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ETS AIPRO 2 ULANG

① Nilai apa yang di return serta big O

```
function mystery(n)
 r:=0
 for i:=1 to n-1 do
    for j:=i+1 to n do
      for k:=1 to j do
         r:=r+1
return (r)
```

Nilai direturn adalah r dimana r = T(n) maka

$$r = T(n) = \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \sum_{k=1}^{j} 1$$

$$= \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} j$$

$$= \sum_{i=1}^{n-1} (i+1)(i+2) \dots (n)$$

$$= \sum_{i=1}^{n-1} ((1+2+\dots+n) - (1+2+3+\dots+i))$$

$$= \sum_{i=1}^{n-1} \left[\frac{1}{2} n(n+1) - \frac{1}{2} i(i+1) \right]$$

$$= \sum_{i=1}^{n-1} \frac{1}{2} n(n+1) - \sum_{i=1}^{n-1} \frac{1}{2} i(i+1)$$

$$= \frac{1}{2}(n-1)n(n+1) - \sum_{i=1}^{n-1} \frac{1}{2} i^2 + \frac{1}{2} i$$

$$= \frac{1}{2}(n-1)n(n+1) - \left[\sum_{i=1}^{n-1} \frac{1}{2} i^2 + \sum_{i=1}^{n-1} \frac{1}{2} i \right]$$

$$= \frac{(n-1)n(n+1)}{2} - \frac{(n-1)n(2n-1)}{12} - \frac{(n-1)n}{4}$$

$$\boxed{T(n) = \frac{1}{3}(n^3 - n) \leq O(n^3)}$$

∴ nilai yang direturn adalah $\frac{1}{3}(n3-n)$ dengan $O\varepsilon(n^3)$

④. Lengkapi program

a) Insertion sort

```
10. in current = arr[i]
12. if (current > largest 1) {
16. } else if (current > largest 2 && current
      != largest 1) {
19 } else if (current > largest 3 && current <
   largest 2) {
```

b) Selection sort

```
13) if (arr[i] > arr[ largest Index 1)
14) largest Index = j;
15) if (arr [largest Index] > largest 1) {
22) } else if (arr[ Largest Index]) > largest 2
       && arr [ largest Index] != largest 1;
25) } else if (arr [largest Index] > largest 3
       && arr[largest index] < largest 2) {
```

2. Konstruksi algoritma untuk mencari jarak terdekat antara 2 elemen array bilangan :

```
public static int MinDistance(int[] A){
    // inisialisasi min dengan selisih elemen pertama dan kedua
    int min = Math.abs(A[0] - A[1]); //Math.abs() adalah nilai absolut dari suatu bilangan
    for(int i = 0; i < A.length; i++){
        for(int j = i+1; j < A.length; j++){
            if(Math.abs(A[i] - A[j]) < min){ //Apabila selisih elemen i dan j lebih kecil dari min
                min = Math.abs(A[i] - A[j]); //Maka min diisi dengan selisih elemen i dan j
            }
        }
    }
    return min;
}
```

Langkah-langkah

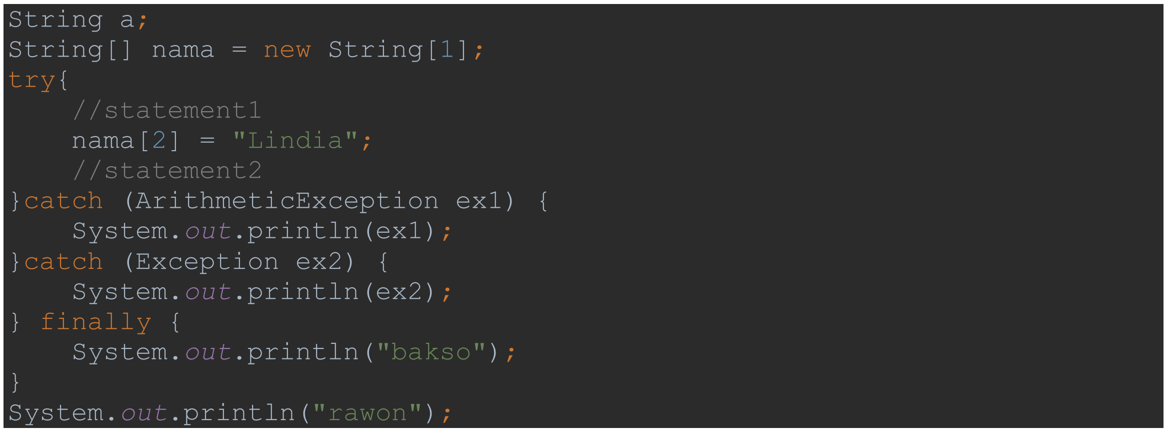
1. Inisialisasi variable int min dengan nilai awal jarak elemen indeks 0 dan 1
2. Lakukan perulangan untuk perbandingan jarak dengan indeks i = 0 sampai elemen terakhir, dibandingkan dengan min, apabila lebih kecil dari min, maka replace min dengan jarak
3. Lakukan perulangan hingga selesai

3. Buatlah coding dengan menggunakan algoritma binary search untuk mendapat nilai pembulatan dan akar bilangan bulat antara 0 sampai 0. Gunakan method int Findsqrt(int n) untuk menampilkan output

```
public static int findsqrt(int n){
    if (n == 0 || n == 1) {
        return n;
    }
    int start = 0, end = n, ans = 0;
    while (start <= end) {
        int mid = (start + end) / 2;
        if (mid * mid == n) {
            return mid;
        }
        if (mid * mid < n) {
            start = mid + 1;
            ans = mid;
        } else {
            end = mid - 1;
        }
    }
    return ans;
}
```

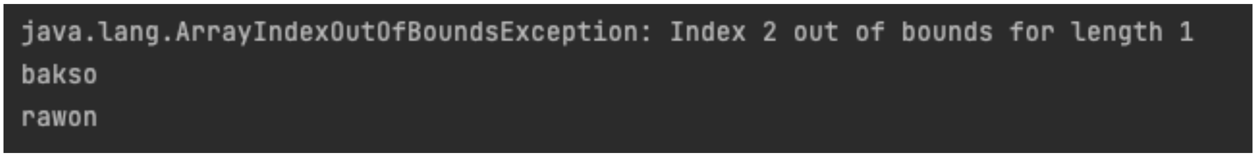
5. Apa output dari program ?

a) Jika statement1 benar dan statement2 benar



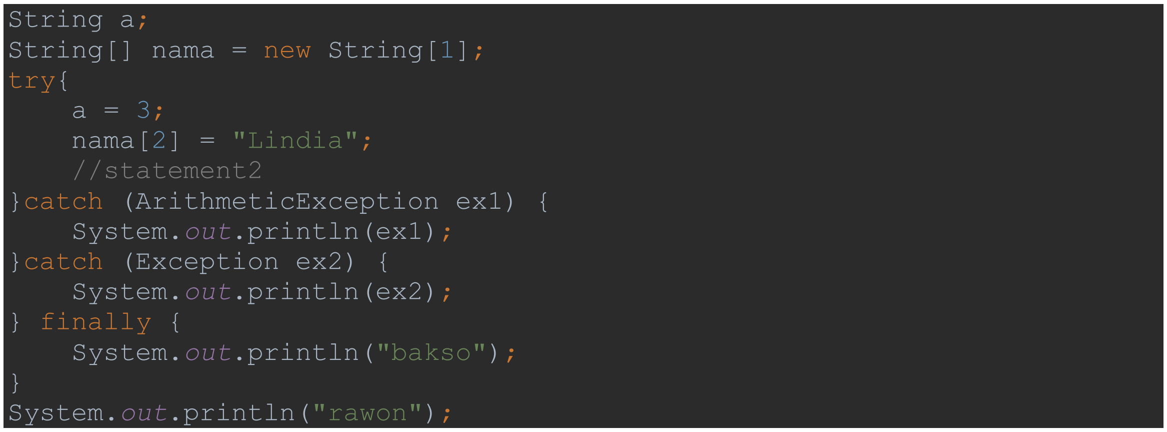
```
String a;
String[] nama = new String[1];
try{
    //statement1
    nama[2] = "Lindia";
    //statement2
}catch (ArithmeticException ex1) {
    System.out.println(ex1);
}catch (Exception ex2) {
    System.out.println(ex2);
} finally {
    System.out.println("bakso");
}
System.out.println("rawon");
```

Output :



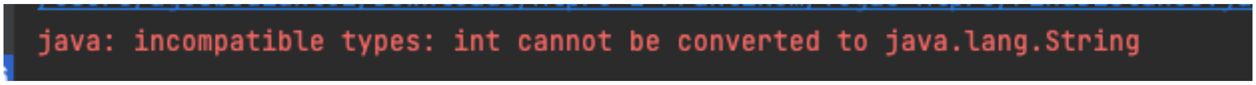
```
java.lang.ArrayIndexOutOfBoundsException: Index 2 out of bounds for length 1
bakso
rawon
```

b) Jika statement1 adalah a=3 dan statement2 benar



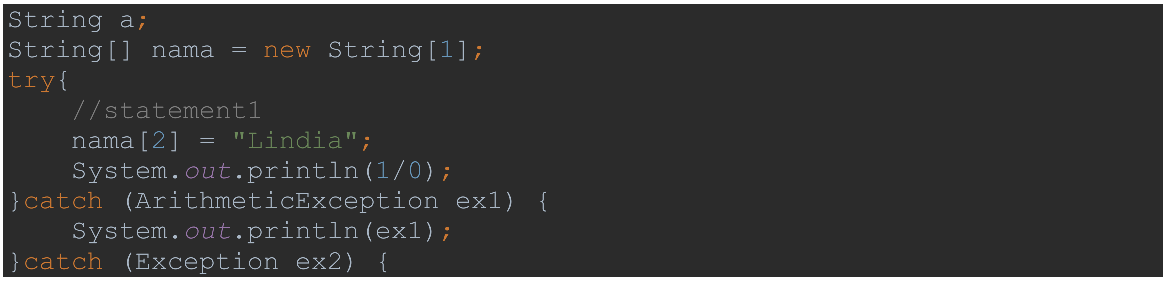
```
String a;
String[] nama = new String[1];
try{
    a = 3;
    nama[2] = "Lindia";
    //statement2
}catch (ArithmeticException ex1) {
    System.out.println(ex1);
}catch (Exception ex2) {
    System.out.println(ex2);
} finally {
    System.out.println("bakso");
}
System.out.println("rawon");
```

Output :

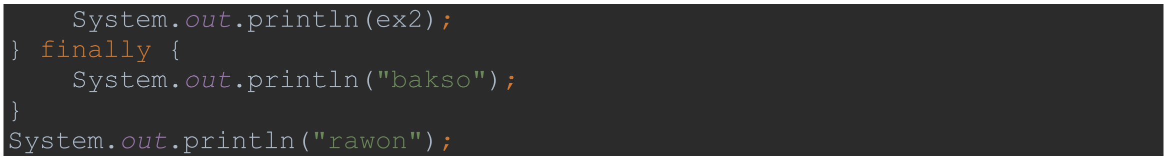


```
java: incompatible types: int cannot be converted to java.lang.String
```

c) Jika statement1 benar, dan statement2 adalah sout(1/0);

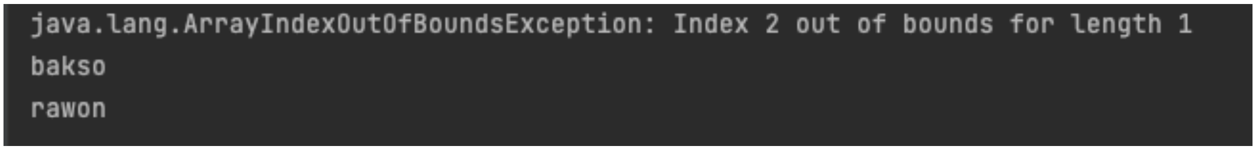


```
String a;
String[] nama = new String[1];
try{
    //statement1
    nama[2] = "Lindia";
    System.out.println(1/0);
}catch (ArithmeticException ex1) {
    System.out.println(ex1);
}catch (Exception ex2) {
```



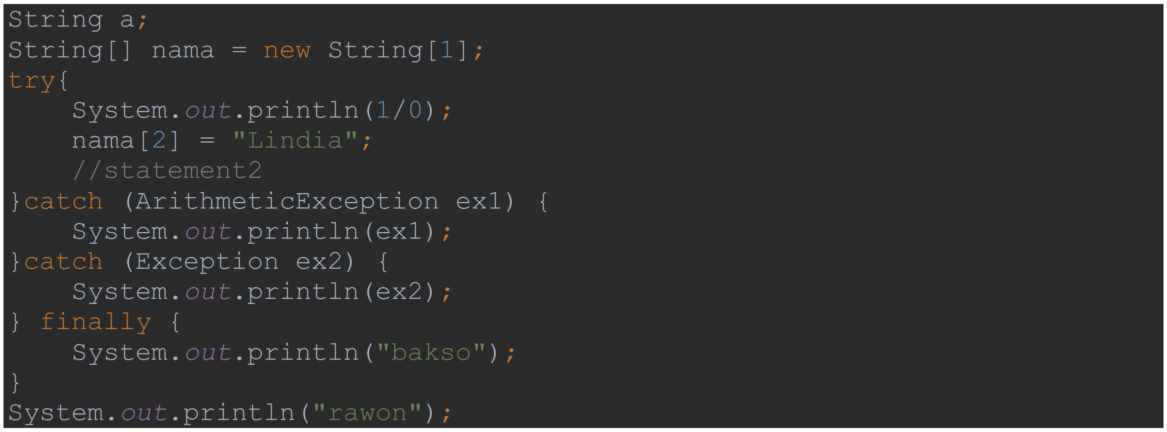
```
    System.out.println(ex2);
} finally {
    System.out.println("bakso");
}
System.out.println("rawon");
```

Output :



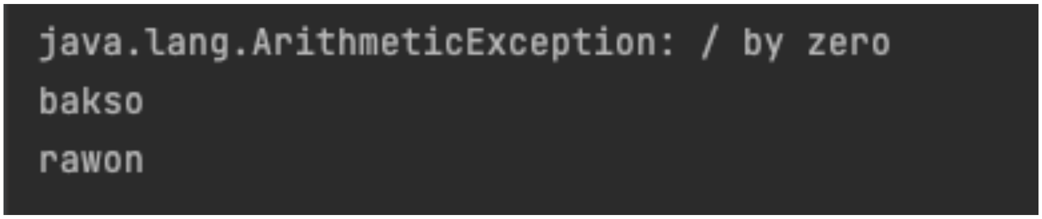
```
java.lang.ArrayIndexOutOfBoundsException: Index 2 out of bounds for length 1
bakso
rawon
```

d) Jika statement1 diganti sout(1/0) dan statement2 benar



```
String a;
String[] nama = new String[1];
try{
    System.out.println(1/0);
    nama[2] = "Lindia";
    //statement2
}catch (ArithmeticException ex1) {
    System.out.println(ex1);
}catch (Exception ex2) {
    System.out.println(ex2);
} finally {
    System.out.println("bakso");
}
System.out.println("rawon");
```

Output :



```
java.lang.ArithmeticException: / by zero
bakso
rawon
```