Lanjutan..
Elemen dasar dan instrusi utama java

Instruksi Utama

- Instruksi Pemilihan dua alternatif
  - If … else …
- Instruksi Pemilihan multi alternatif
  - Switch( )
- Instruksi Perulangan
  - For
  - While
  - Do/while

1. Pemilihan dua alternatif

- Bentuk dua alternatif :

```
if  (kondisi)
      statement-4;
else
      statement-2;
```

Kerjakan statement-4
bila kondisi benar,
bila tidak kerjakan
statement-2

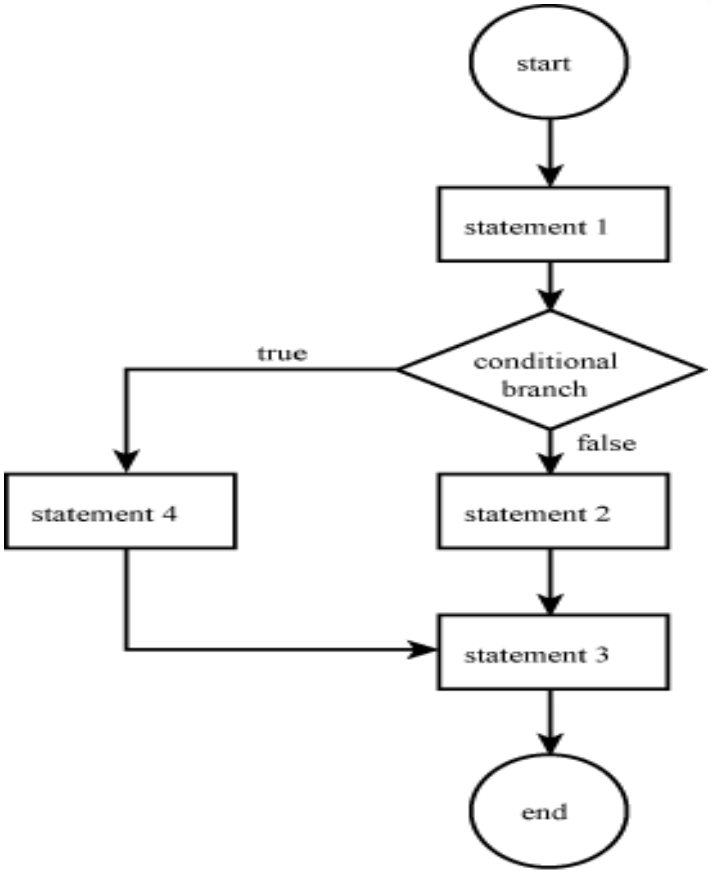
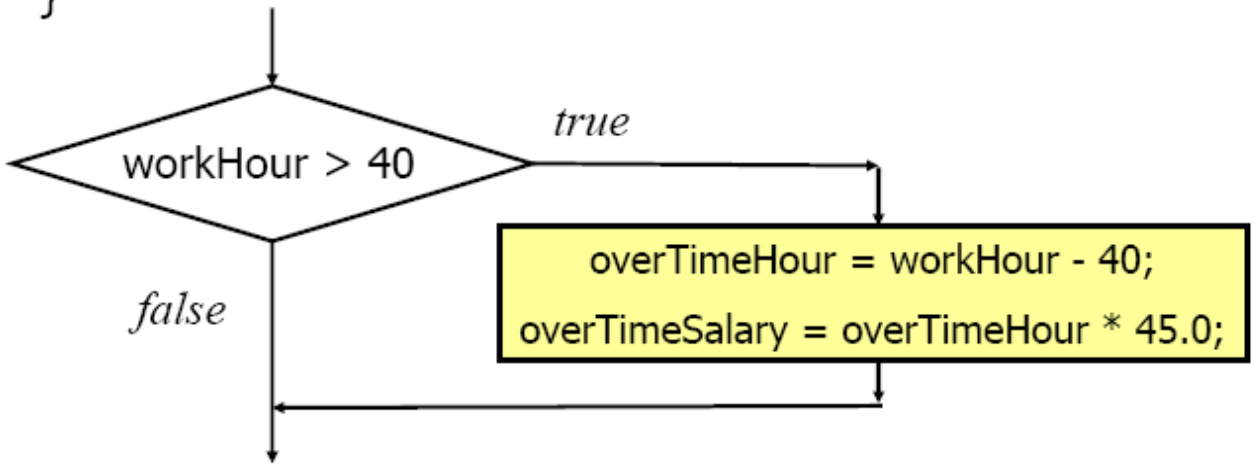


Figure 13.2

Contoh

- Example

```
if (workHour > 40) {
        overTimeHour = workHour - 40;
        overTimeSalary = overTimeHour * 45.0;
}
```



The assignment statements (then-part) will only be executed when workHour > 40

Contoh 1

```
class ContohIfElse {
    public static void main (String args[]) {
        char HurufDepan = (char) -1;
        System.out.println("Masukkan huruf depan nama anda: ");
        try {
            HurufDepan = (char) System.in.read();
        }
        catch (Exception e) {
            System.out.println("Error : " + e.toString());
        }
        if (HurufDepan == -1)
            System.out.println("Anda tidak memasukkan huruf depan!");
        else if (HurufDepan == 'a')
            System.out.println("Apa namamu Amin?");
        else if (HurufDepan == 'b')
            System.out.println("Apa namamu Bambang?");
        else if (HurufDepan == 'c')
            System.out.println("Apa namamu Charlie?");
        else if (HurufDepan == 'd')
            System.out.println("Apa namamu Daud?");
        else if (HurufDepan == 'e')
            System.out.println("Apa namamu Endang?");
        else System.out.println("Aku belum bisa menebak!");
    }
}
```

Contoh 2

```
import java.io.*;
class ContohIfElse {
        public static void main (String args[]) {
                DataInputStream baca = new DataInputStream(System.in);
                int na =0;
                String input;
                System.out.print("Masukkan Nilai Akhir Anda anda: ");
                try {
            input= baca.readLine();
                        na = Integer.parseInt(input);
                }
                catch (Exception e) {
                        System.out.println("Error : " + e.toString());
                }
                    if (na >= 85)
                       System.out.println("Nilai Huruf A");
                       else if (na >= 75)
                                System.out.println("Nilai Huruf B");
                             else if (na >= 65)
                                    System.out.println("Nilai Huruf C");
                                 else if (na >=45)
               System.out.println("Nilai Huruf D");
                    else
                        System.out.println("Nilai Huruf E");
        }
}
```

Pemilihan SWITCH

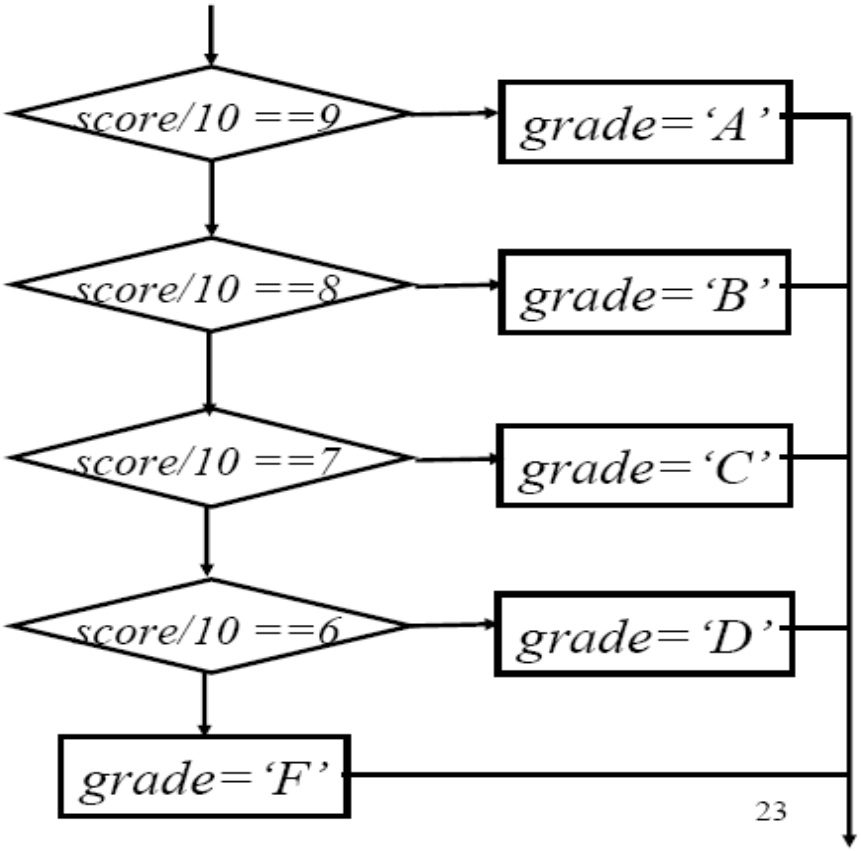
```
switch (expressi) {
      case nilai-1 : statement-1; break;
      case nilai-2 : statement-2; break;
            ........
      default : statement;
 }
```

- Bila expressi=nilai-1 kerjakan statement-1
- Bila expressi=nilai-2 kerjakan statemen-2
- dst
- Bila tdk ada nilai yang memenuhi kerjakan default statement

Contoh

- switch statements

```
switch  (score / 10)  {      //Assume that score's value is  betw 0 & 99.
      case  9:               // score/10 is either 9, 8, 7, 6, 5, 4, 3, 2, 1 or 0
                grade = 'A';
                break;
      case  8:
                grade = 'B';
                break;
      case  7:
                grade = 'C';
                break;
      case  6:
                grade = 'D';
                break;
      default:
                grade = 'F';
                break;
}
```



Contoh 1

```
class ContohSwitch {
    public static void main (String args[]) {
        char HurufDepan = (char) -1;
        System.out.println("Masukkan huruf depan nama anda: ");
        try {
            HurufDepan = (char) System.in.read();
        }
        catch (Exception e) {
            System.out.println("Error : " + e.toString());
        }
    Switch(HurufDepan) {
    case (char) -1 : System.out.println("bukan huruf depan!"); break;
    case 'a' : System.out.println("Apa namamu Amin?"); break;
    case 'b' : System.out.println("Apa namamu Bambang?"); break;
    case 'c' : System.out.println("Apa namamu Charlie?"); break;
    case 'd' : System.out.println("Apa namamu Daud?"); break;
    case 'e' : System.out.println("Apa namamu Endang?"); break;
    default: System.out.println("Aku belum bisa menebak namamu");
    }
}
}
```

Alternatif Penggunaan

- Kapan pakai if/else? Kapan switch() ?
  - Bila alternatif tidak banyak pakai if/else saja
  - Bila alternatif-nya banyak dan kondisi yang diperlukan adalah “kesamaan” bukan > (lebih besar) atau < (lebih kecil), gunakan switch()

3. Perulangan

(1) Perulangan dengan **for** statement:

Bentuk: **for** (nilai_awal; kondisi; step)
statement;

Contoh: **for** (i=1; i < 20; i++)
System.out.println(i);

Contoh

```
public class ContohFor{
    public static void main(String args[]){
        int hitung = 1;
        for(int i = 0; i < 9; i++){
            for(int j = 0; j < i + 1; j++){
                System.out.print(hitung);
            }
            hitung++;
            System.out.println();
        }
    }
}
```

3. Perulangan lanjutan ..

(2) Perulangan dengan **while** statement:

Bentuk: **while** (kondisi) { statement; ... }

Contoh: **while** (i < 20) {

```
        System.out.println(i);
        i++;  // harus ada
    }
```

- Apa yang terjadi bila “i++” tidak ada dalam perintah while tersebut?

Contoh..

```
class whileCount {
    public static void main (String args[]) {
      char input = (char) -1;
      int numToCount;
      System.out.println("Masukkan satu angka antara 1 dan 10: ");
      try {
          input = (char) System.in.read();
      }
      catch (Exception e) {
          System.out.println("Error : " + e.toString());
      }
      numToCount = Character.digit(input, 10);
      if ((numToCount > 0) && (numToCount < 10)) {
          int  i = 1;
          while (i <= numToCount) {
                    System.out.println(i);
                    i++;
          }
      }
    else System.out.println("Angka tsb tidak berada diantara 1 dan 10");
    }
}
```

Contoh..

```
import java.io.*;
class progLoop {
  public static void main(String[] args) {
    int N=0;
    int idx=0;
    String input=" ";
    DataInputStream in = new DataInputStream(System.in);
    try {
       System.out.print("Masukkan jumlah anak ayam: ");
       input = in.readLine();
       N = Integer.parseInt(input);
    }
    catch (Exception e) {}
    idx = N;
    while (idx > 1)
    {
                System.out.println("Kotek-kotek kotek ...");
                System.out.println("Anak ayam berkotek");
       System.out.println("Anak ayam turun " + idx);
       idx--;
       System.out.println("mati 1 tinggal " + idx);
       System.out.println(" ");
    }
    System.out.println("Anak ayam turun " + idx);
    System.out.println("mati 1 tinggal induknya");
  }
}
```

3. Perulangan lanjutan ..

Do –while

Digunakan untuk mengeksekusi sebuah blokselama kondisi tertentu.

Sintak

```
Do{
    Statemen;
}
While(A);
```

Contoh:

```
class contoh{
        public static void main(String args[]){
                int i=1;
                do {
                        System.out.println("STMIK ke- " +i);
                        i++;
                }
                while(i<=5){
        }
}
```

Perubahan Nilai Variabel pada Loop

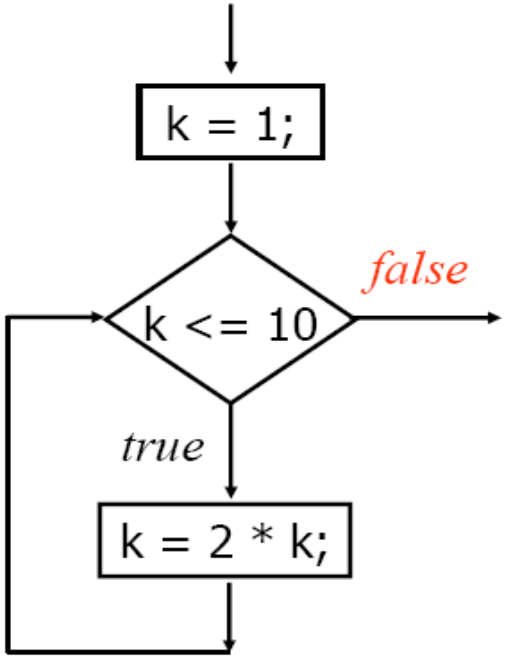
- To find the smallest integer that is a power of two (2^k) and it is larger than 10

  Idea: Compute 2^1, 2^2, 2^3, … one after one while the result is less than or equal to 10

```
k = 1;

while  (k <= 10)  {
        k = 2 * k;
}
```

Iteration	k	$k \leq 10$
Before	1	*true*
After 1st round	2	*true*
After 2nd round	4	*true*
After 3rd round	8	*true*
After 4th round	16	*false*



Perubahan Nilai Variabel pada Loop

- Example: for $N \geq 1$, to compute $1 + 2 + 3 + \ldots + N$.

```
s =0;
i = 1;

if (i > n) <stop>
s = s + i;
++i;

if (i > n) <stop>
s = s + i;
++i;

if (i > n) <stop>
s = s + i;
++i;
. . .
```

terminating condition

repeated operation

opposite

while condition

```
s = 0;
i = 1;
while  (i <= n)  {
        s = s + i;
        ++ i;
}
```

while-loop version

Perubahan Nilai Variabel pada Loop

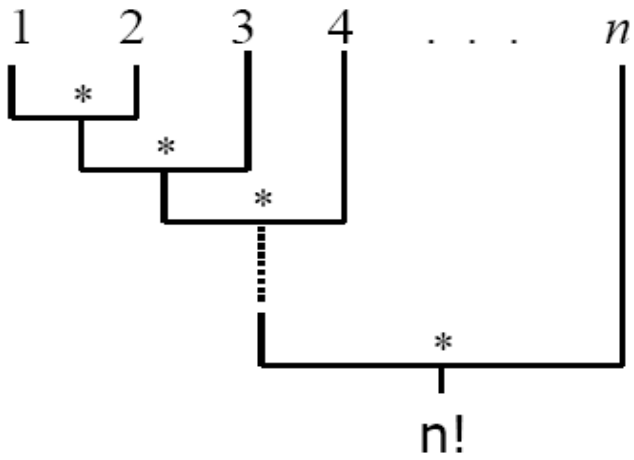
What is the output of the following program?

```
int  x = 2,  n = 5,  p = 1;
while  ( n != 0)  {
        if  (n%2 == 1)  p = p * x;
        n = n / 2;
        x = x * x;
}
System.out.println( p);
```

p	n	x	n != 0
1	5	2	true
2	2	4	true
2	1	16	true
32	0	256	false

Perubahan Nilai Variabel pada Loop

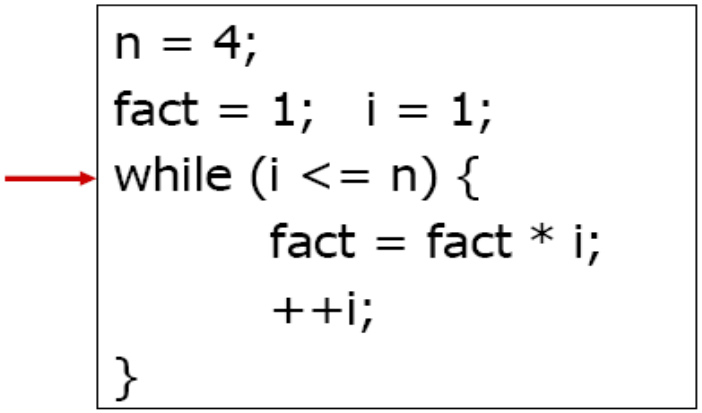
- A *while* loop that computes $n! = 1 \times 2 \times 3 \times \ldots \times n, \quad n \geq 1$.




```
fact = 1;
 i = 1;
While  (i <= n)  {
        fact = fact * i;
        ++i;
}
```

In this example, the repeated operation is multiplying the next integer to the preceding product.

Perubahan Nilai Variabel pada Loop



```
n = 4;
fact = 1;   i = 1;
while (i <= n) {
        fact = fact * i;
        ++i;
}
```

Iteration No.	*fact*	*i*	*i ≤n*
0	*1*	*1*	*true*
1	*1*	*2*	*true*
2	*2*	*3*	*true*
3	*6*	*4*	*true*
4	*24*	*5*	*false*

Perubahan Nilai Variabel pada Loop

- The last example belongs to a major kind of *while* loops that have the structure

```
<init-stat>
while (<bool-expr>) {
        <repeated-stat>
        <update-stat>
}
```

```
fact = 1;   //while-loop version
 i = 1;
while (i <= n) {
        fact = fact * i;
        ++i;
}
```

- A ***for*** statement is equivalent to such *while* loop structure

```
for (<init-stat>; <bool-expr>; <update-stat>)
        <repeated-stat>
```

```
fact = 1;                          //for-loop version
for ( i=1;  i<=n;  ++i)
        fact = i * fact;
```

Perubahan Nilai Variabel pada Loop

- To compute $1 + 2 + 3 + \ldots + N$.

```
s = 0;
i = 1;
while  (i <= n)  {
        s = s + i;
        ++ i;
}
```

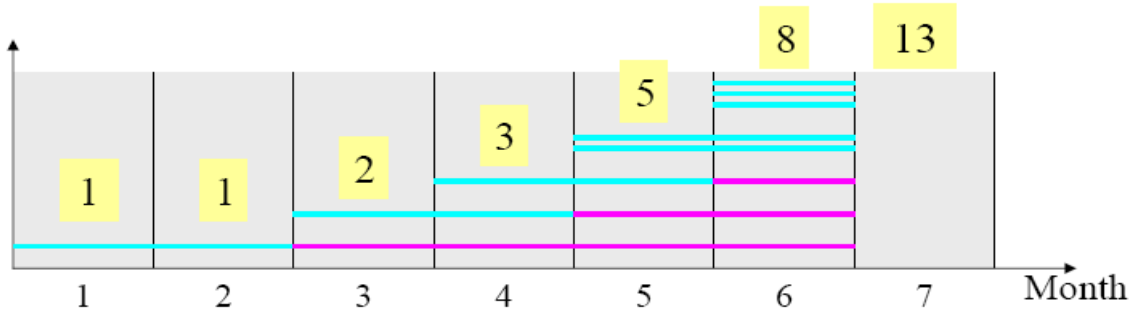
while-loop version

```
s = 0;
for ( i=1;  i<=n;  ++i)
        s = s + i;
```

for-loop version

Perubahan Nilai Variabel pada Loop

- A pair of new born rabbits take 2 months to be mature and then start to reproduce 1 pair of rabbits each month. How many pairs of rabbits in the k^{th} month?



In first month: 1 pair
In second month: 1 pair
In the third month: 2 pairs
In the forth month: 3 pairs
In the fifth month: 5 pairs

In the k^{th} month: ? pairs

Recursive definition

$F(1) = 1,$

$F(2) = 1,$

$F(k) = F(k\text{-}1)+F(k\text{-}2)$, for $k > 2.$

Existings

Newborns

Perubahan Nilai Variabel pada Loop

- The sequence: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ... in which each number is the sum of the two preceding numbers, appears in many different areas of mathematics and is useful in analysis.

- This sequence is called Fibonacci sequence

$$f(k) = \frac{1}{\sqrt{5}}\left(\left(\frac{1+\sqrt{5}}{2}\right)^k - \left(\frac{1-\sqrt{5}}{2}\right)^k\right)$$

Leonardo Pisano (Fibonacci)

Perubahan Nilai Variabel pada Loop

- To write a program that computes the k^{th} Fibonacci Number

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	...
-	1	1	2	3	5	8	13	21	...

oldf f newf — *0th iteration*

oldf f newf — *1st iteration*

oldf f newf — *2nd iteration*

oldf f newf — *3rd iteration*

- Keep 3 variables, initialized as in the 0*th* iteration. Move *k-1* steps forward. *f* will then equal the k^{th} Fibonacci No.

- In each iteration,

  oldf = ?

  f = ?

  newf = ?

Perubahan Nilai Variabel pada Loop

```
int  k = 4,  oldf,  f = 1, newf = 1;
i = 2;
while  (i <= k)  {
        oldf = f;
        f = newf;
        newf = oldf + f;
        ++i;
}
```

Oldf	*f*	*newf*	*i*	$i \leq k$
-	*1*	*1*	*2*	*true*
1	*1*	*2*	*3*	*true*
1	*2*	*3*	*4*	*true*
2	*3*	*5*	*5*	*false*

Perubahan Nilai Variabel pada Loop

- The while loop for computing the Fibonacci number can be re-written using a for loop.

The while loop version

```
i = 2;
while (i <= k)  {
        oldf = f;
        f = newf;
        newf = oldf + f;
        ++i;
}
```

The for loop version

```
for  (i = 2;  i <= k;  ++i)  {
        oldf = f;
        f = newf;
        newf = oldf + f;
}
```

Tugas 1

Buat program berikut sehingga dapat menginput data secara berulang kali dengan Input sbb:

Tampilan Program Pd Saat di jalankan :

Data ke - 1
Input kode barang =
input Jenis Barang =
input Jumlah beli =

Output :
DATA PEMBELIAN BARANG
Kode barang ……..nama barang ……
harga barang = ……..
jumlah beli =……
jumlah bayar=…….
diskon =……
total bayar = ……..

Tampilan Program Pd Saat di jalankan :

Data ke - 2
Input kode barang =
input Jenis Barang =
input Jumlah beli =

Output :
DATA PEMBELIAN BARANG
Kode barang ……..nama barang ……
harga barang = ……..
jumlah beli =……
jumlah bayar=…….
diskon =……
total bayar = ……..

Ketentuan Tugas

1. Nama Barang dan Harga Diperoleh dari Jenis Barang dengan menggunakan 2 instruksi : If .. Else dan switch

Jenis Barang	Nama Barang	Harga Barang
A	Baju Kemeja	50000
B	Celana Panjang	70000
C	Topi	80000
D	Sepatu	100000

2. Diskon akan diberikan sebesar 10 % dari jumlah bayar jika jumlah pembelian lebih besar dari 5 jika tidak diskon = 0

3. Jumlah bayar = harga barang * jumlahbeli

4. Total bayar = jumlah bayar - diskon

Ketentuan Tugas

Agar program dapat di input berulang kali maka gunakan ketiga bentuk looping for , while dan do while

File program :

NamaAndaForIf.java
NamaAndaForSwitch.java

NamaAndaWhileIf.java
NamaAndaWhileSwitch.java

NamaAndaDoWhileIf.java
NamaAndaDowhileSwitch.java