



IT Fundamentals

Programming Basics

- › Problem çözme
- › Computational Thinking
 - › Decomposition
 - › Pattern Recognition
 - › Abstraction
 - › Algorithm
 - › Flowchart
 - › Pseudo Code



Computational Thinking





Computational Thinking

Decomposition

Pattern Recognition

Abstraction

Algorithm

Böl, Parçala, Çöz

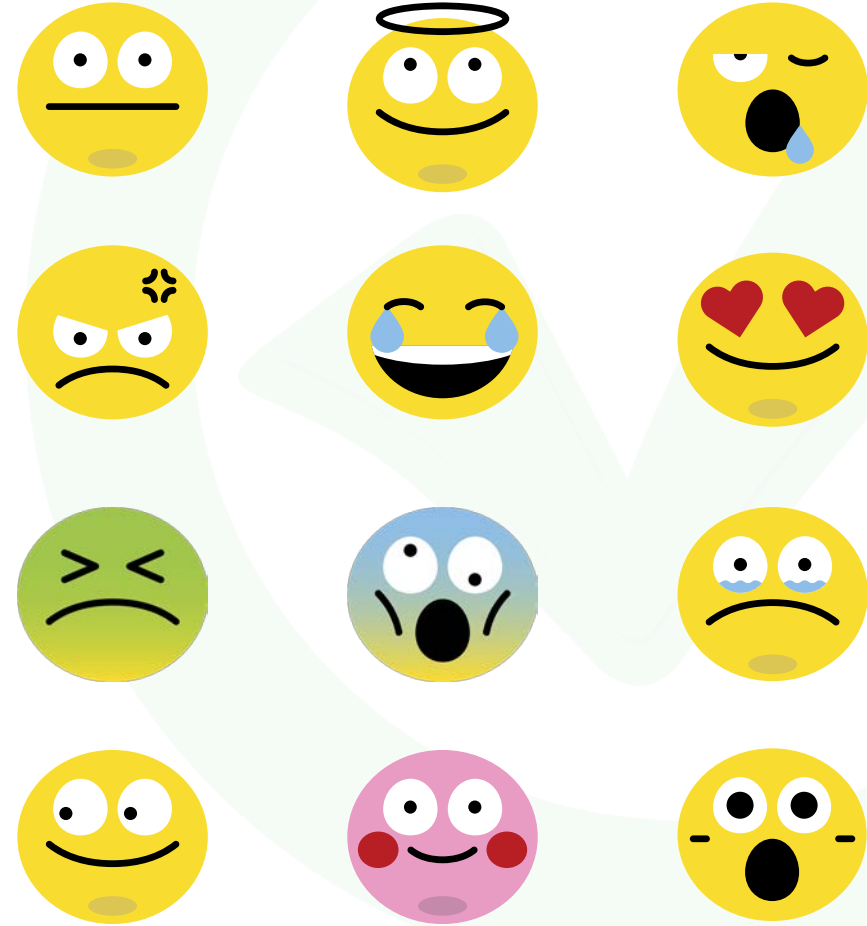




Decomposition

PRACTISE

- Yüz, göz ve ağız tipleri belirlenebilen emoji yapılmak isteniyor. Bu proje için decomposition yapınız.



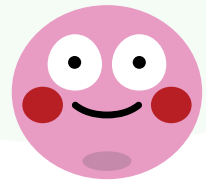


Decomposition

AĞIZLAR

GÖZLER

YÜZLER





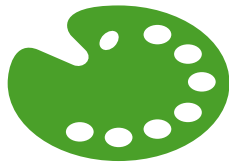
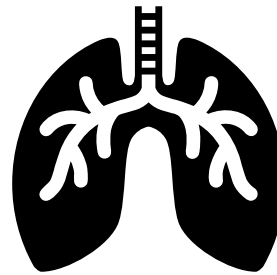
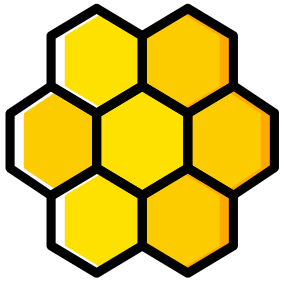
Computational Thinking

Decomposition

Pattern Recognition

Abstraction

Algorithm

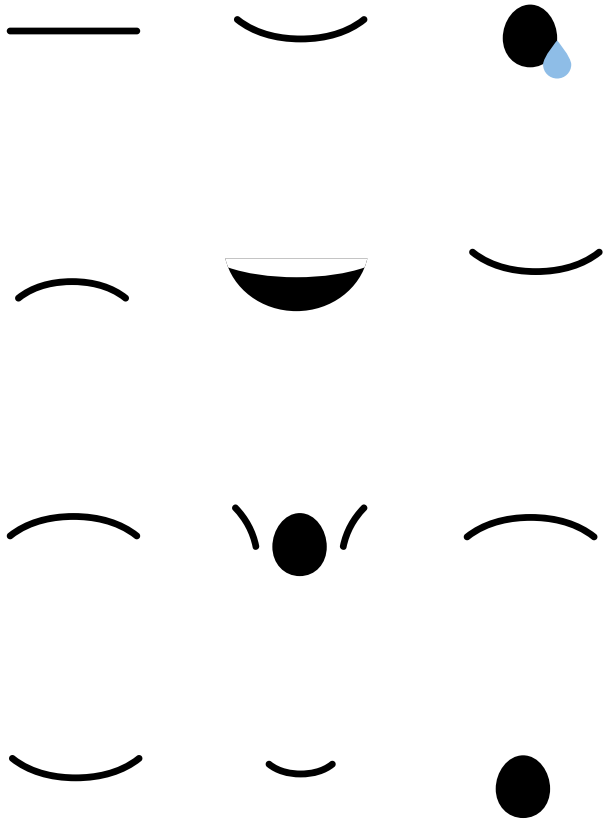




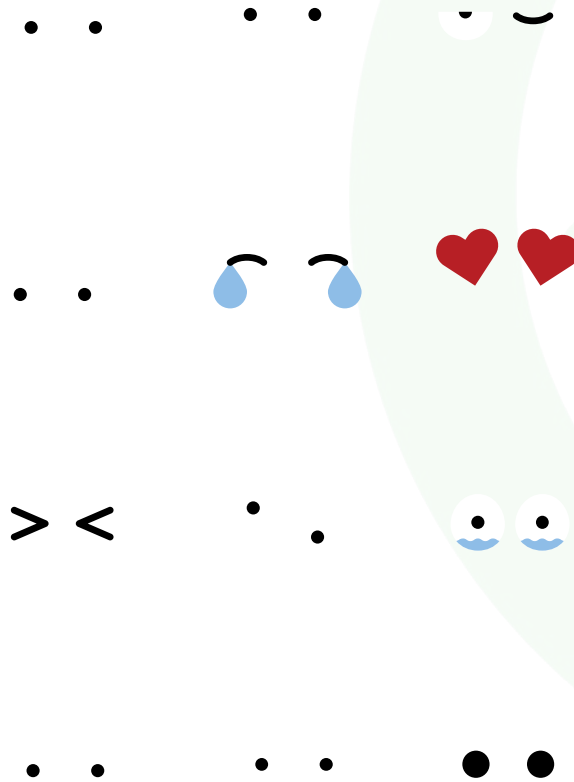
Pattern Recognition

PRACTISE

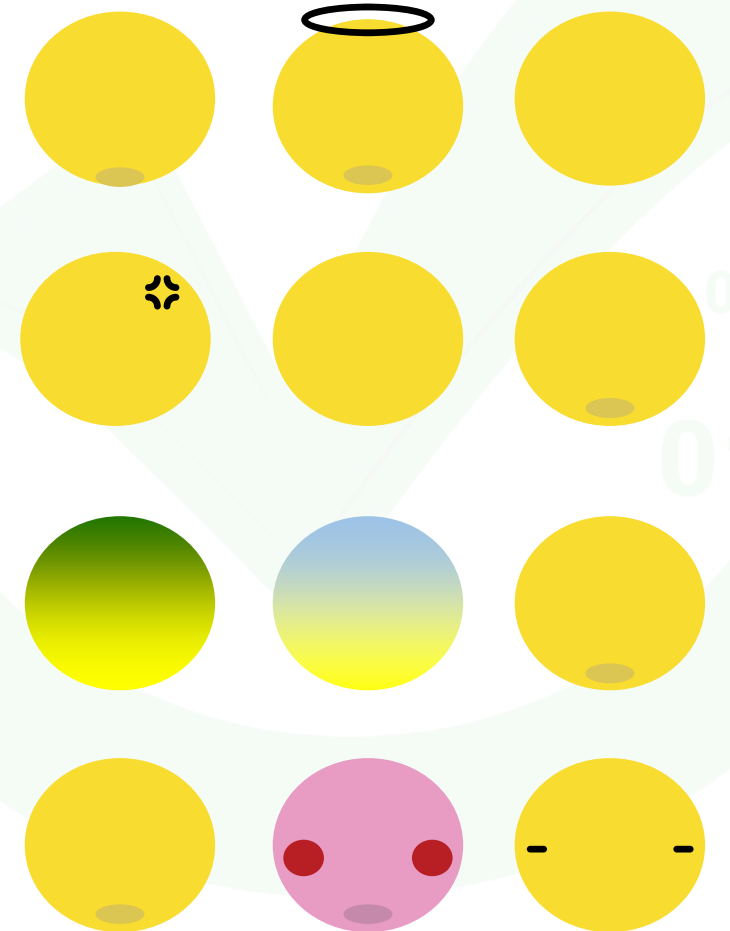
AĞIZLAR



GÖZLER



YÜZLER





Computational Thinking

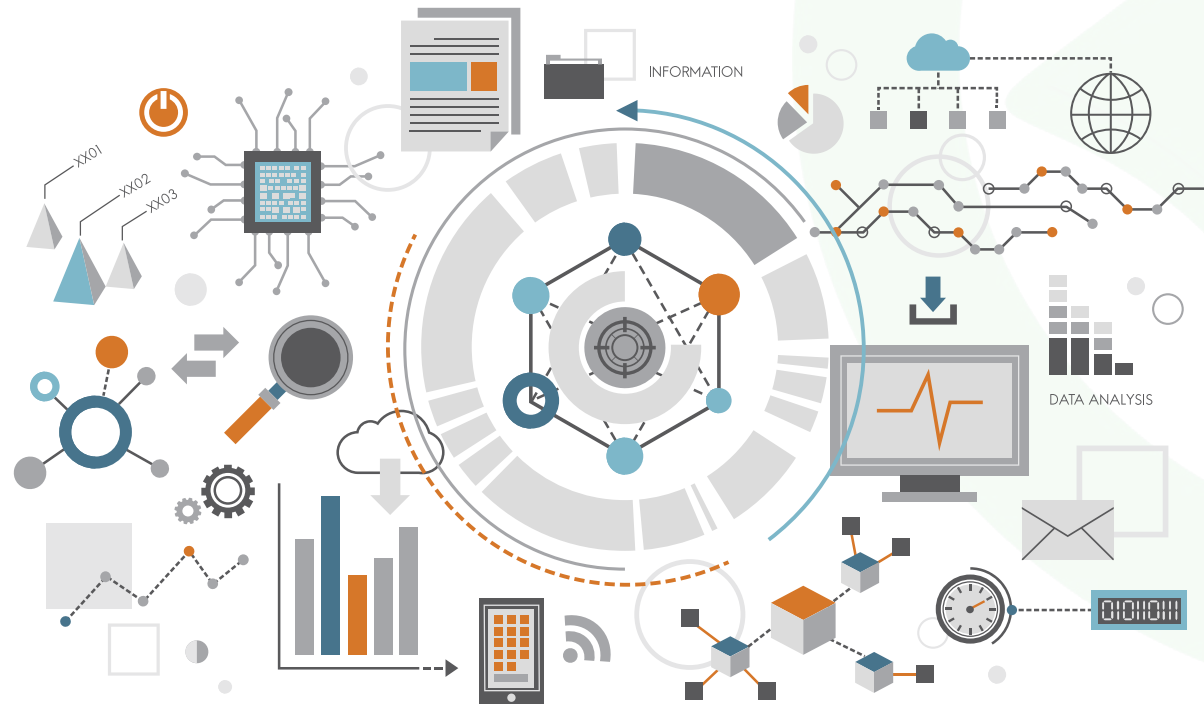
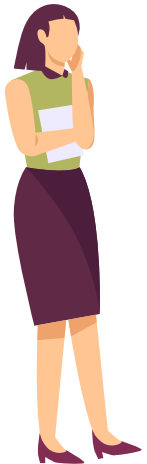
Decomposition

Pattern Recognition

Abstraction

Algorithm

«Look at the big picture»





Abstraction

PRACTISE

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CT Videos

- <https://www.youtube.com/watch?v=mUXo-S7gzds>



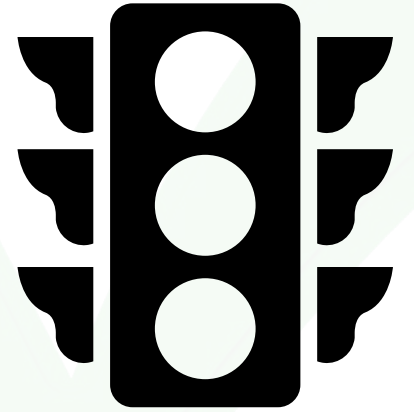
- https://www.youtube.com/watch?v=_TWsmF8l418
- <https://www.youtube.com/watch?v=91utNt5qshE>



Computational Thinking

PRACTISE

Kırmızı ışıkta geçen araçları tespit edip plakasına ceza kaydı oluşturacak bir sistem yapılacaktır. Bu problemi computational thinking kullanarak çözüyoruz.





Computational Thinking

Decomposition

Pattern Recognition

Abstraction

Algorithm

Input

Algorithm

Output





Programlamanın Temelleri

Küçük bir çocuğa ortam sıcak olduğunda klimayı açmasını nasıl anlatabiliriz ?

- Ortamın sıcak olduğunu düşündüğünde eline klima kumandasını al.
- Klima kumandasındaki büyük kırmızı düğmeyi bul.
- Kırmızı düğmeye 1 kez bas.
- Sorun yaşarsan bir büyüğünden yardım iste.

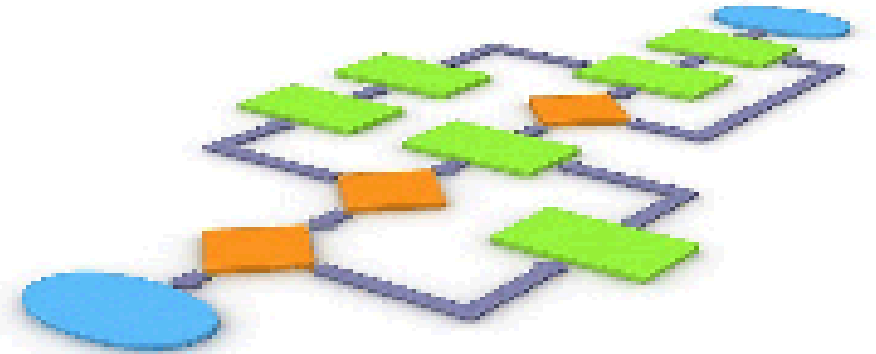




Programlamanın Temelleri

Peki bu görevi bir programa yüklersek nasıl olurdu ?

- › Ortam sıcaklığını ölç.
- › Sıcaklık 27 derecenin üstünde ise klimayı çalıştırır.
- › Ortam sıcaklığını 15 dakikada bir ölç ve gerektiğinde tekrar çalıştır.





Programlamanın Temelleri

Algoritma nedir ?



Algoritmanın faydası nedir ?



Programlamanın mantığı





Algoritma

PRACTISE

El yıkama
algoritmasını
yazınız





*Algoritma

PRACTISE

4 kişilik
makarna
pişirme
programının
algoritmasını
yazınız.





*Algoritma

PRACTISE

2 sayının
toplamını bulan
programın
algoritmasını
yazınız.





*Algoritma

PRACTISE

3 sayının
ortalamasını
bulan
programın
algoritmasını
yazınız.





Pseudo code

A rectangular image with a dark background, showing blurred lines of code in various colors (blue, green, red). A semi-transparent grey horizontal bar is centered across the image, containing the word 'PSEUDOCODE' in white, bold, uppercase letters.

PSEUDOCODE

- Algoritmaların, herhangi bir dile bağımlı olmadan, programlama dillerine daha yakın ifadelerle yazılmasına pseudocode denir.



Pseudo code

Örnek: İki Sayının Toplamı Algoritması

29

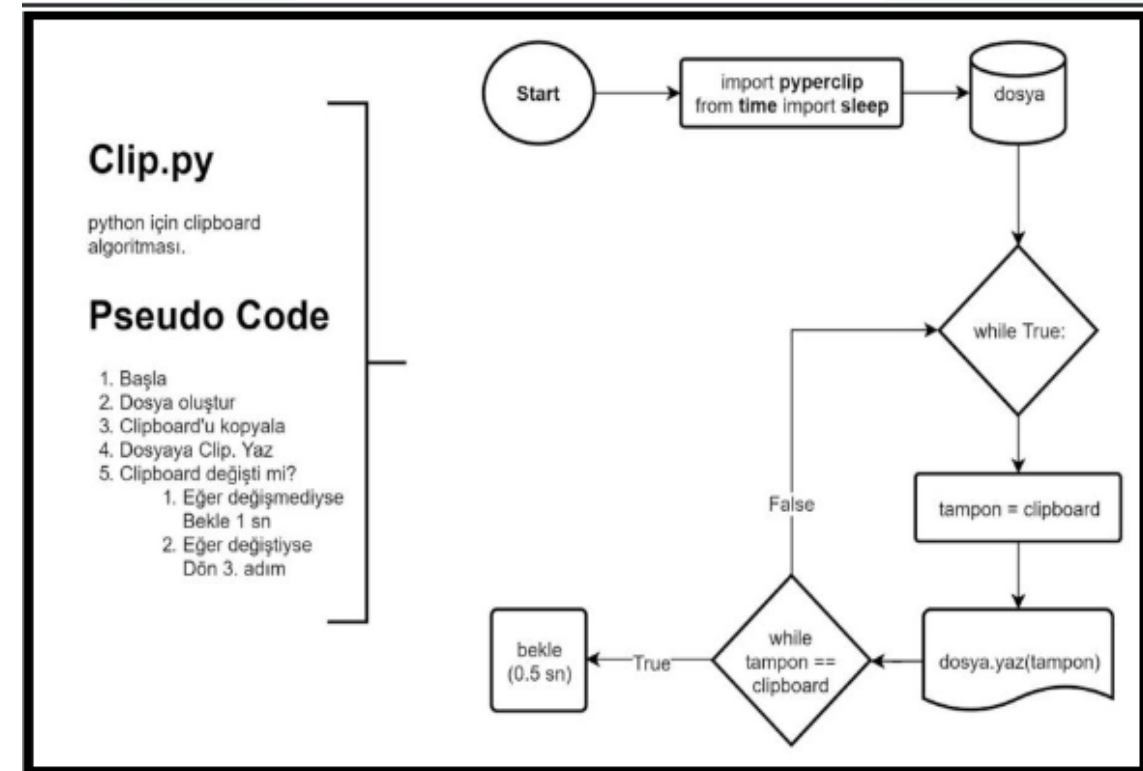
Düz Yazı

1. BAŞLA
2. Birinci sayıyı gir
3. İkinci sayıyı gir
4. İki sayıyı topla
5. Sayıların toplam değerini yaz
6. BİTİR

Sözde Kod

Toplam için T, birinci sayı için X, ikinci sayı için Y seç

1. BAŞLA
2. X değerini OKU
3. Y değerini OKU
4. $T = X + Y$
5. T değerini YAZ
6. BİTİR





Pseudo code

Komut	Açıklama
START	Pseudo kodun başladığını gösterir
DECLARE	Değişkenleri tanımlamak için kullanılır.
INPUT	Kullanıcıdan bilgi alındığında kullanılır
READ / GET	Bir dosyadan bilgi okunurken kullanılır
PRINT, DISPLAY, SHOW	Sonuç göstermek için kullanılır
SET, INIT	Değer atamak için kullanılır
IF, ELSE IF, ELSE	Karar yapılarında kullanılır
WHILE	Belli kod bloklarını tekrar ettirmek için kullanılır
END	Pseudo kodun bittiğini gösterir



*Pseudo code

Klavyeden girilen
iki sayının
ortalamasını alan
programın
algoritmasını
yazınız

ES

Komut	Açıklama
START	Pseudo kodun başladığınız gösterir
DECLARE	Değişkenleri tanımlamak için kullanılır.
INPUT	Kullanıcıdan bilgi alındığında kullanılır
READ / GET	Bir dosyadan bilgi okunurken kullanılır
PRINT, DISPLAY, SHOW	Sonuç göstermek için kullanılır
SET, INIT	Değer atamak için kullanılır
IF, ELSE IF, ELSE	Karar yapılarında kullanılır
WHILE	Belli kod bloklarını tekrar ettirmek için kullanılır
END	Pseudo kodun bittiğini gösterir



*Pseudo code

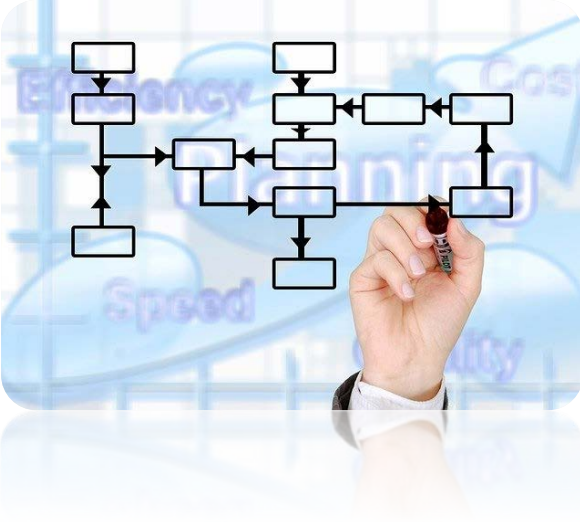
Kenar ve yüksekliği
klavyeden girilen
üçgenin alanını
hesaplayan
programın
algoritmasını

Yazınız

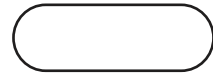
Komut	Açıklama
START	Pseudo kodun başladığını gösterir
DECLARE	Değişkenleri tanımlamak için kullanılır.
INPUT	Kullanıcıdan bilgi alındığında kullanılır
READ / GET	Bir dosyadan bilgi okunurken kullanılır
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IF, ELSE IF, ELSE	Karar yapılarında kullanılır
WHILE	Belli kod bloklarını tekrar ettirmek için kullanılır
END	Pseudo kodun bittiğini gösterir



Flowchart



➤ Pseudocode un şekillerle gösterilmesidir



Başlama ve bitirme



Değer atama ve aritmetik işlemler



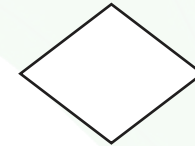
Veri giriş



Fonksiyon



Döngü



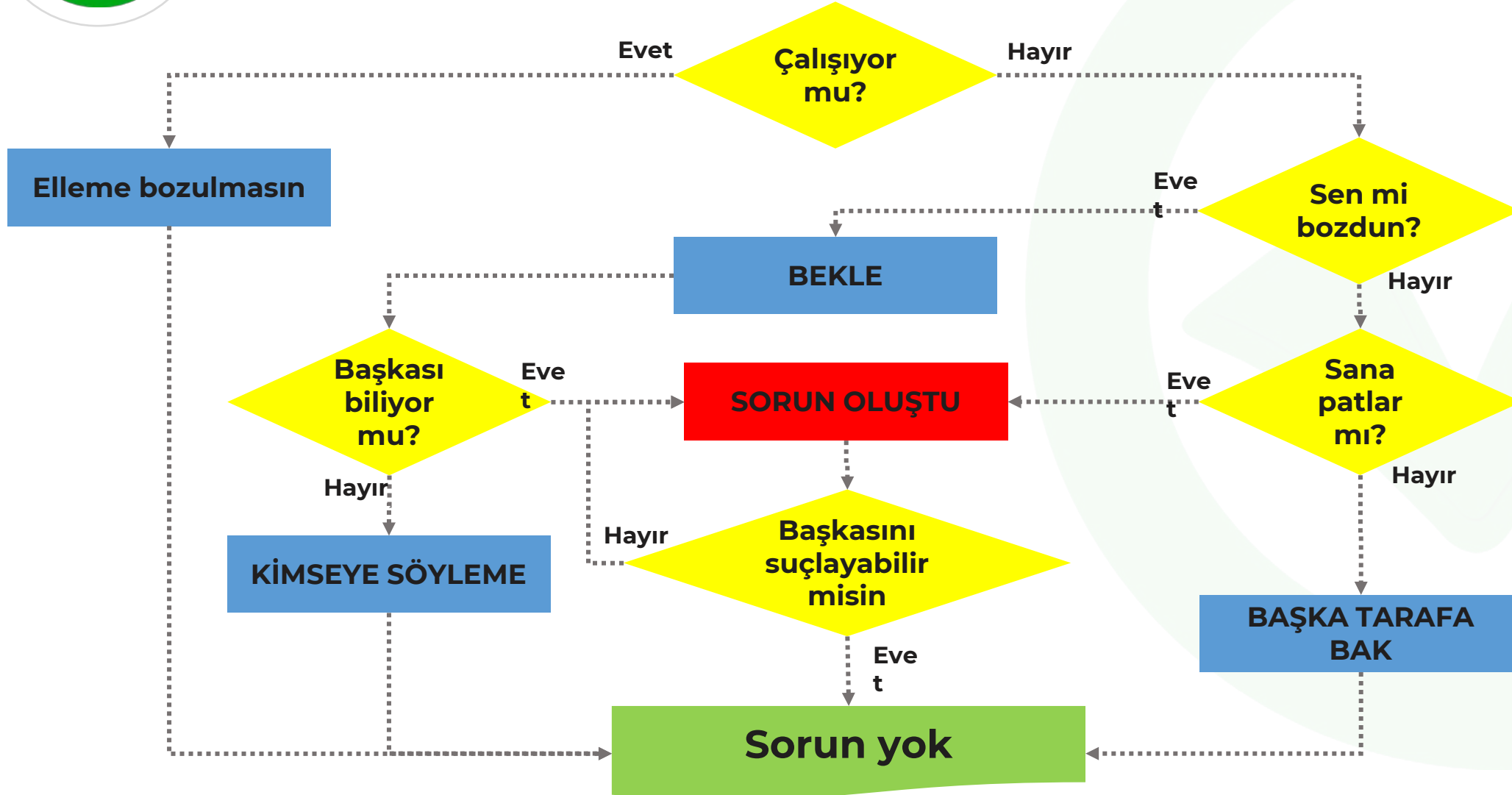
Karar verme



Çıktı



Flowchart



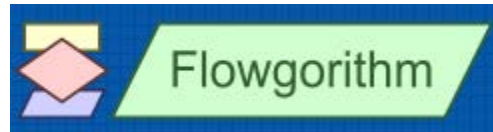


Flowchart



Download & Install

- › Flowchart oluşturmak için aşağıdaki uygulamayı indirip bilgisayarınıza kurunuz



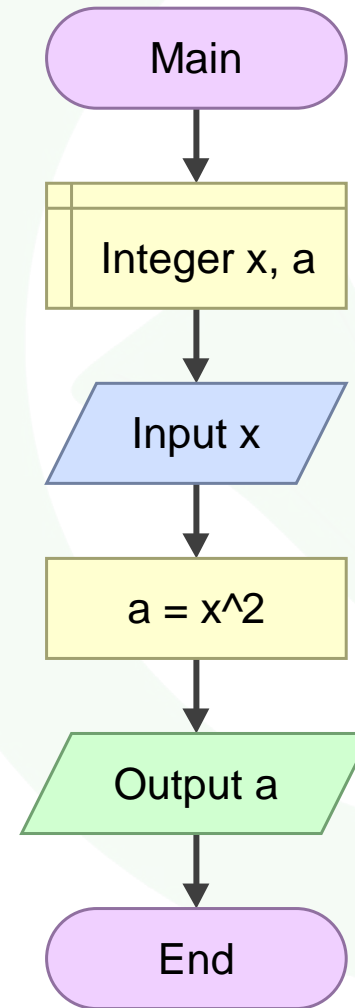
<http://www.flowgorithm.org>



*Flowchart

PRACTISE

Kenar uzunluğu
klavyeden
girilen karenin
alanını bulan ve
sonucu
gösteren
programın
flowchart
tasarımını
yapınız





Nasıl Kod yazacağız ?



IDE



Dil
Öğren



Console

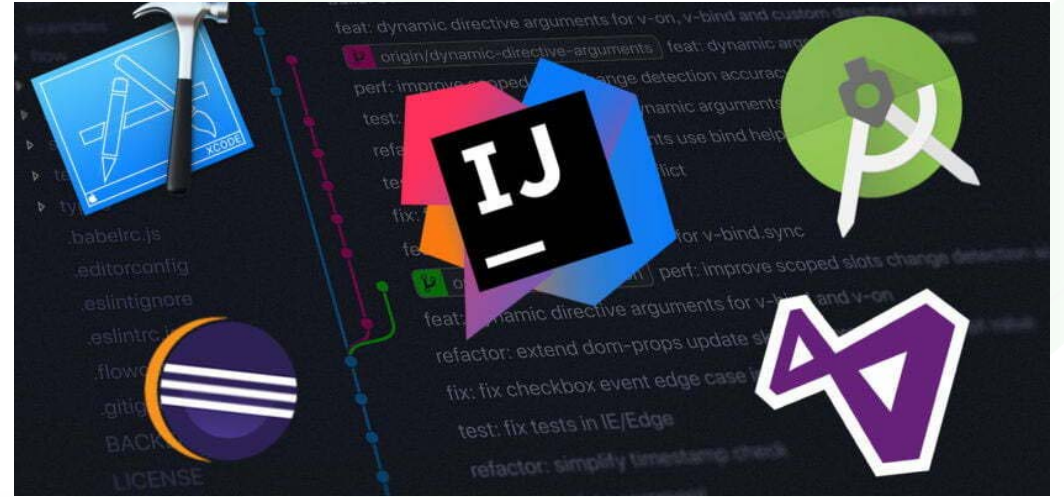
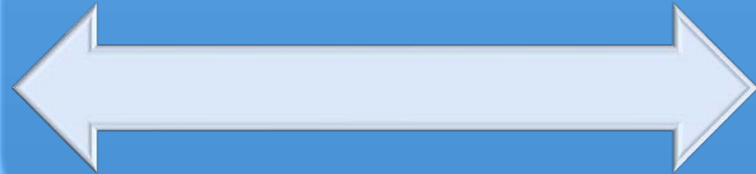




Nasıl Kod yazacağız ?



IDE



```
Blink | Arduino 1.8.5

Blink §

This example code is in the public domain.

http://www.arduino.cc/en/Tutorial/Blink

*/

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000); // wait for a second
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
  delay(1000); // wait for a second
}
```

```
$n = 1;
$NCategories = (int)sizeof($categories);
foreach ($categories AS $category)
{
  $edit = '<a href="'. $urlBase. 'id_category="'. $category. '>';
  $fullPath .= $edit;
  ($n < $NCategories ? '<a href="'. $urlBase. 'id_category="'. $category. '>';
  (!empty($highlight) ? str_replace($highlight, 'highlighted', $fullPath);
  ($n < $NCategories ? '</a>';
  (($n++ != $NCategories OR !empty($path)) ? '<br>' : '' );
}
```



Nasıl Kod yazacağız ?



Dil Öğren



```
int variable = 3;
```

Java

```
x = 3
```

Python

```
var x = 3
```

JavaScript

```
it variable = 3;
```

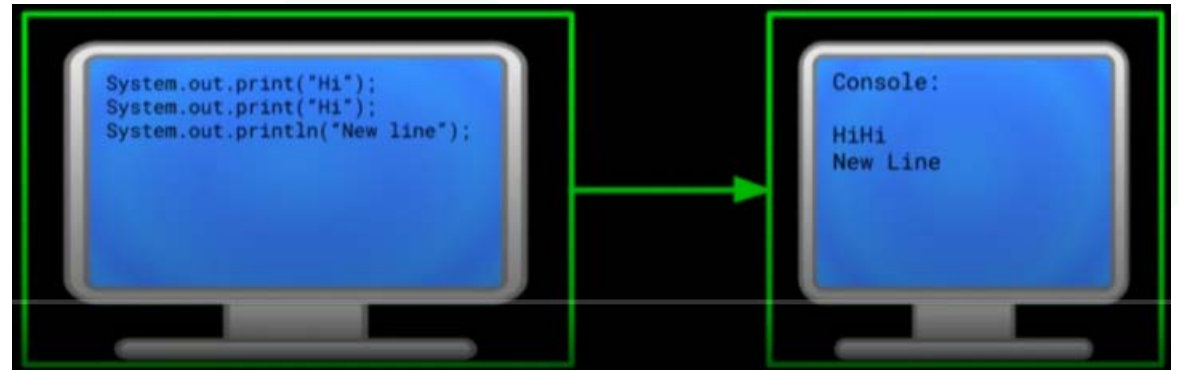
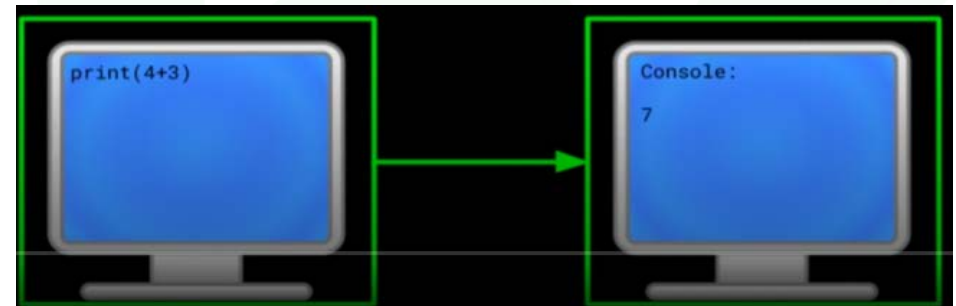
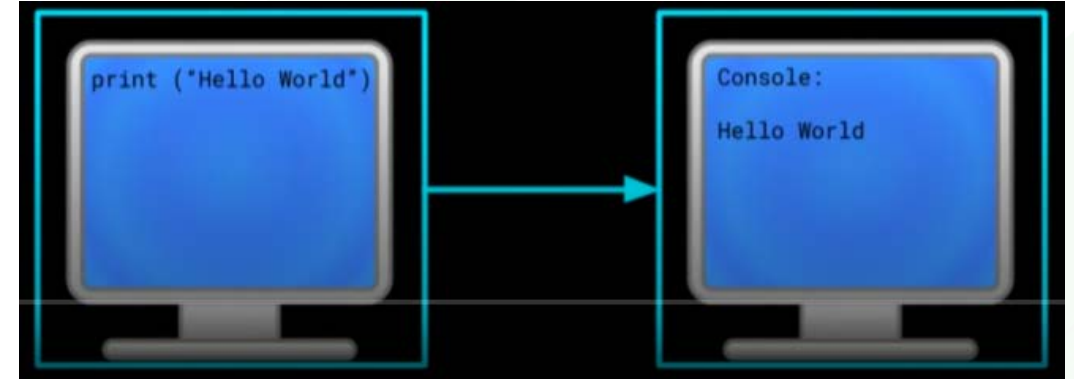
- Usually underlined in red like above



Nasıl Kod yazacağız ?



Console





Bilgisayar ne yapabilir o zaman?

➤ Mathematics

➤ Modulus

- When we take **10 modulus 3**...
 - We essentially tell the computer to divide 10 by 3, **ignore the answer**, and give us the remainder -> 1

```
print(10 % 3)
```

Console:

1

- In the case where there **isn't a remainder**...
 - The computer will simply print/return **0**

```
print(50 % 2)
```

Console:

0



Bilgisayar ne yapabilir o zaman?

► Tek-Çift Sayılar

► Strings

- This is extremely useful when determining if a number is **even or odd**
 - If a number modulo 2 is 0 -> The number is **even**
 - If a number modulo 2 is 1 -> The number is **odd**

EVEN Numbers:
Number % 2

|
V

0

EVEN

Even

Numbers ending in

0 2 4 6 8

Odd

Numbers ending in

1 3 5 7 9

Odd Numbers:
Number % 2

|
V

1

Odd



Bilgisayar ne yapabilir o zaman?

➤ Concatenation

- 4 in quotation marks ("4") is treated as a **STRING**
- 4 without quotation marks (4) is treated as an **INTEGER**

4
Integer

≠

"4"
String

Using concatenation (Adding strings together)

```
print("Game over, " + 4 + " was your final score.")
```



Console: Game over, 4 was your final score.

```
print("Game over, + (4+4) + " was your final  
score.")
```



Console: Game over, 8 was your final score.



Variables (Değişkenler) nedir ?

- Variable nedir ?
- Neden Önemlidir ?

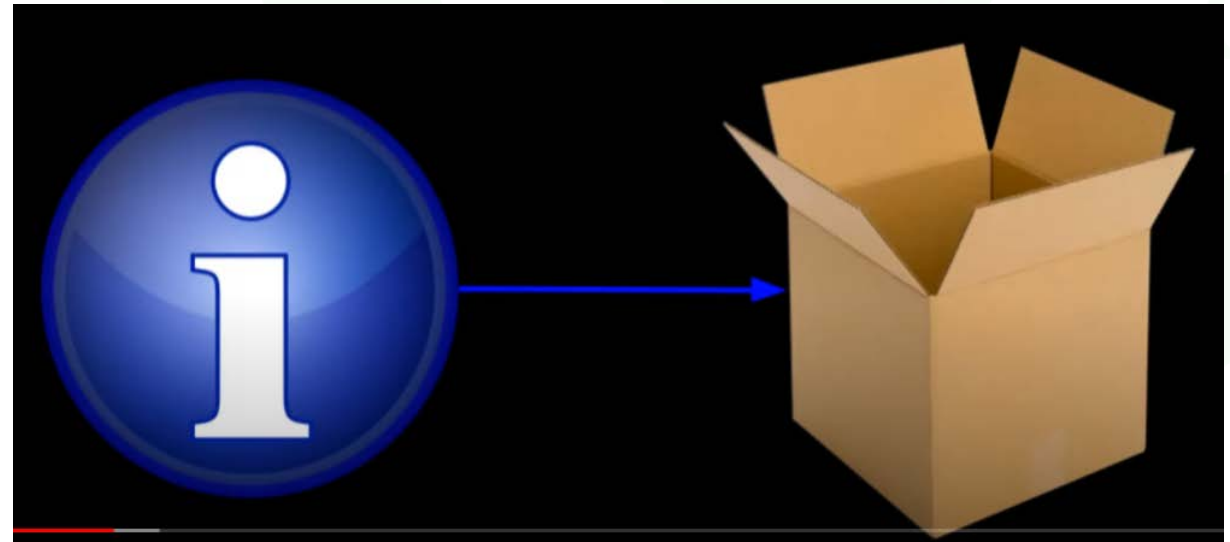
- Variables

- Something that can store information
 - Can be referenced and manipulated

"Bob"

true

35





Variables (Değişkenler) nedir ?

➤ Variable types

➤ Integer

- Many types of variables, but we will be focusing on **primitive type variables**
 - **Integers**, **booleans**, **floats**, **doubles**, **Strings**, and **Chars**

4

Integer

False

Boolean

π

Float

4.0

Double

"Hi"

String

"A"

Char's

- **Integer's**
 - A **variable** that can store and Integer value
 - -2,147,483,648 to 2,147,483,648
- **CAN'T** and **WILL NOT** hold any decimal values





Variables (Değişkenler) nedir ?

› Variable types

› Booleans

› Floats and Doubles

- Can store a value of either **true** or **false**
- Can **ONLY** hold true or false
 - No other types of information

True

False

- Both are types of **floating point data types**
 - Can store numbers with decimal places
- **Float Variables**
 - Can store up to 32 bits of information
- **Double Variables**
 - Can store up to 64 bits of information

```
3.1415926535897932384626433832795028841971693993751058209
749445923078164062862089986280348253421170679821480865132
823066470938446095505822317253594081284811174502841027019
385211055596446229489549303819644288109756659334461284756
482337867831652712019091456485669234603486104543266482133
```



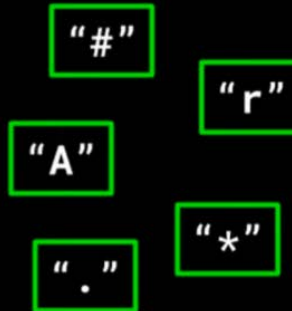
Variables (Değişkenler) nedir ?

› Variable types

› Strings

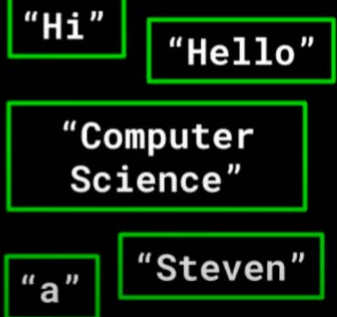
› Char Variable

- **Char** -> **Character**
- Each hold **one** character
- Useful when a programmer wants to read one button press of one character in a string without using a String variable
 - Example: Game controlled by keyboard



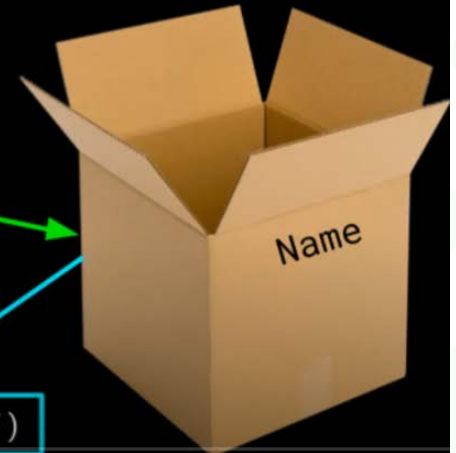
Tip: You can store char's in a String variable, but not Strings longer than 1 character in a char variable

- What we talked about before, except stored somewhere in a variable
- Useful for displaying text and storing **input information**
 - Information the user puts into our program
- Also useful for outputting information in a readable format for the user



- Prompt the user for their name
- Store the value inside of the "Name" variable

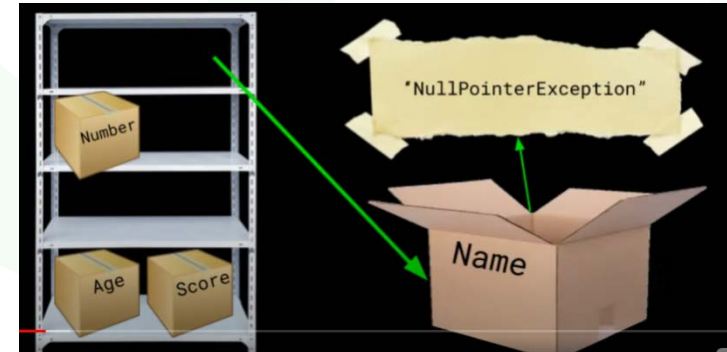
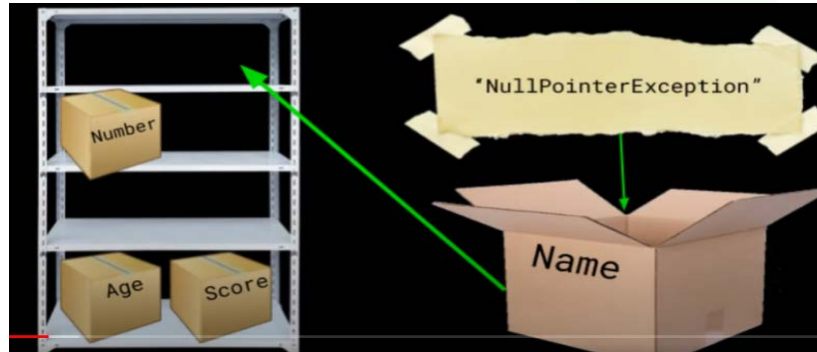
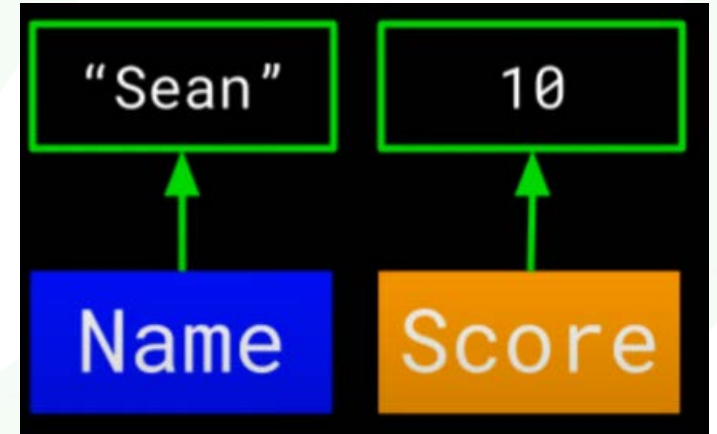
Print("Your name is " + name + ".")





Variables

- › Variable'lar neden kullanışlı..
- › Variable ları nasıl manipüle edebiliriz

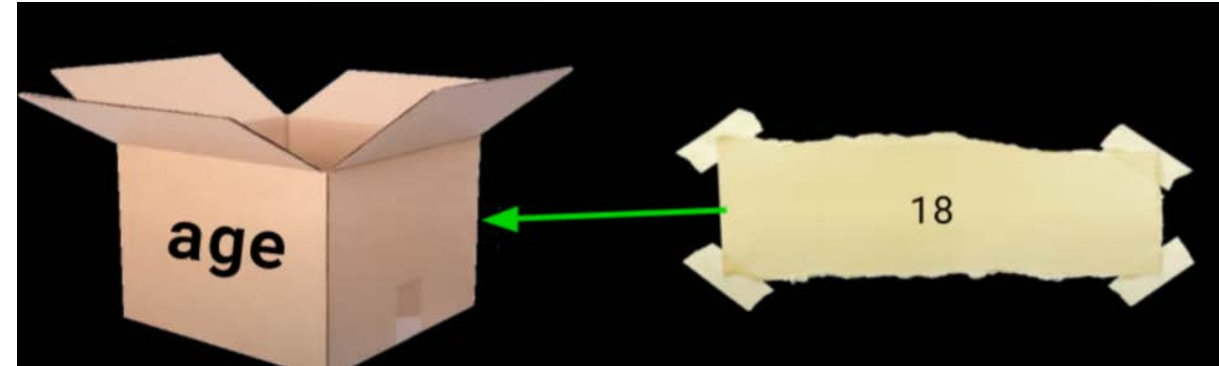




Variables

› Variable değişmek

› Yapabileceklerimiz



- Integer, Float, and double variables can be

- Added
- Subtracted
- Multiplied
- Divided
- Modulused

- String variables can be

- Added

- Char's and Boolean's **can't be operated on**

Num1 8	+	Num2 4	=	Num3 12
Num1 8	-	Num2 4	=	Num3 4
Num1 8	÷	Num2 4	=	Num3 2
Num1 8	×	Num2 4	=	Num3 32

- While you can't **subtract, multiply, divide, or modulo** strings, you are able to **add them...**

Str1
"Hello"



Str2
" There"



dualString
"Hello There"



Variables

▶ Variable isimlendirme

- There is **one big rule** when naming variables
 - They **MUST** be one continuous String
- Most programmers name variables according to **camelCase**
 - **Don't** capitalize the first word, but **capitalize** the first letter of all words after it

```
int player score = 20;
```

BAD



Conditional Statements

➤ Conditional Statements..

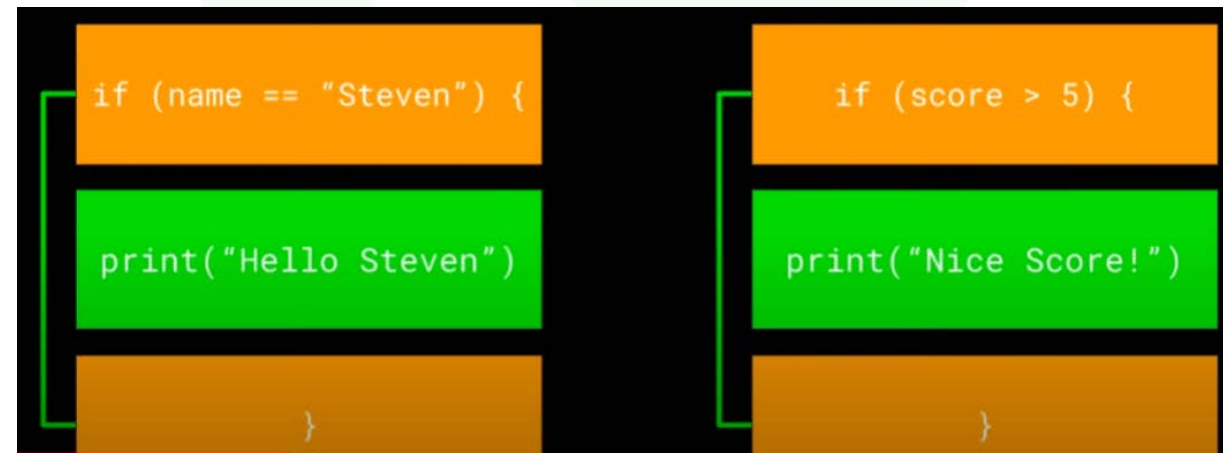
Koşullu İfadeler:

- Each condition is evaluated as a **boolean**
 - **True** or **False**

True

False

- The most basic conditional statement is the If Statement
 - If something is True, do this, otherwise do something else

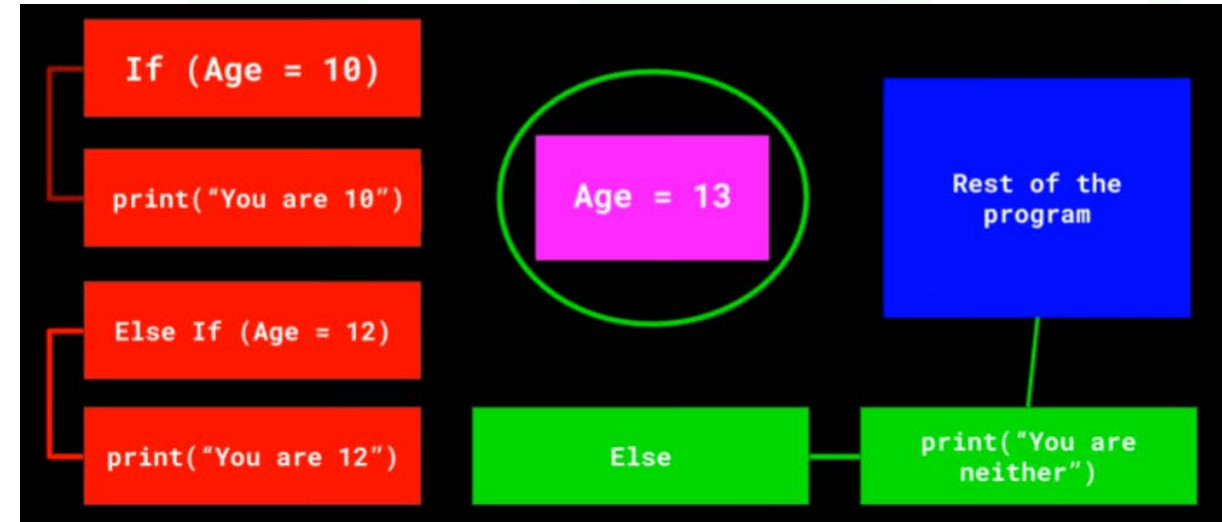
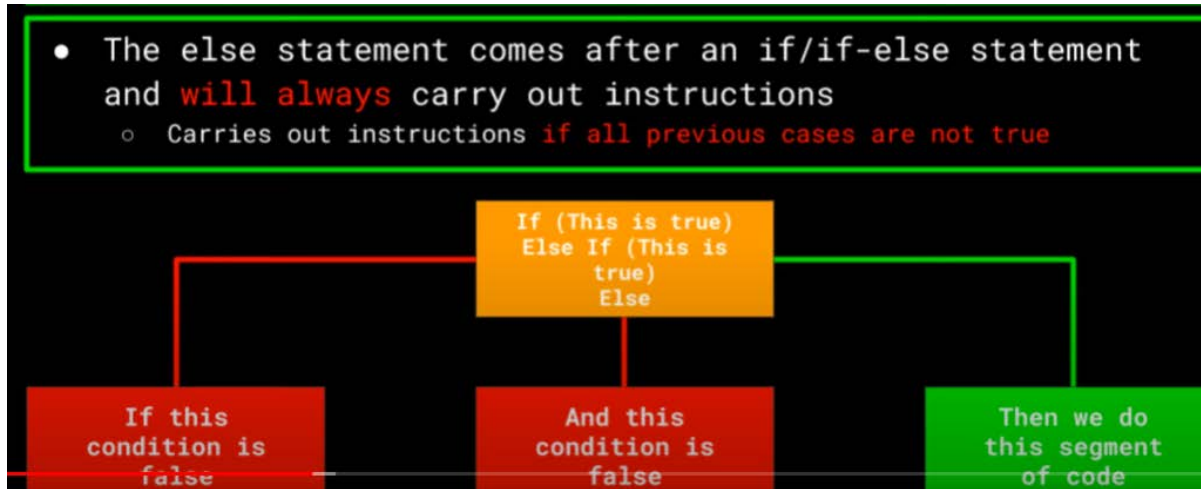
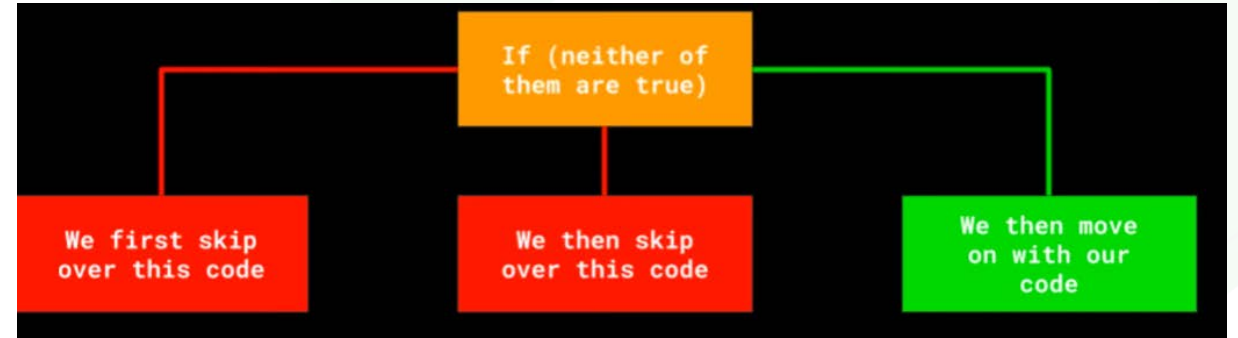




Conditional Statements

› Conditional Statements..

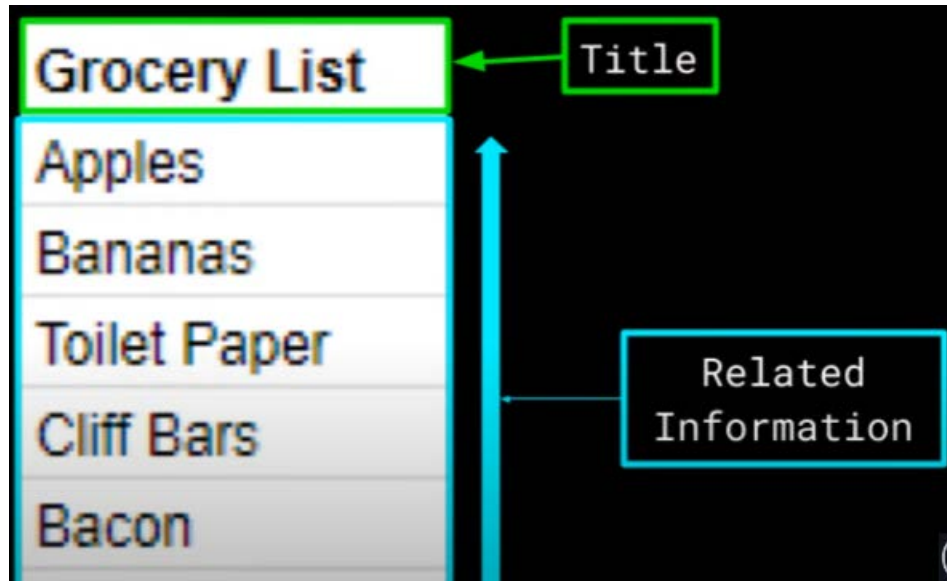
› Else If..





Arrays

► Array ler nedir ?



```
String groceryList =  
"EggsMilkButterPancakeMixBrown  
SugarCinamonMoreEggsMoreMilkMo  
reButter";
```

```
String groceryList =  
"EggsMilkButterPancakeMixBrown  
SugarCinamonMoreEggsMoreMilkMo  
reButter";
```



Arrays

► Array ler neden kullanılır ?

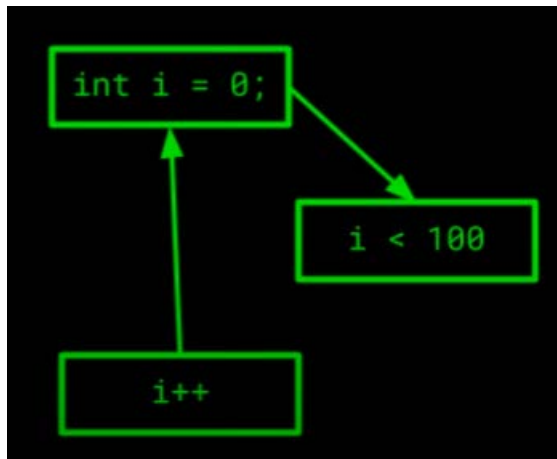
Numbers	1	2	3	4	5	6	7	8	9	10
Index	0	1	2	3	4	5	6	7	8	9

1,1 Position				
Index	0	1	2	3
0	Ayton	Alex	Arnold	Ashton
1	Bob	Ben	Bryan	Billy
2	Clint	Chris	Colton	Cal
3	David	Doug	Drew	Dan



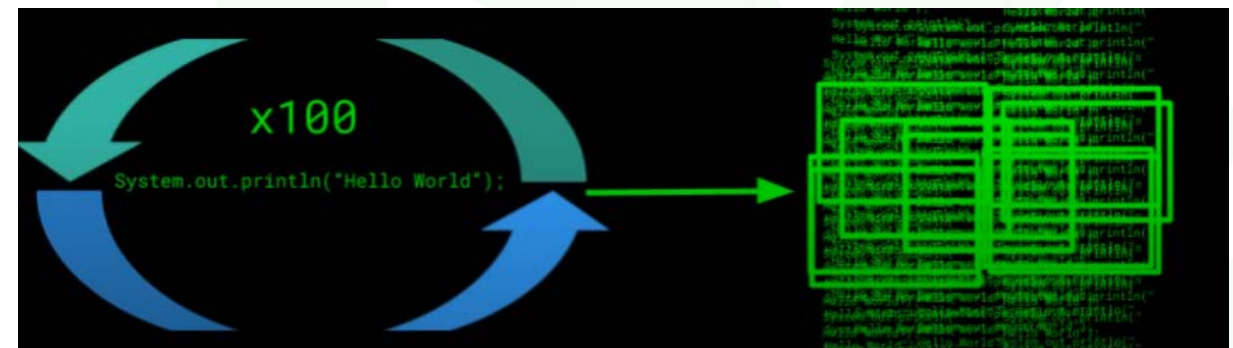
LOOP's.. Döngüler..

► For Loop (For Döngüsü)



```
System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
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System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
System.out.println("Hello World");
```



```
for(int i = 10; i > 0; i++) {
```

An integer starting at 10, and only increasing will never be less than 0



LOOP's.. Döngüler..

› While Loop

› Do-While Loop

```
while(x == 0)
```

```
while(x < 10)
```

```
while(score == highscore)
```

```
while (true) {
```

```
    playGame();
```

```
}
```





Errors..

› Error Nedir ?

› Syntax Error

› Runtime Error

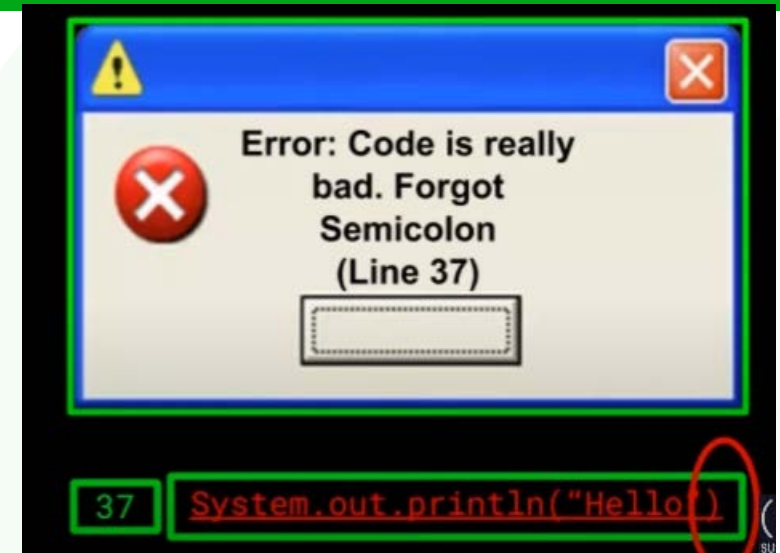
› Logic Error

```
System.out.println("Hello")  
int high Score = 10;  
String name = "NullPointerException";
```




Code Debug (Hata Ayıklama)

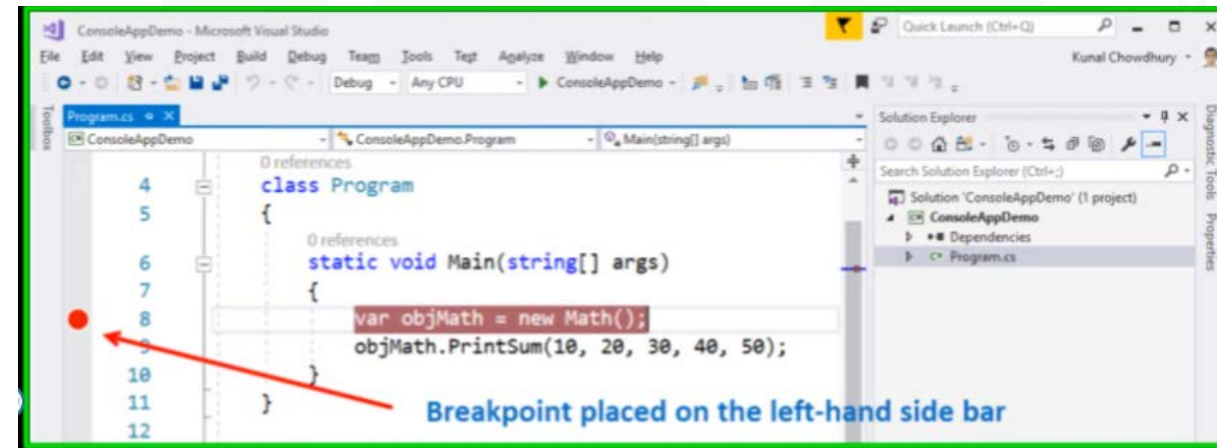
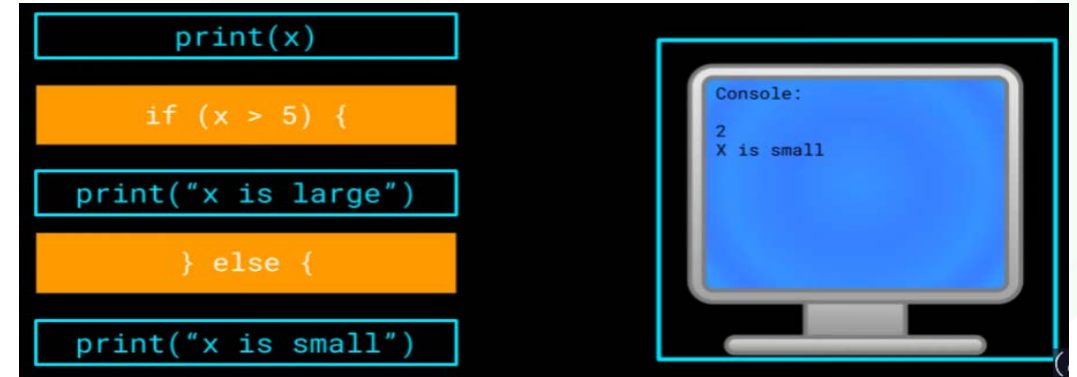
› Code Debug (Hata Ayıklama) nasıl olacak ?





Code Debug (Hata Ayıklama)

› Code Debug (Hata Ayıklama) nasıl olacak ?



//This is a comment

Java

#So is this

Python

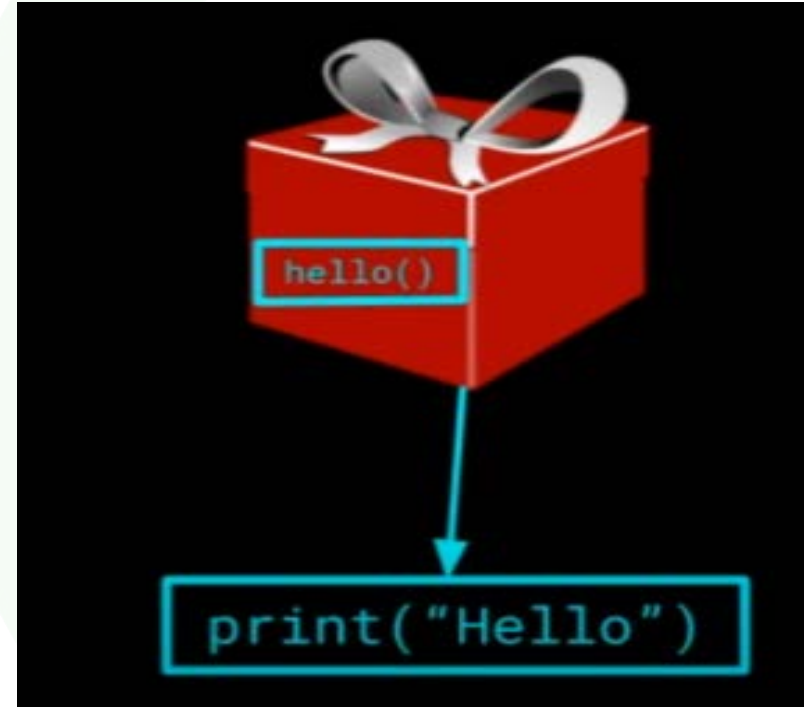
//This as well

JavaScript



FUNCTIONS

- › Fonksiyonlar nedir ?
- › Nasıl kullanılır ?

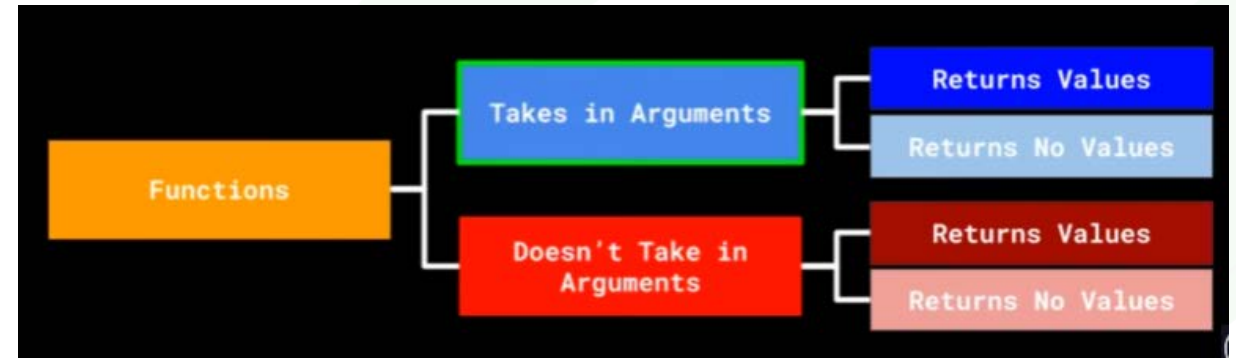




FUNCTIONS

› Functions 4 çeşittir.

› Arguments



- Max Function

- Takes in **two arguments** (two **integers**) and returns the **higher** one

```
int maxNumber = Max(1,100);
```

```
maxNumber = 100
```

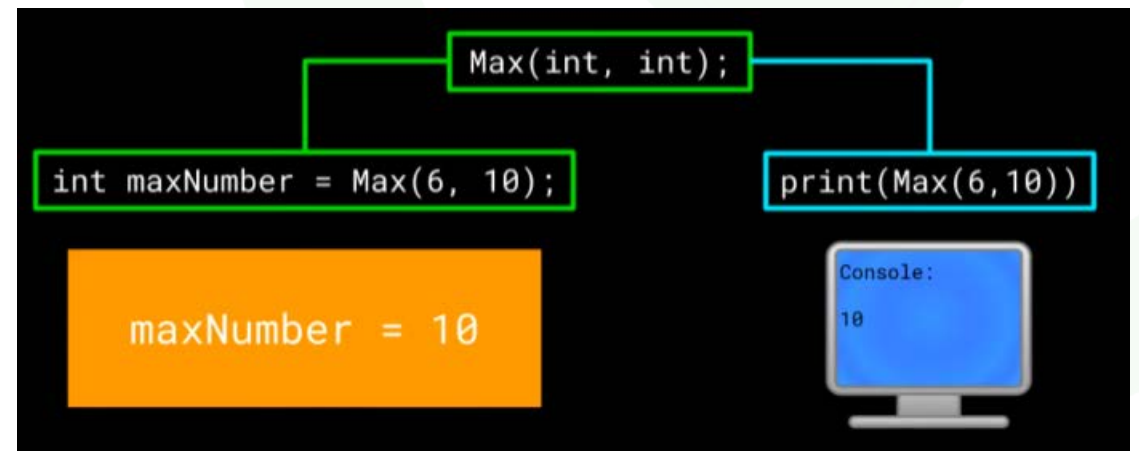
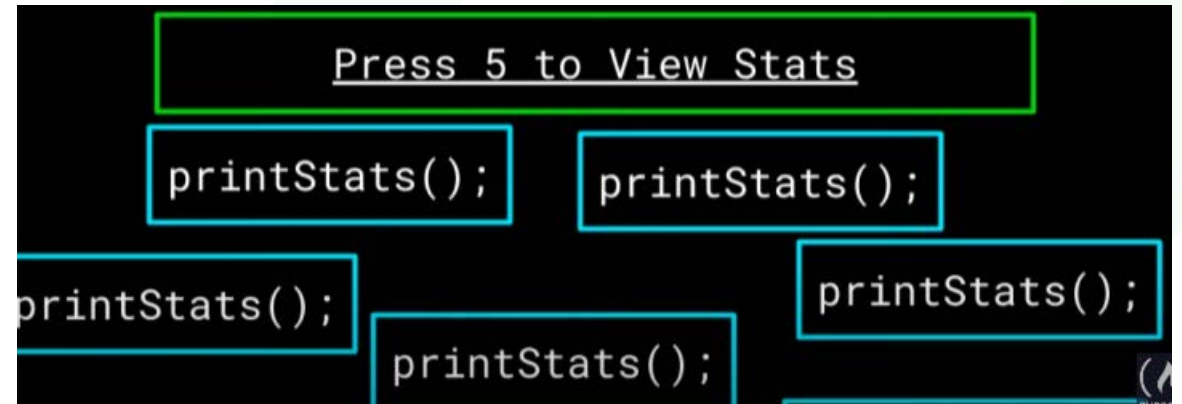
```
int maxNumber = Max(60,2);
```

```
maxNumber = 60
```



FUNCTIONS

► Arguments





FUNCTIONS

► Functions nasıl Import
Edilir ?





FUNCTIONS

► Functions nasıl Import Edilir ?

```
public class Math
{
    double abs(double a)           absolute value of a
    double max(double a, double b) maximum of a and b
    double min(double a, double b) minimum of a and b
    double sin(double theta)       sine of theta
    double cos(double theta)       cosine of theta
    double tan(double theta)       tangent of theta
    double toRadians(double degrees) convert angle from degrees to radians
    double toDegrees(double radians) convert angle from radians to degrees
    double exp(double a)           exponential (e^x)
    double log(double a)           natural log (log, a, or ln a)
    double pow(double a, double b) raise a to the bth power (a^b)
    long round(double a)          round a to the nearest integer
    double random()               random number in [0, 1)
    double sqrt(double a)         square root of a
}
```

pandas

$$y_{it} = \beta'x_{it} + \mu_i + \epsilon_{it}$$

```
from math import factorial
```

```
import Java.math.factorial
```



FUNCTIONS

► Kendi

Fonksiyonumuzu
yazabilir miyiz ?

Örnek

```
def toplama(a,b):  
    return a+b  
  
sonuc = toplama(10,20)  
print(sonuc) # 30
```

```
Public void productCalculator(int num1, num2) {  
    System.out.println(num1 * num2);  
}
```

```
productCalculator(5, 8);
```




Array ve Dictionaries

➤ Array

- Arrays

- Lists of similar **values** that are stored together
- Fixed **Size** (Cannot be increased)
- Reference values using an **index** which **starts at 0**

Numbers	1	2	3	4	5	6	7	8	9	10
Index	0	1	2	3	4	5	6	7	8	9

- 2 Dimensional Arrays

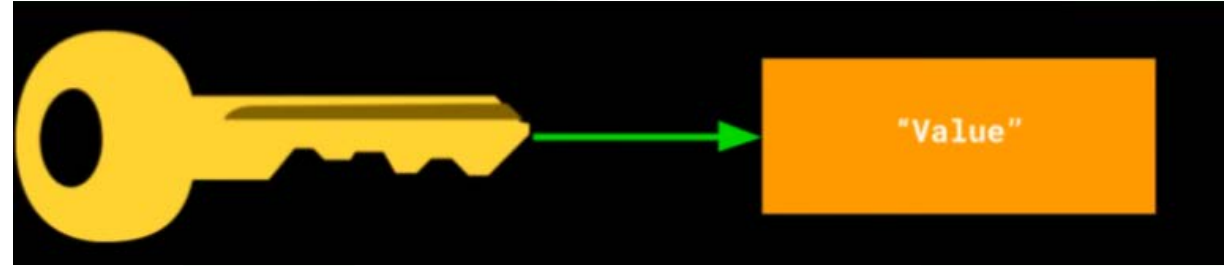
- An **array** containing an **array** in each of its indexes
- Referenced using [Row, Column]

Index	0	1	2	3
0	Ayton	Alex	Arnold	Ashton
1	Bob	Ben	Bryan	Billy
2	Clint	Chris	Colton	Cal
3	David	Doug	Drew	Dan



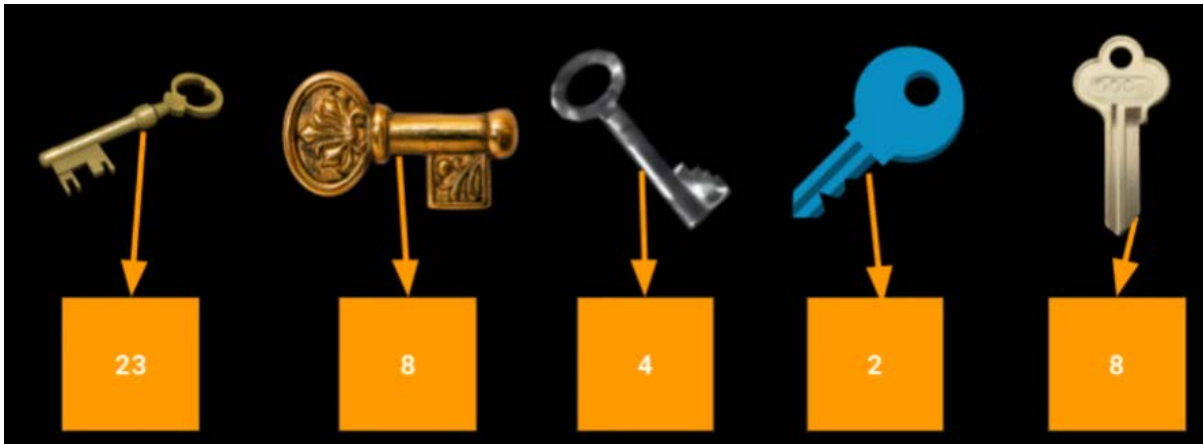
Array ve Dictionaries

› Dictionaries



```
fiyatlar = {  
    "0001-Lenovo":5000,  
    "0002-Acer":3500,  
    "0003-HP":5500  
} # fiyatlar sözlüğümüzü oluşturuyoruz
```

```
fiyatlar.keys()  
fiyatlar.items()  
fiyatlar.values()
```



```
ogrenci = {  
    "numara": "120",  
    "ad": "Ahmet",  
    "soyad": "Yılmaz"  
}
```

```
print(ogrenci) # { "numara": "120", "ad": "Ahmet", "soyad": "Yılmaz" }
```



Hangi Dil ?

- HTML and CSS

- Used for **web development**

- HTML

- A **markup** language used for writing the content of a website

- CSS

- Used to design the **style** of a website



- General Purpose Languages

- Offer a wide variety of uses and **applications**
- Very good **basic** languages



Game / Web
Development



Data
Analysis / Scripting



Application / System
Programs