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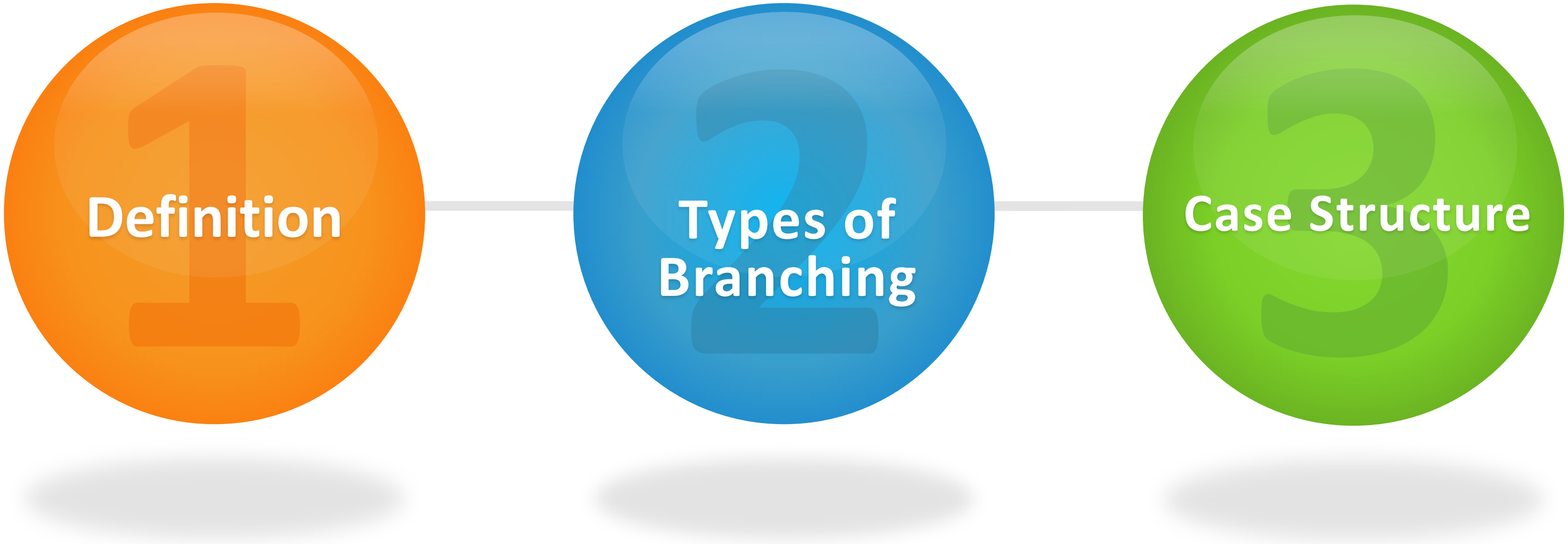
English Class

Informatics Engineering 2011

Algorithms and Programming

Branching Structure

Steps of the Day



Definition

Types of Branching

Case Structure

Let's Start

1

Definition

Definition of Branching Structure

Algorithm structure which allow to execute the instruction if **the condition of this instruction was met**.

Usage of Branching Structure

- Make menu structure
- Input validation
- Error handling

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Types of Branching Structure

All about Branching Structure

Types of Branching Structure

- **One Case** Branching
- **Two Cases** Branching
- **Three/Many Cases** Branching
- **Many Conditions** Branching

One Case Branching

Algorithm Notation:

```
if condition then
    statement
endif
```

One Case Branching

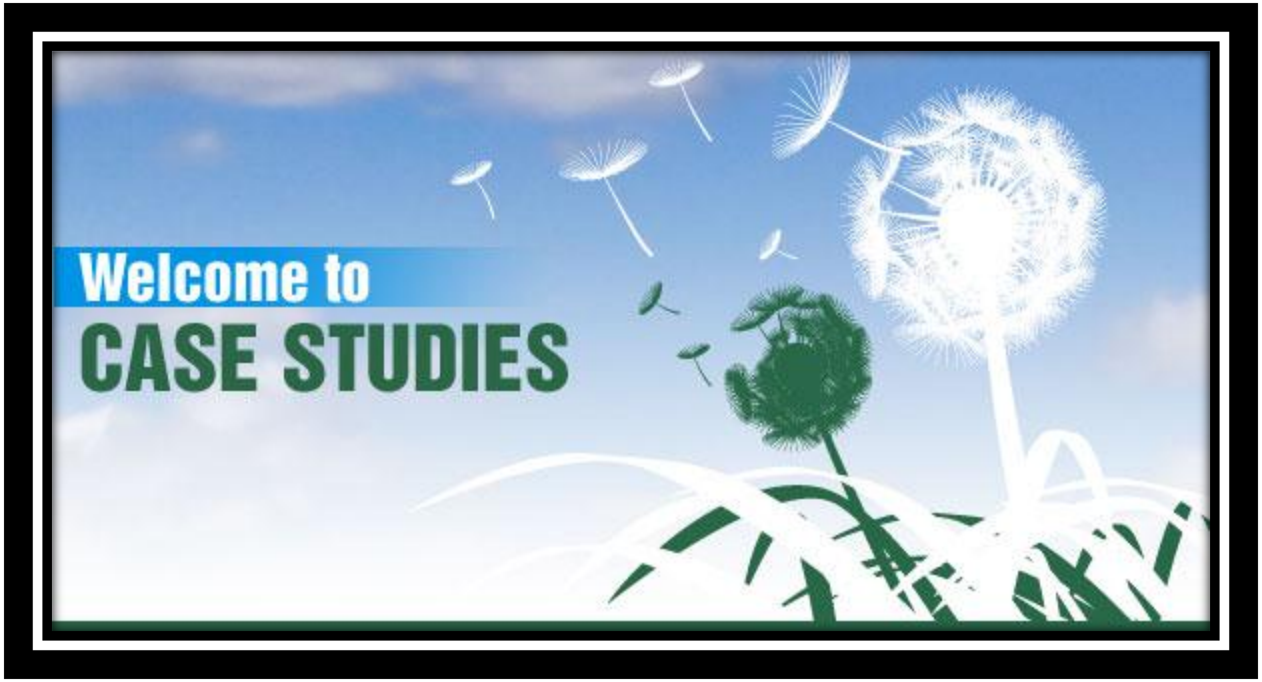
Pascal Notation (if there’s only one statement):

```
if condition then
   statement;
```

One Case Branching

Pascal Notation (if there are many statement):

```
if condition then
begin
   statement 1;
   statement 2;
end;
```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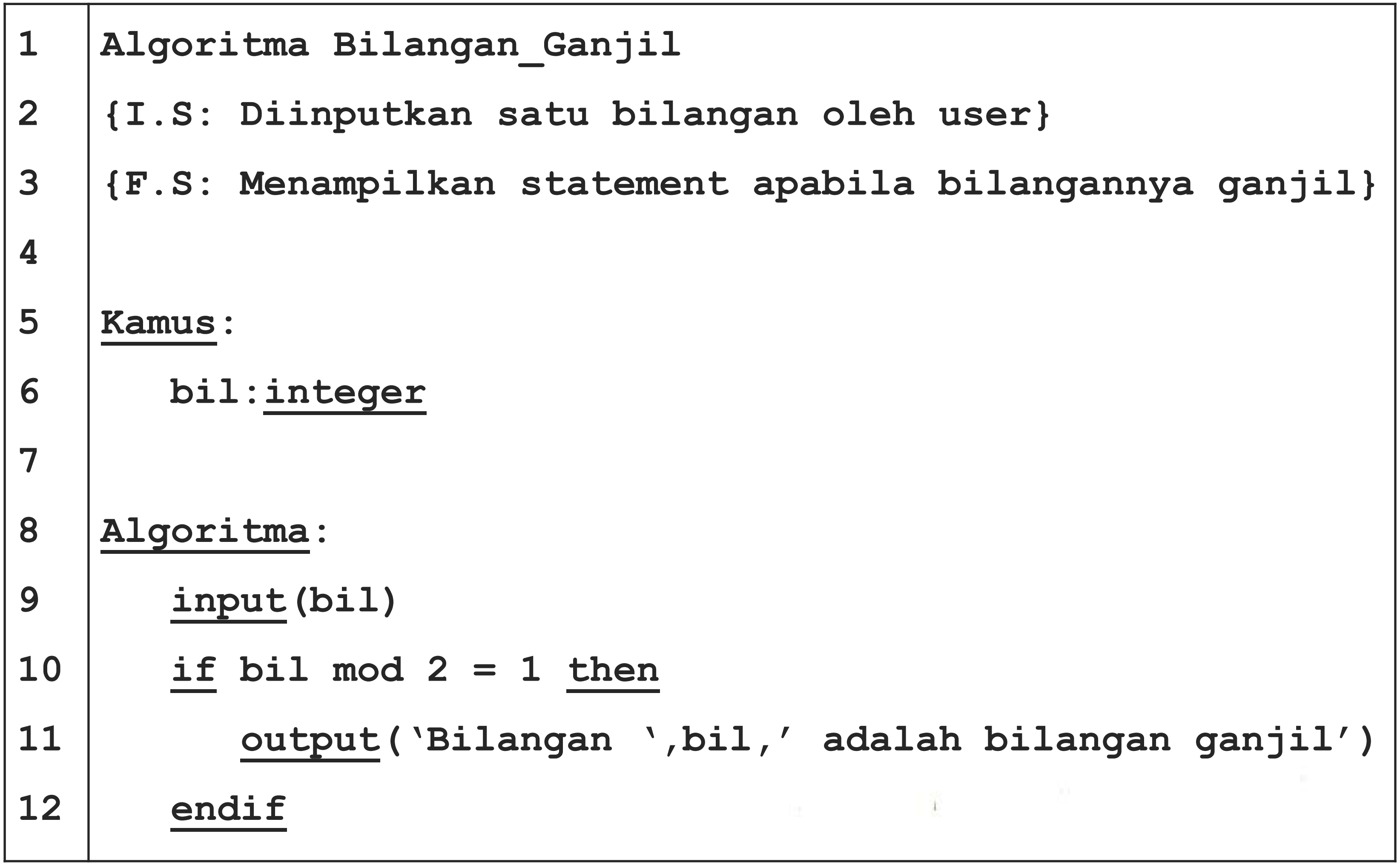
Example of One Case Branching (Algorithm)



```
Algoritma Bilangan_Ganjil
{I.S: Diinputkan satu bilangan oleh user}
{F.S: Menampilkan statement apabila bilangannya ganjil}

Kamus:
   bil:integer

Algoritma:
   input(bil)
   if bil mod 2 = 1 then
      output('Bilangan ',bil,' adalah bilangan ganjil')
   endif
```

Example of One Case Branching (Pascal)

```
program Bilangan_Ganjil;
uses crt;

var
   bil:integer;

begin
   write('Masukan sebuah bilangan bulat: ');
   readln(bil);
   if bil mod 2 = 1 then
     writeln('Bilangan ',bil,' adalah bilangan ganjil');
   writeln();
   writeln('Ketik sembarang tombol untuk menutup...');
   readkey();
end.
```

Two Cases Branching

Algorithm Notation:

```
if condition then
    statement 1
else
    statement 2
endif
```

Two Cases Branching

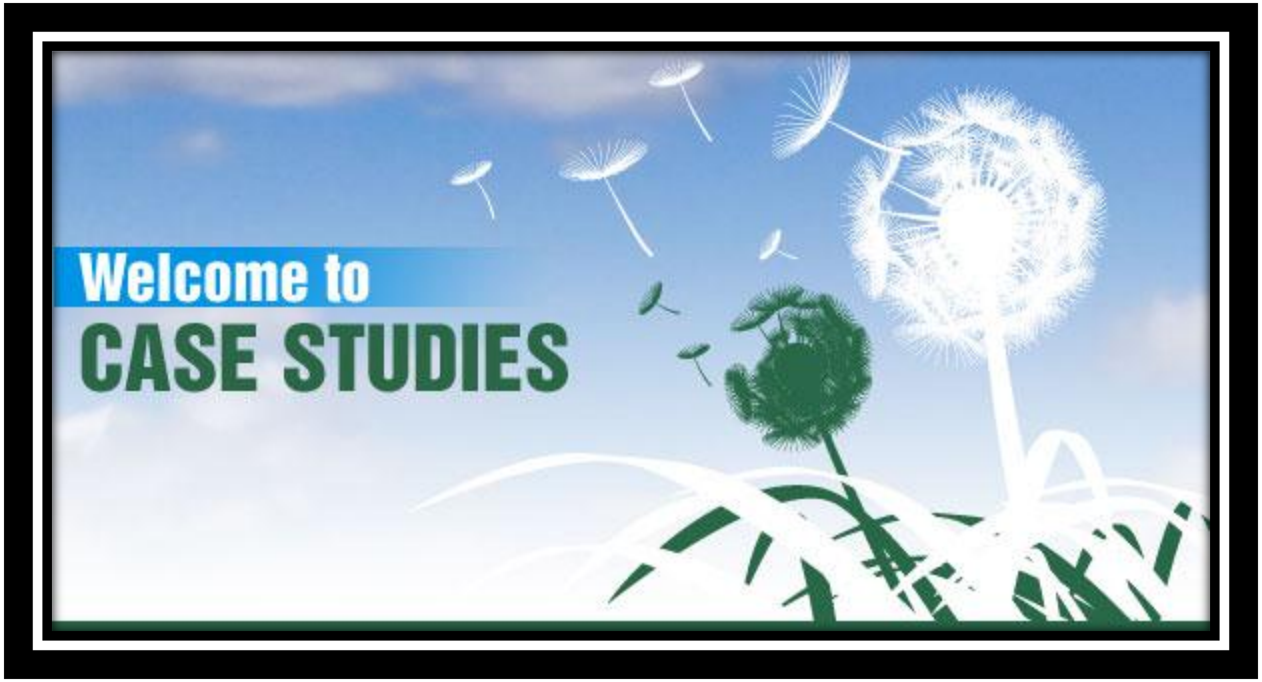
Pascal Notation (if there’s only one statement):

```
if condition then
    statement 1
else
    statement 2;
```

Two Cases Branching

Pascal Notation (if there are many statement):

```
if condition then
begin
      statement 1;
      statement 2;
end
else
begin
      statement 3;
      statement 4;
end;
```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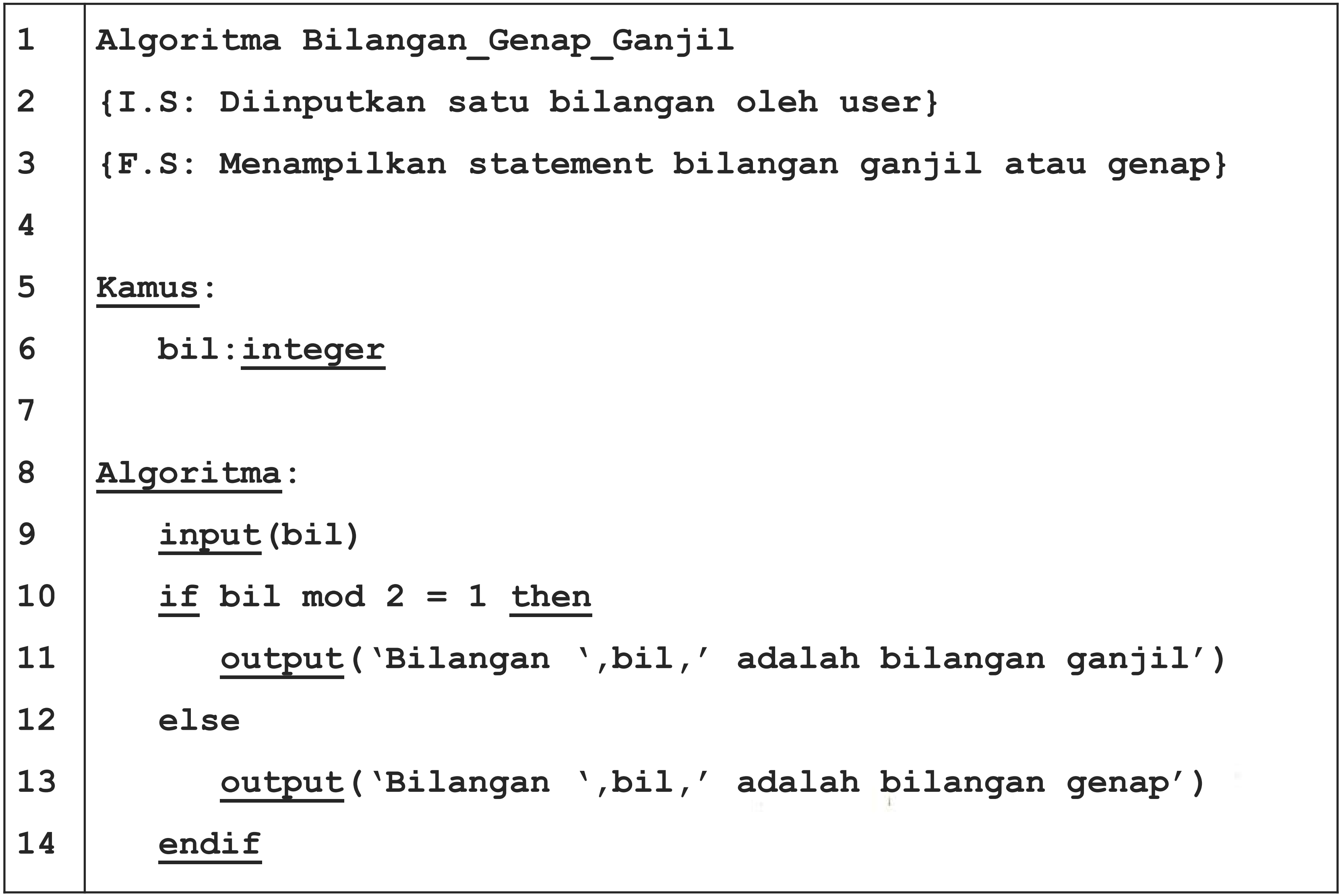
Example of Two Cases Branching (Algorithm)



```
Algoritma Bilangan_Genap_Ganjil
{I.S: Diinputkan satu bilangan oleh user}
{F.S: Menampilkan statement bilangan ganjil atau genap}

Kamus:
   bil:integer

Algoritma:
   input(bil)
   if bil mod 2 = 1 then
      output('Bilangan ',bil,' adalah bilangan ganjil')
   else
      output('Bilangan ',bil,' adalah bilangan genap')
   endif
```

Example of Two Cases Branching (Pascal)

```pascal
program Bilangan_Genap_ganjil;
uses crt;

var
   bil:integer;

begin
   write('Masukkan sebuah bilangan bulat: ');
   readln(bil);
   if bil mod 2 = 1 then
      writeln('Bilangan ',bil,' adalah bilangan ganjil')
   else
      writeln('Bilangan ',bil,' adalah bilangan genap');
   writeln();
   writeln('Tekan sembarang tombol untuk menutup...');
   readkey();
end.
```

Three/Many Cases Branching

Algorithm Notation:

```
if condition 1 then
   statement 1
else
   if condition 2 then
      statement 2
   else
      if condition 3 then
         statement 3
      else
         statement 4
      endif
   endif
endif
```

Three/Many Cases Branching

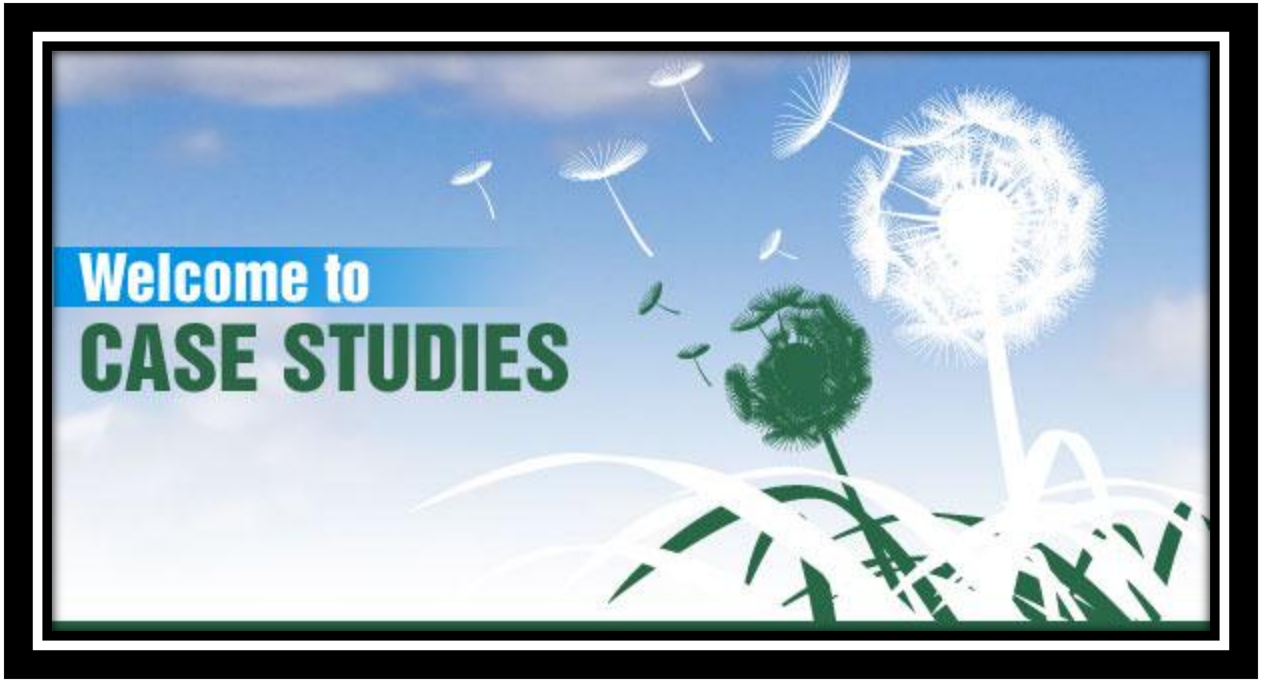
Pascal Notation (if there's only one statement):

```
if condition 1 then
   statement 1
else
   if condition 2 then
      statement 2
   else
      if condition 3 then
         statement 3
      else
         statement 4;
```

Three/Many Cases Branching

Pascal Notation (if there are many statement):

```
if kondisi 1 then
begin
   statement 1;
end
else
   if kondisi 2 then
   begin
      statement 2;
   end
   else
      if kondisi 3 then
      begin
         statement 3;
      end
      else
      begin
         statement 4;
      end;
```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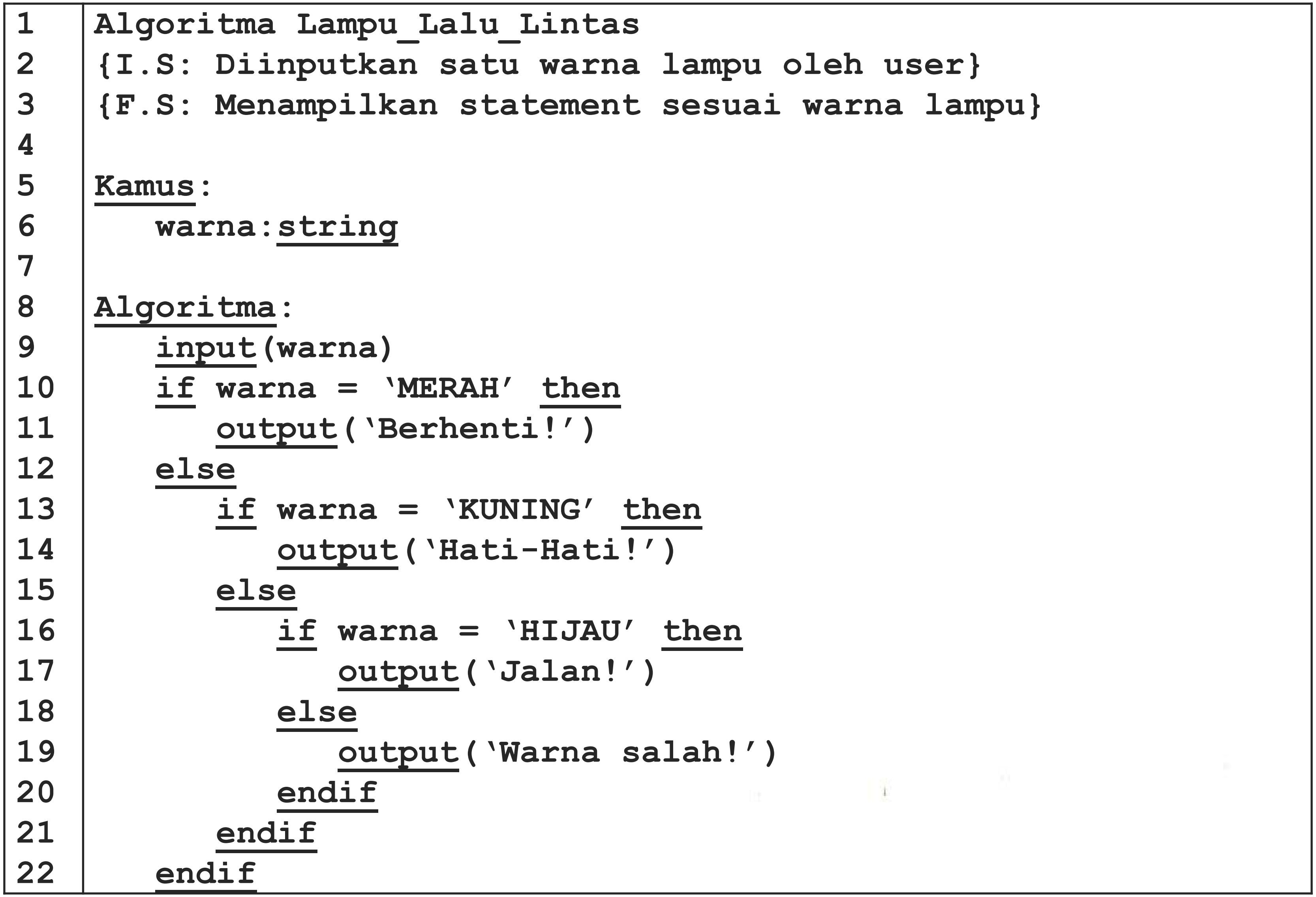
Example of Three/Many Cases Branching (Algorithm)



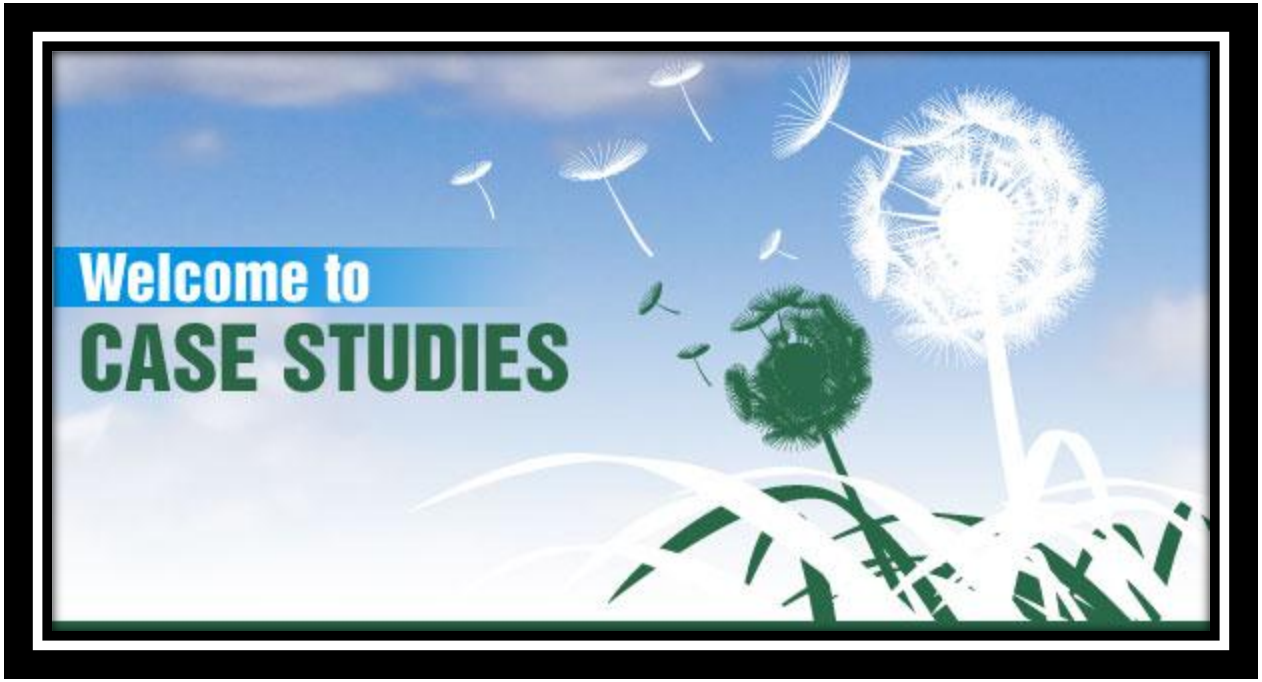
```
Algoritma Lampu_Lalu_Lintas
{I.S: Diinputkan satu warna lampu oleh user}
{F.S: Menampilkan statement sesuai warna lampu}

Kamus:
   warna:string

Algoritma:
   input(warna)
   if warna = ‘MERAH’ then
      output(‘Berhenti!’)
   else
      if warna = ‘KUNING’ then
         output(‘Hati-Hati!’)
      else
         if warna = ‘HIJAU’ then
            output(‘Jalan!’)
         else
            output(‘Warna salah!’)
         endif
      endif
   endif
```

Example of Three/Many Cases Branching (Pascal)

```pascal
program Lampu_Lalu_Lintas;
uses crt;

var
   warna:string;

begin
   write('Masukkan sembarang warna: ');
   readln(warna);
   warna:=upcase(warna); {membuat uppercase}

   if warna='MERAH' then
      writeln('Berhenti!')
   else
      if warna='KUNING' then
         writeln('Hati-Hati!')
      else
         if warna='HIJAU' then
            writeln('Jalan!')
         else
            writeln('Warna salah!');
   writeln();
   writeln('Tekan sembarang tombol untuk menutup...');
   readkey();
end.
```

Many Conditions Branching

- There are several cases which was requested **more than one conditions**.
- Problem solving:
  - Use **AND** : if **all condition** must be fulfilled
  - Use **OR** : if **only one condition** must be fulfilled.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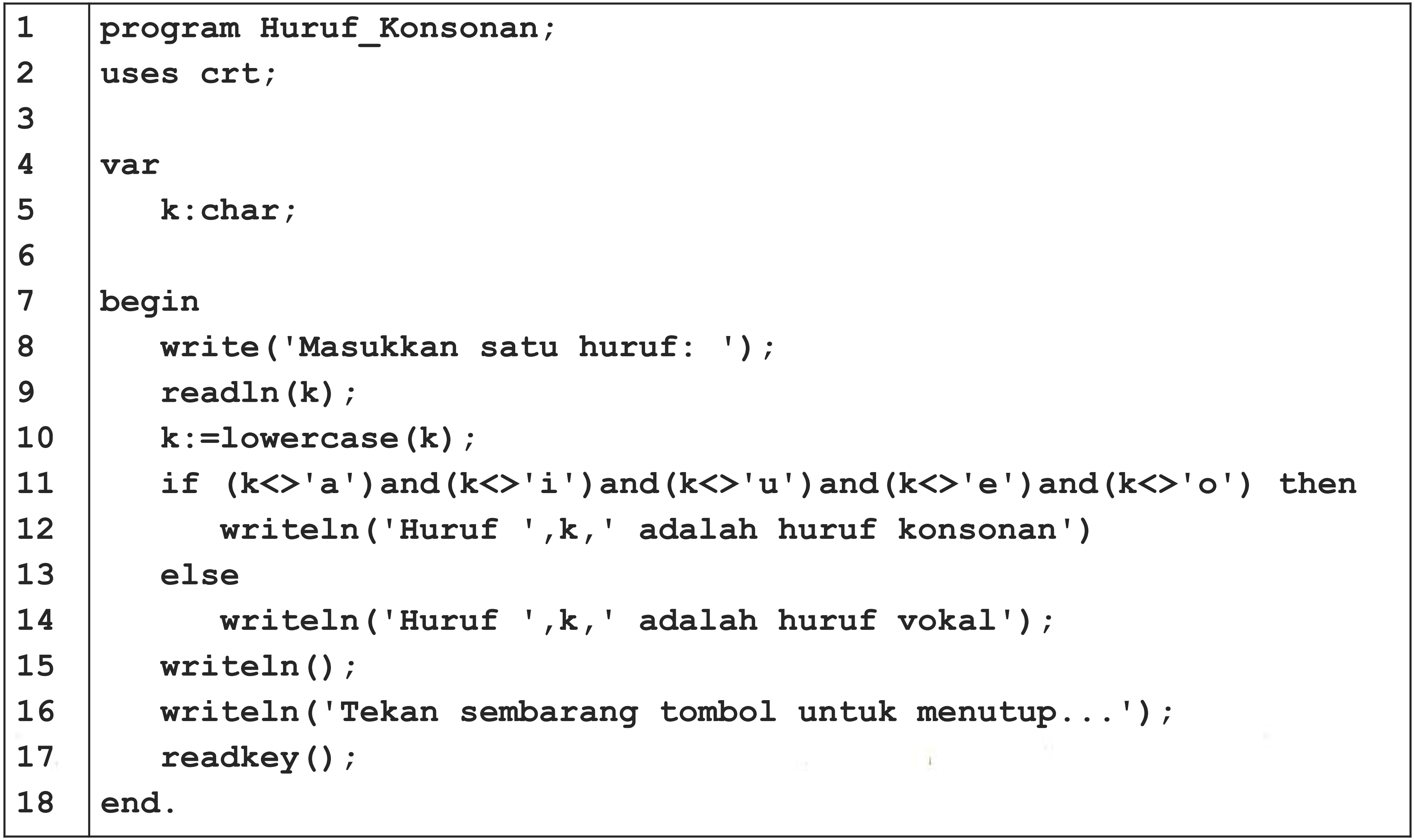
Example of Many Conditions Branching (Algorithm)

```
Algoritma Huruf_Konsonan
{I.S: Diinputkan satu huruf oleh user}
{F.S: Menampilkan pesan huruf konsonan jika konsonan}

Kamus:
   k:char

Algoritma:
   input(k)
   if (k≠’a’)and(k≠’i’)and(k≠’u’)and(k≠’e’)and(k≠’o’) then
       output(‘Huruf ‘,k,’ adalah huruf konsonan’)
   else
       output(‘Huruf ‘,k,’ adalah huruf vokal’)
   endif
```

Example of Many Conditions Branching (Pascal)



```pascal
program Huruf_Konsonan;
uses crt;

var
   k:char;

begin
   write('Masukkan satu huruf: ');
   readln(k);
   k:=lowercase(k);
   if (k<>'a')and(k<>'i')and(k<>'u')and(k<>'e')and(k<>'o') then
      writeln('Huruf ',k,' adalah huruf konsonan')
   else
      writeln('Huruf ',k,' adalah huruf vokal');
   writeln();
   writeln('Tekan sembarang tombol untuk menutup...');
   readkey();
end.
```

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Case Structure

All About Case Structure

Case Structure

- Expression could be **arithmetics or boolean**.
- Expression was produce **a constant**.
- Value must be **ordinal type** (char, boolean, and integer)
- Statement in otherwise will be executed **if the other value aren’t fulfilled**.

Case Structure

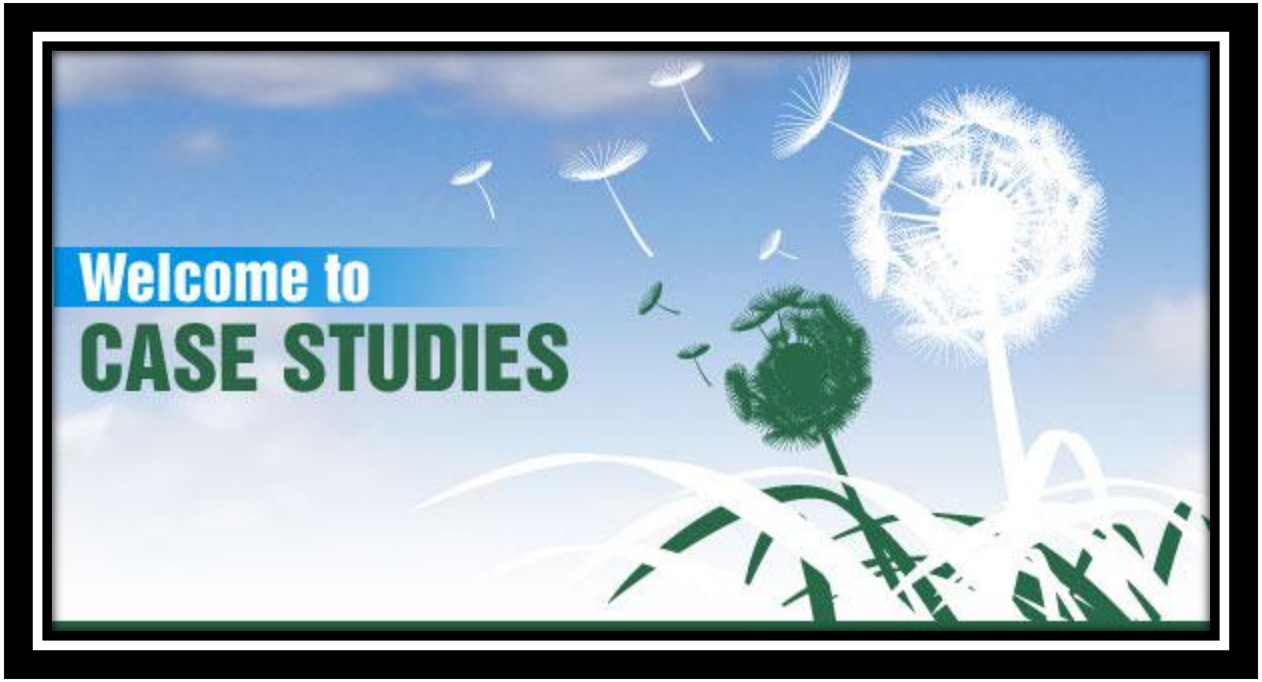
Algorithm Notation:

```
case ekspresi
   nilai 1 : statement 1
   nilai 2 : statement 2
   nilai 3 : statement 3
   .
   .
   .
   nilai n : statement n
   otherwise : statement x
endcase
```

Case Structure

Pascal Notation:

```
case ekspresi of
   nilai 1 : statement 1;
   nilai 2 : statement 2;
   nilai 3 : statement 3;
   .
   .
   .
   nilai n : statement n;
   else statement x;
end;
```



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CASE STUDIES

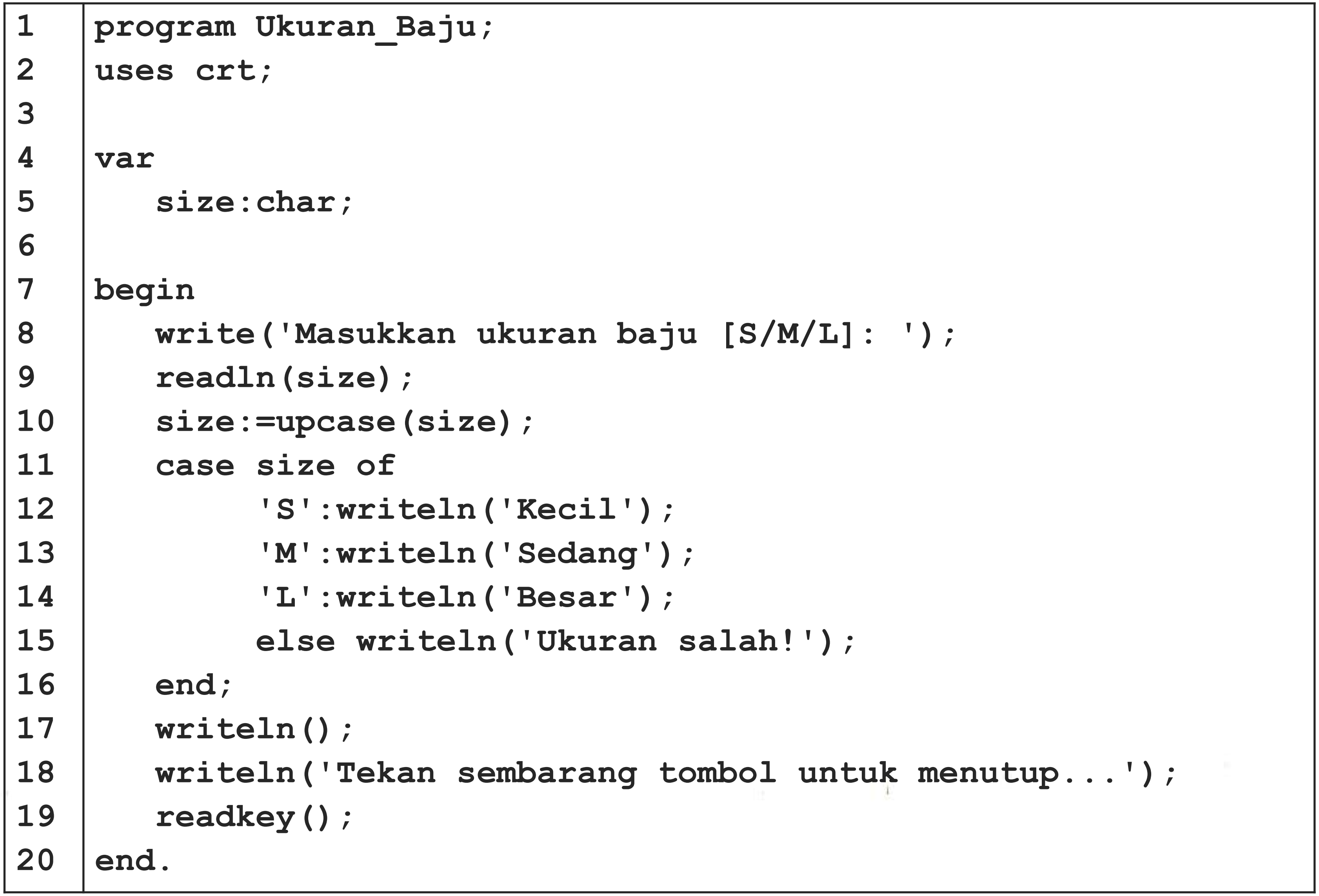
Example of Case Structure (Algorithm)

```
Algoritma Ukuran_Baju
{I.S: Diinputkan satu huruf untuk ukuran baju oleh user}
{F.S: Menampilkan arti ukuran baju}

Kamus:
   size:char

Algoritma:
   input(size)
   case size
      ‘S’:output(‘Kecil’);
      ‘M’:output(‘Sedang’);
      ‘L’:output(‘Besar’);
      otherwise : output(‘Ukuran salah!’)
   endcase
```

Example of Case Structure (Pascal)



```pascal
program Ukuran_Baju;
uses crt;

var
   size:char;

begin
   write('Masukkan ukuran baju [S/M/L]: ');
   readln(size);
   size:=upcase(size);
   case size of
        'S':writeln('Kecil');
        'M':writeln('Sedang');
        'L':writeln('Besar');
        else writeln('Ukuran salah!');
   end;
   writeln();
   writeln('Tekan sembarang tombol untuk menutup...');
   readkey();
end.
```

THANK YOU

GRACIAS

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