

FORM 5 PASCAL PROGRAMMING**Unit 7: Records**

March, 01

9.1 WHAT IS A RECORD (紀錄) ?

- A record is a collection of data items which may have different data types. Each data item is stored in a separate record field and each field is referred to by the field name.

- Example 1:

Consider the three piece of information in the simplified library catalogue entry

Cheung Siu Han	the name of the author (string)
Bread Tree	the book title (string)
350	the number of pages (integer)

- One way of representing the catalogue would be to declare three variables, one for the name of the author, the other for the title of the book, and the third for the number of pages. The following is the program segment to do this :

```
var
  Author, Title : string ;
  NoOfPage : integer ;
. . .
begin
  Author := 'Cheung Siu Han' ;
  Title := 'Bread Tree' ;
  NoOfPage := 350 ;
```

- Another approach is to treat the catalogue as a single entity having three components corresponding to the three piece of information. This can be done by writing down the name and type of each field, enclosed between the reserved words record and end as shown below :

```
type
  Entry = record
    Author, Title : string ;
    NoOf Page : integer ;
  end ;
```

- With this type declaration, we may subsequently write a program segment shown below :

```
type
  Entry = record
    Author, Title : string ;
    NoOf Page : integer ;
  End ;
var
  Book1, Book2 : Entry ;
. . .
begin
  {we can refer to an individual field of a record by using
  a field designator, which is formed by appending a period
  and the field identifier to the record variable identifier}

  Book1.Author := 'Cheung Siu Han' ;
  Book1.Title := 'Bread Tree' ;
  Book1.NoOfPage := 350 ;
```

```

    {record assignment treat a record as a whole}
    Book2 := Book1 ;
    . . .

```

9.2 NESTED STRUCTURE

- Arrays and records may be combined to form nested structures. The following example shows that we may declare an array of records or a record with a field of array type.

- Example 2 :

In the following example, Date[] is an array of records. Each element of Date[] is a record with three fields : Year, Month and Day. The second variable Class is a record with three fields, the first of which is an array of strings.

```

type
  Datetype = record
    Year : 1950..2050 ;
    Month : 1..12 ;
    Day : 1..31
  end ;
  NameList = array[1..40] of string ;

var
  Date : array[1..10] of DateType ;
  Class : record
    Name : NameList ;
    NoOfStudent : 25..40 {usual range}
    FormTeacher : string {Name of form teacher}

```

9.3 MORE EXAMPLES ON RECORDS

- Example 3

```

program TestProcessing;

type StudentRec = record
    Name : string[20];
    Class : string[2];
    Test : array[1..5] of integer;
    Average : real
end;

var Student : StudentRec;

procedure ProcessTestMark( var Student : StudentRec );
var i, Sum : integer;
begin
    Sum := 0;
    with Student do
        begin
            for i := 1 to 5 do
                Sum := Sum + Test[i];
            Average := Sum / 5
        end
    end;

begin
end.

```

■ Example 4

```

program TelDirectory;
const Size = 100;
type Str20 = string[20];
   Str8 = string[8];
   Info = record
       Name : Str20;
       PhoneNo : Str8
   end;
   InfoArray = array[1..Size] of Info;
var Friend : InfoArray;

procedure LookUpDirectory( var Friend : InfoArray;
                           WhoToFind : str20 );

var i : integer;
begin
  for i := 1 to Size do
    if Friend[i].Name = WhoToFind
    then begin
      write( 'The phone number is ' );
      writeln( Friend[i].PhoneNo )
    end
  end;

begin
end.

```

■ Example 5

```

program MyFamily;
const Size = 20;
type MemberInfo = record
   Name : string[20];
   Relation : string[10];
   DateOfBirth : record
       Year,
       Month,
       Day : integer
   end
end;
   InfoArray = array[1..Size] of MemberInfo;

var Member : InfoArray;
   i : integer;
   Response : char;

begin
  i := 0;
  repeat
    i := i + 1;
    with Member[i] do
      begin
        write( 'What is the name? ' );
        readln( Name );

        write( 'What is the relation to you? ' );
        readln( Relation );

        write( 'What is the date of birth? ' );
        with DateOfBirth do
          readln( Year, Month, Day );
        end;
      end;
    write( 'Any more (Y/N)? ' );
    readln( Response );
    writeln
  until Response = 'N'
end.

```

end of unit 7