  cout << endl;
  r = 10105; found =0;
  POS = ftell(fp);
// find marks for roll number 10105
```

Program …

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```
do {
   fread(&s,rec_size,1, fp);
   if (s.roll ==r){
       // found student, print record
      cout << endl << "Found roll "<< r;
      found = POS/rec_size +1;
      cout << " at record no. " << found <<"\nThe name and marks are: ";
      printf("%s %5.2f \n", s.name,s.marks);
      break;
  }
```

Program …

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```
    else{
        POS= ftell(fp);
        fread(&s,rec_size, 1, fp);
    }
} while (!feof (fp));
if (found == 0){
   cout << "\nroll number not found in database\n";
}
 cout << " ------------"<<endl;
```

Program …

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```
 cout << "demonstrating direct access to records" << endl;
 cout << "read and display 6th record"<< endl<< endl;
// find and print 6th record in database file
recnum = 6;
POS = (recnum-1) * rec_size;
```

Program …

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```
fseek (fp, POS, SEEK_SET);// set the file position
fread(&s, rec_size, 1, fp);
cout << "Record starting at byte position " << POS << " is\n";
printf("%5d %30s %3d %5.2f \n", s.roll, s.name,s.batch,
        s.marks);
cout << "Record Number is: " << recnum << endl;
```

Program …

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```
// update Nilamani's marks to 93.5
// His roll number is 10108.
// We access 8th record starting at 7 * rec_size)
 cout << " ------------"<<endl;
 cout << "read and update Nilamani Raut's marks" << endl;
 cout << "Nilamani's roll number is 10108"<< endl;
 r = 10108;
```

Program …

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```
recnum = r-10100;
POS = (recnum-1)*rec_size;
fseek (fp, POS, SEEK_SET);
fread(&s,rec_size, 1,fp);
cout << "Record for Nilamani is\n";
printf("%5d %30s %3d %5.2f \n", s.roll, s.name,s.batch,
            s.marks);
```

Program …

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```
s.marks = 93.5;
// previous read has advanced the internal position indicator
fseek (fp, POS, SEEK_SET);
fwrite(&s, rec_size,1, fp);
// verify correct data is written
fseek (fp, POS, SEEK_SET);
fread(&s, rec_size, 1,fp);
cout << "--------Updated record in database file is\n";
printf("%5d %30s %3d %5.2f \n", s.roll, s.name,s.batch, s.marks);
```

Program …

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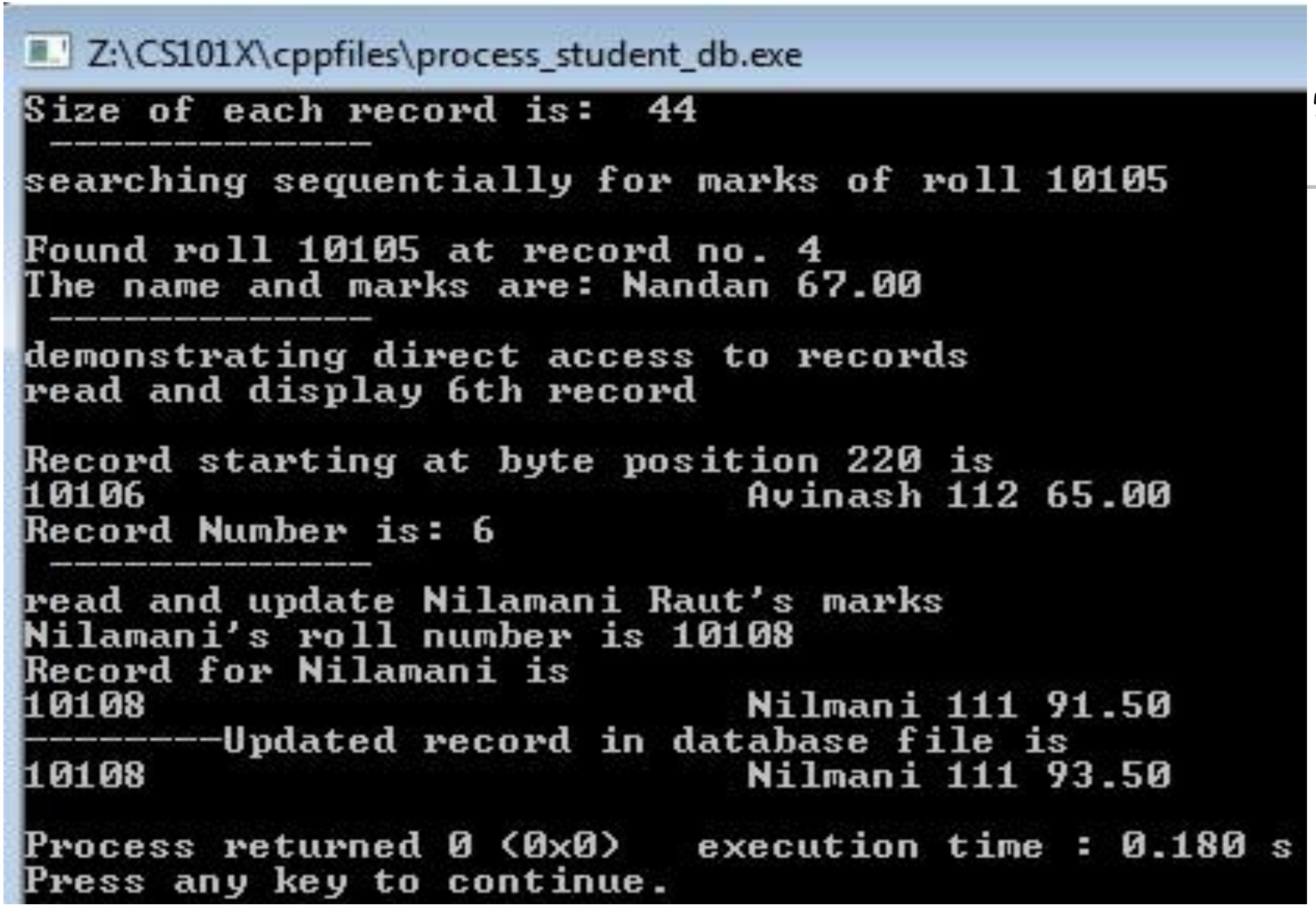
```
  fclose(fp);
  return 0;
}
```


Z:\CS101X\cppfiles\process_student_db.exe
Size of each record is: 44
searching sequentially for marks of roll 10105
Found roll 10105 at record no. 4
The name and marks are: Nandan 67.00
demonstrating direct access to records
read and display 6th record
Record starting at byte position 220 is
10106 Avinash 112 65.00
Record Number is: 6
read and update Nilamani Raut's marks
Nilamani's roll number is 10108
Record for Nilamani is
10108 Nilmani 111 91.50
---------Updated record in database file is
10108 Nilmani 111 93.50
Process returned 0 (0x0) execution time : 0.180 s
Press any key to continue.

Summary

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- Records in binary files can be directly accessed and processed
  - We typically search on a key attribute, such as roll_number
- Need to know the record number of the desired record
  - We need a mapping from roll_number to record position
- Refer to C++ tutorials and reference section on the web at: http://www.cplusplus.com/reference/cstdio
- Handouts posted this week will provide a summary of file processing, along with the program listings