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English Class
Informatics Engineering 2011

Algorithms and Programming

Looping Structure

Steps of the Day

1. For Structure
2. While Do Structure
3. Repeat Until Structure

Let’s Start

Why We Need Looping Structure?

Make a program to showing "**I LOVE ALGORITHM**" on the screen as much as 1000 times. **WHAT WILL YOU DO?**

What is Looping Structure

An Algorithm structure that allow us to **REPEAT** some statements that fulfill **LOOPING CONDITION**.

Components in Looping Structure

- Looping condition
- Body statement
- Initialization
- Termination

Types of Looping Structure

- FOR
- WHILE
- REPEAT

1 For Structure

Definition and Structures of For Structure

For Structure

- For structure was used in looping that have **specified ending** of repetition.
- Number of repetition **have been known** in the beginning.
- Can be in **ASCENDING** or **DESCENDING** way

Format of For Structure (Ascending)

Algorithm Notation:

```
for variable ← start_value to end_value do
    statement
endfor
```

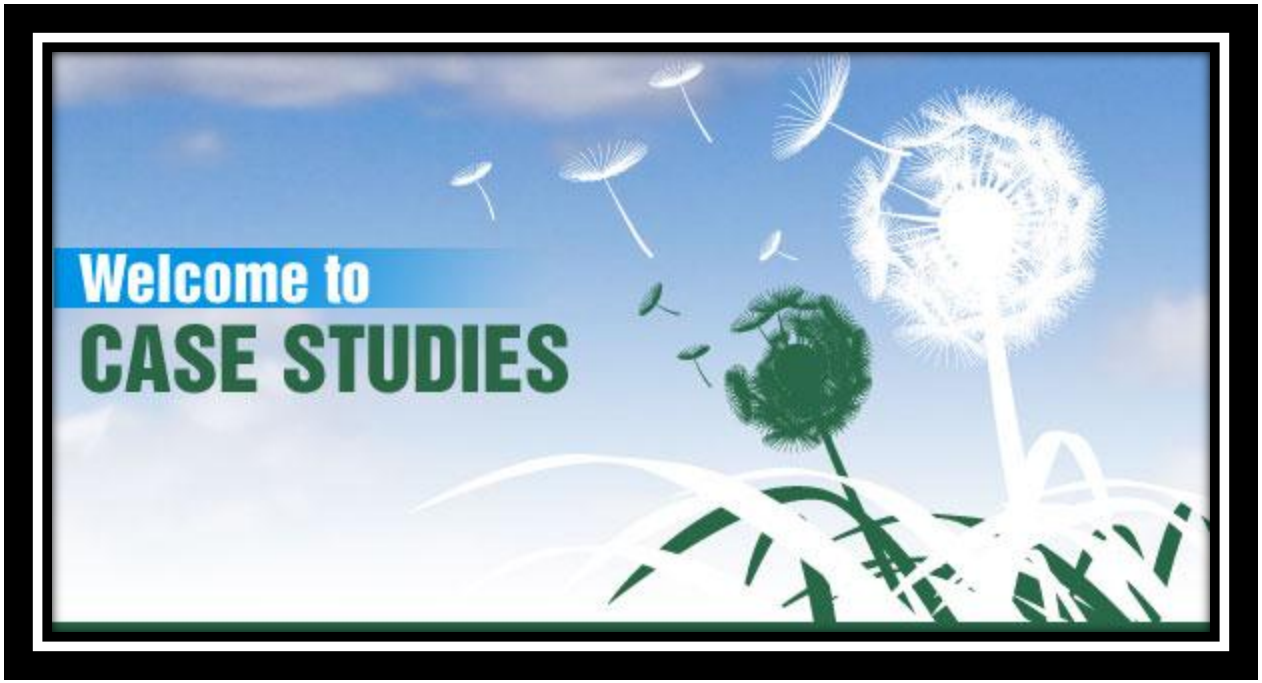
Pascal Notation I:

```
for variable := start_value to end_value do
    statement;
```

Format of For Structure (Ascending)

Pascal Notation II:

```
for variable := start_value to end_value do
begin
     statement;
end;
```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Example of For in Ascending Way (Algorithm)

```
Algoritma Deret_Bilangan_Ganjil
{I.S: Diinputkan satu nilai akhir oleh user}
{F.S: Menampilkan jumlah deret ganjil}

Kamus:
   x,akhir:integer
   jumlah:integer

Algoritma:
  input(akhir)
  jumlah ← 0
  for x ← 1 to akhir do
    if x mod 2 = 1 then
      jumlah ← jumlah + x;
  endfor
  output('Jumlah deret ganjil dari 1 - ',akhir,' = ',jumlah)
```

Example of For in Ascending Way (Pascal)

```
program Deret_Bilangan_Ganjil;
uses crt;

var
   x,akhir:integer;
   jumlah:integer;

begin
   write('Masukan batas akhir angka : ');readln(akhir);
   jumlah:=0;
   for x:=1 to akhir do
   begin
        if x mod 2=1 then
           jumlah:=jumlah+x;
   end;
   writeln('Jumlah Deret ganjil dari 1 - ',akhir,' = ',jumlah);
   writeln();
   write('Tekan sembarang tombol untuk menutup...');
   readkey();
end.
```

Format of For Structure (Descending)

Algorithm Notation:

```
for variable ← end_value downto start_value do
      statement
endfor
```

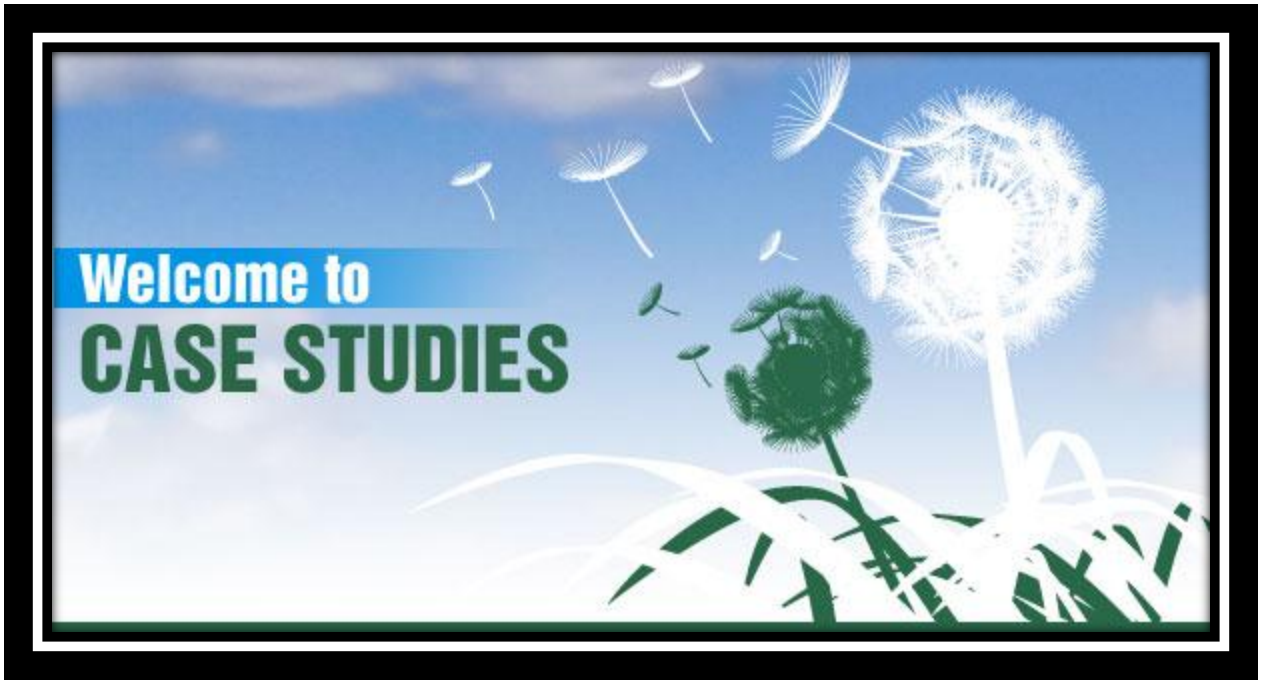
Pascal Notation I:

```
for variable := end_value downto start_value do
      statement;
```

Format of For Structure (Ascending)

Pascal Notation II:

```
for variable := end_value downto start_value do
begin
      statement;
end;
```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Example of For in Descending Way (Algorithm)

```
Algoritma Deret_Faktorial
{I.S: Diinputkan satu nilai oleh user}
{F.S: Menampilkan faktorial dari bilangan tersebut}

Kamus:
    i,nilai:integer
    faktorial:integer

Algoritma:
    input(nilai)
    faktorial←1
    for i ← nilai downto 1 do
        faktorial←faktorial*i
    endfor
    output(nilai,'! = ',faktorial)
```

Example of For in Descending Way (Pascal)

```
1   program Deret_Faktorial;
2   uses crt;
3
4   var
5      i,nilai:integer;
6      faktorial:integer;
7
8   begin
9      write('Masukan nilai = ');readln(nilai);
10     faktorial:=1;
11     for i:=nilai downto 1 do
12         faktorial:=faktorial*i;
13     writeln(nilai,'! = ',faktorial);
14     writeln();
15     write('Tekan sembarang tombol untuk menutup...');
16     readkey();
17  end.
```

While Structure

Definition and Structures of For Structure

While Structure

- While structure **always be executed** while its condition value is **true**.
- If the condition value is **false**, it **means stop repetition**.
- While structure have condition in the **beginning of structure**.

Format of While Structure

Algorithm Notation:

```
while kondisi do
    statement
endwhile
```

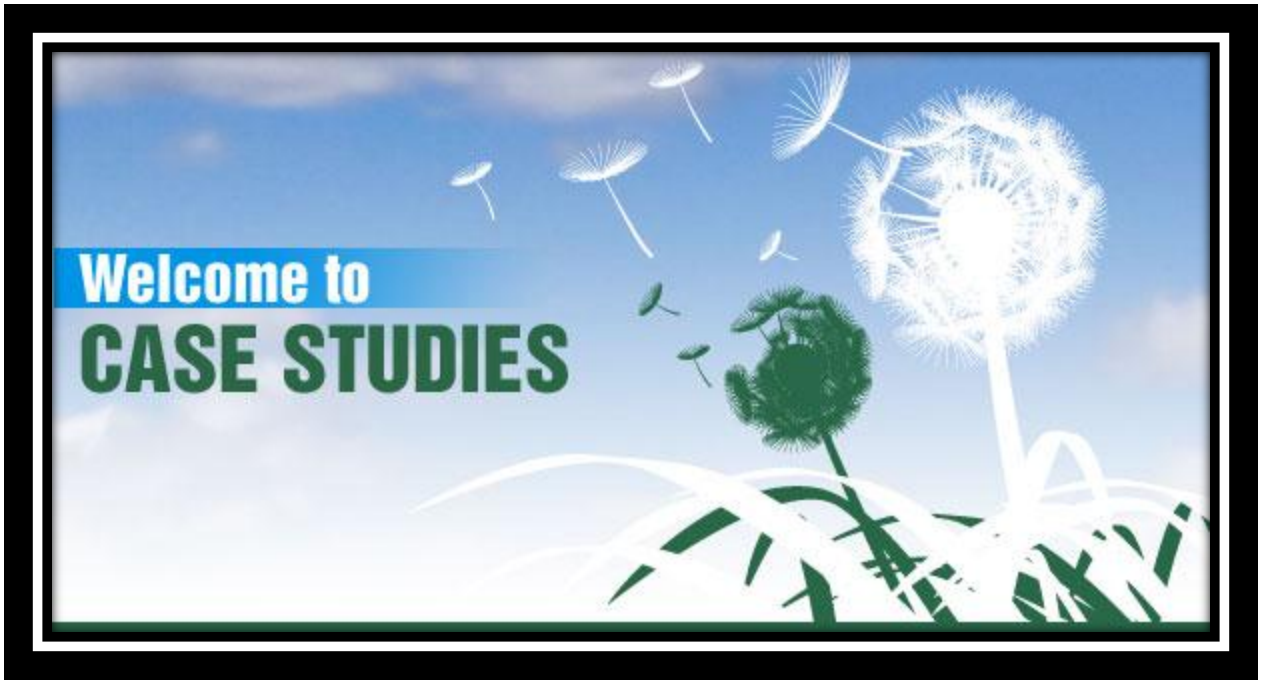
Pascal Notation I:

```
while kondisi do
    statement;
```

Format of While Structure

Pascal Notation II:

```
while kondisi do
begin
    statement;
end;
```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Example of While (Algorithm)

```
Algoritma Deret_Bilangan
{I.S: Diinputkan satu angka oleh user}
{F.S: Menampilkan jumlah deret dari 1 sampai angka}

Kamus:
    i,deret:integer
    angka:integer

Algoritma:
    input(angka)
    deret←0
    i←1
    while i<=angka do
        deret←deret+i
        i←i+1;
    endwhile
    output('Jumlah deret dari 1 - ',angka,' = ',deret)
```

Example of While (Pascal)

```
1   program Deret_Angka;
2   uses crt;
3
4   var
5      i,deret:integer;
6      angka:integer;
7
8   begin
9      write('Masukan angka = ');readln(angka);
10     deret:=0;
11     i:=1;
12     while i<=angka do
13     begin
14           deret:=deret+i;
15           i:=i+1;
16     end;
17     writeln('Jumlah deret dari 1 - ',angka,' = ',deret);
18     writeln();
19     write('Tekan sembarang tombol untuk menutup...');
20     readkey();
21  end.
```

Repeat Structure

Definition and Structures of For Structure

Repeat Structure

- Repeat structure **always be executed** until its condition value is **true**.
- If the condition value is **true**, it **means stop repetition**.
- Repeat structure have condition in the **end of structure**.

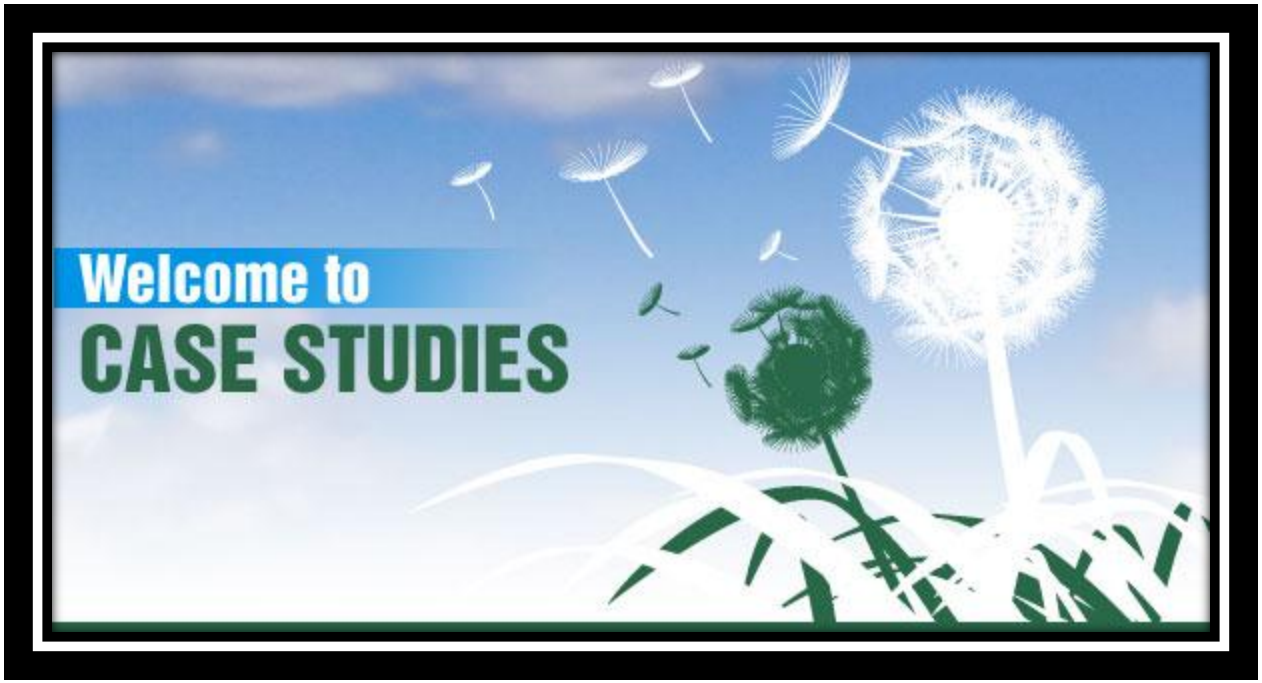
Format of While Structure

Algorithm Notation:

```
repeat
    statement
until kondisi
```

Pascal Notation:

```
repeat
    statement;
until kondisi;
```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Example of Repeat (Algorithm)

```
Algoritma Coba_Password
{I.S: Diinputkan password oleh user}
{F.S: Menampilkan pesan benar atau salah}

Kamus:
   const
      password=1234

   pass,i,j:integer

Algoritma:
   i←1
   j←3
   repeat
      input(pass)
      if pass=password then
         output('Password anda benar!');
      else
         i←i+1
         j←j-1
         output('Password salah (',j,' kali lagi)!')
      endif
   until (pass=password)or(i=4)
```

Example of Repeat (Pascal)

```
1   program Coba_Password;
2   uses crt;
3
4   const
5        password=1234;
6
7   var
8      pass,i,j:integer;
9
10  begin
11     i:=1;
12     j:=3;
13     repeat
14           write('Masukan password (',i,'): ');readln(pass);
15           if pass=password then
16           begin
17                writeln('Password anda benar!');
18                writeln();
19                writeln('Tekan sembarang tombol untuk menutup...');
21                readkey();
22           end
23           else
24           begin
25                i:=i+1;
26                j:=j-1;
27                writeln('Password salah (',j,' kali lagi)!');
28                readkey();
29           end;
30           clrscr();
31     until (pass=password)or(i=4);
32  end.
```

EXERCISE

Exercise 1

Make the algorithm to solve this problem below (Color of stars will be different each row):

N=5

```
*
* *
* * *
* * * *
* * * * *
```

Exercise 2

Make the algortihm to solve this problem below (Color of stars will be different each row):

N=3

```
*
* *
* * *
* *
*
```

Exercise 3

Make algorithm to count:

$$s = 1 - 2/3 + 3/5 - 4/7 + \ldots.$$

Exercise 4

Make algorithm to count the maximum value and mean value from n students.

THANK YOU

GRACIAS

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