



## Topic 1:

# Introduction to Programming and Computer System

CSGE601020 - Dasar-Dasar Pemrograman 1

Lintang Matahari Hasani, S.Kom., M.Kom. | Dr.Eng. Lia Sadita, S.Kom., M.Eng.

# Acknowledgement

This slide is an adapted version of 'Introduction to Programming' slides used in DDP1 Course (2020/2021) by **Hafizh Rafizal Adnan, M.Kom.**

Several materials are reused from 'Komputer dan Programming' slides used in Dasar-Dasar Pemrograman 1 dengan Python (CSGE601020/4 SKS) Course (<https://ocw.ui.ac.id/course/view.php?id=142>) by **Fariz Darari, Ph.D.**

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# In this session, you will learn ...

**Computer: Definition and Architecture**

**An Overview of Programming**

**Computational Thinking**

**How Python works: Syntax and some simple examples**



## Triggering Question 1

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# What is a computer?

Write your answer in the **comment section**



# What is a computer?

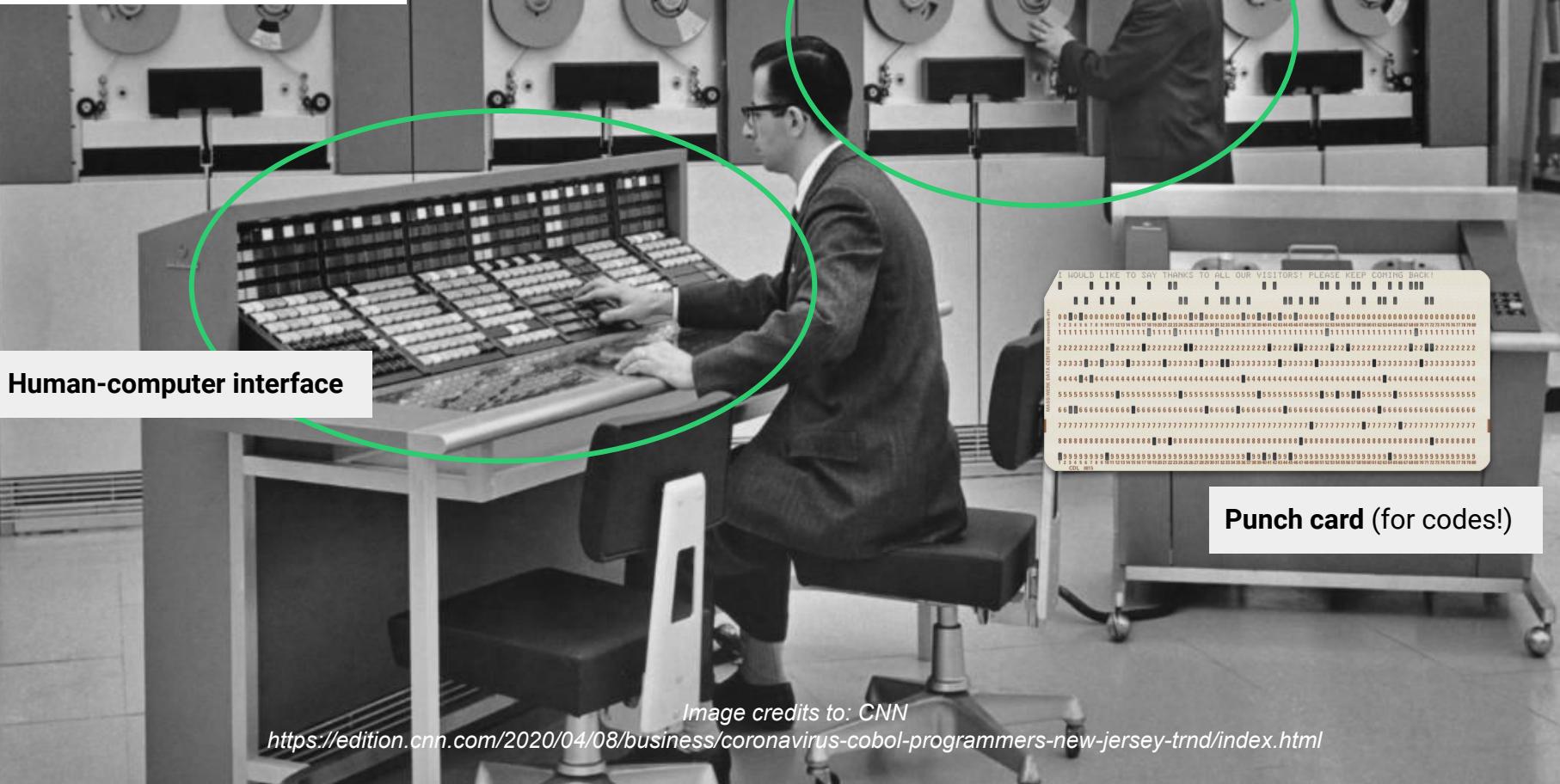
Komputer adalah **mesin** yang dapat:

- **Menyimpan data** dalam bentuk angka, teks, gambar, & video
- **Berinteraksi** dengan perangkat seperti layar monitor, speaker, dan printer
- **Mengeksekusi program**, misalnya program ramalan cuaca, game, web browser, serta Integrated Development Environment (IDE)



Two men operating a **mainframe** computer, circa 1960.

**Memory**



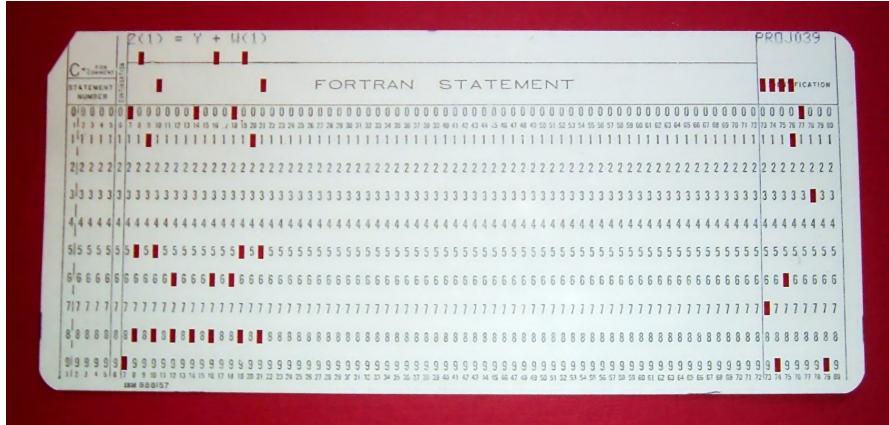
*Image credits to: CNN*

<https://edition.cnn.com/2020/04/08/business/coronavirus-cobol-programmers-new-jersey-trnd/index.html>

# Coding in 1960s

Punched card from a Fortran program:

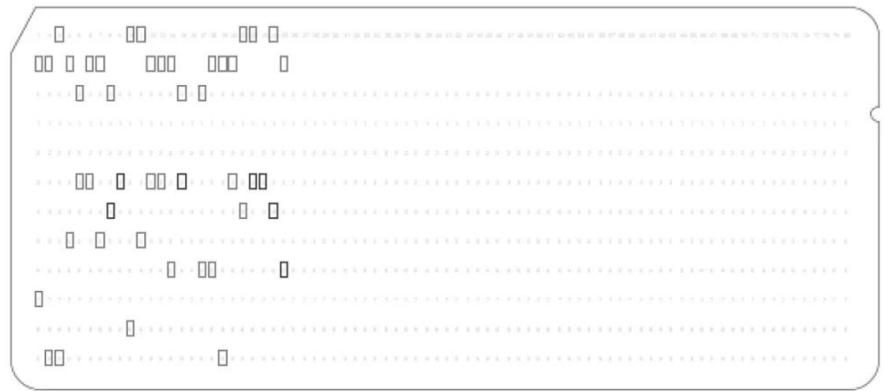
```
Z(1) = Y + W(1)
```



*Image credits to: Arnold Reinhold*

Punched card from a Fortran program:

```
println("Hello, world.");
```



*Image credits to:  
<https://www.jeffreythompson.org/blog/2015/02/20/punch-card-encoding/>*



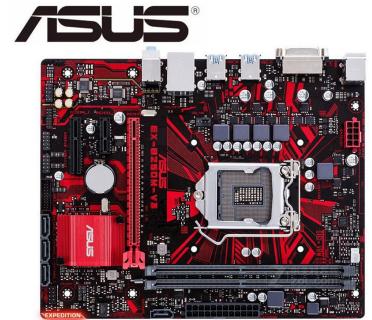
Kids react to an OLD PC (personal computer) from 1970s  
<https://www.youtube.com/watch?v=PF7EpEnglkq>

The original Tetris game running on  
Диалоговый вычислительный комплекс (DVК-2) personal computer  
<https://www.youtube.com/watch?v=Q0gAgQOHFcQ>

```
322+2
3PRINT
3
3
3PRINT 2+2
4
3PRINT DISK
0
3
3
3SYNTAX ERROR
3
3
3GOOGLE
3SYNTAX ERROR
3
```

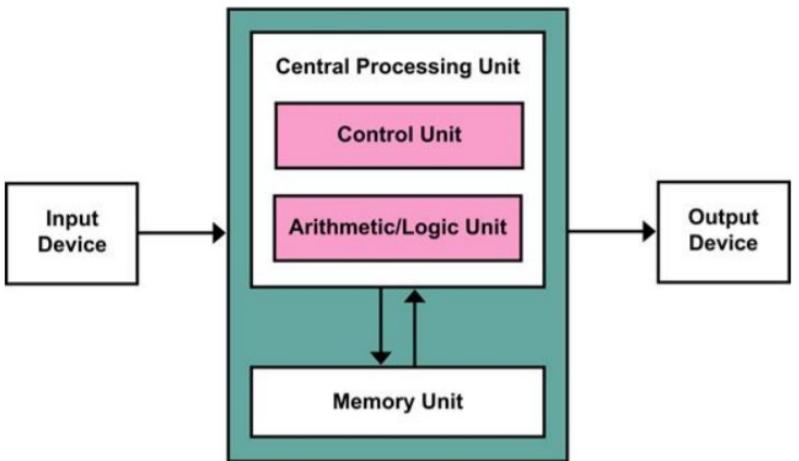


# Hardware vs Software



# Computer Architecture

(Von Neumann, 1945)



# What is computer science?

Computer Science is the **study of computers and computational systems**.

Unlike electrical and computer engineers, computer scientists **deal mostly with software and software systems**; this includes their theory, design, development, and application.



*Image credits to: kuliahdimana.id, testingtime.com, Habibie et al. (2016)*

# Some CS Domains ...

Artificial intelligence

Computer systems and networks

Database systems

Human-computer interaction

Computer vision

Numerical analysis

Software engineering

Programming languages

Information security

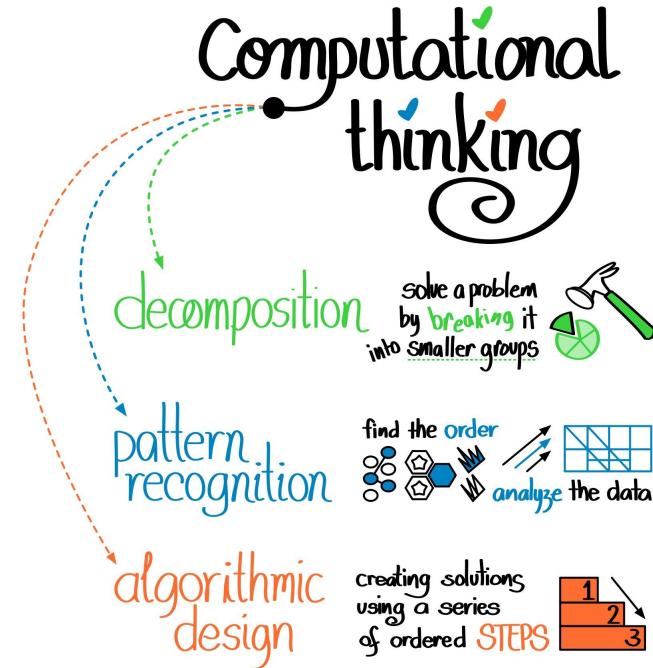
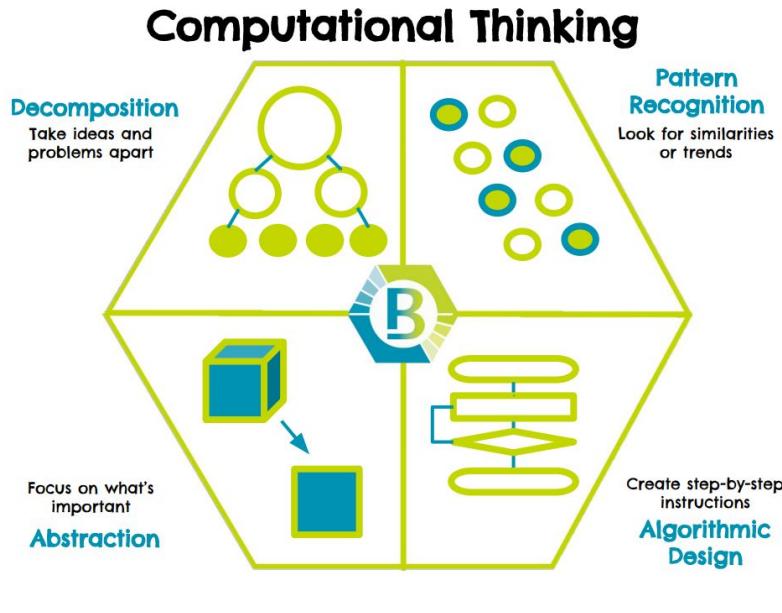
Bioinformatics

etc ...

*Image credits to: kuliahdimana.id, testingtime.com, Habibie et al. (2016)*



# Computational Thinking



<https://medium.com/pythonforkids/lesson-1-computational-thinking-f02fa49ac82b>  
<https://www.wcpss.net/domain/17003>

# What is a program?

Program adalah **kumpulan instruksi** yang diberikan pada komputer untuk mengerjakan sesuatu (**problem solving**, eksekusi aksi)

Program terbentuk dari kumpulan instruksi-instruksi sederhana pada komputer:

- Taruh titik biru pada lokasi tertentu di layar monitor
- Kirim huruf B ke printer
- Dapatkan nilai dari suatu lokasi pada RAM
- Tambahkan dua angka
- Jika nilai X kurang dari 0, stop programnya
- Ulangi suatu instruksi satu juta kali

An example:

```
# This program says hello and asks for my name.

print('Hello, world!')
print('What is your name?')      # ask for their name
myName = input()
print('It is good to meet you, ' + myName)
print('The length of your name is:')
print(len(myName))
```

# What is programming?

Computer programming is a way of giving computers **instructions** about what they should do next.

These instructions are known as **code**, and computer programmers write code to solve problems or perform a task.

An example:

```
# This program says hello and asks for my name.

print('Hello, world!')
print('What is your name?')      # ask for their name
myName = input()
print('It is good to meet you, ' + myName)
print('The length of your name is:')
print(len(myName))
```

# Code, Programming, and Software Development



# My First Code (1): Installing Python



The screenshot shows the Python.org website's download section. At the top left is the Python logo. Below it is a blue navigation bar with links for "About", "Downloads", "Documentation", and "Community". The main content area has a dark blue background. In the center, the text "Download the latest version for Windows" is displayed in yellow. Below this, a yellow button contains the text "Download Python 3.8.5". Further down, there is text for users looking for different operating systems, links for "Prereleases" and "Docker images", and a note about Python 2.7 releases.

python™

About    Downloads    Documentation    Community

Download the latest version for Windows

Download Python 3.8.5

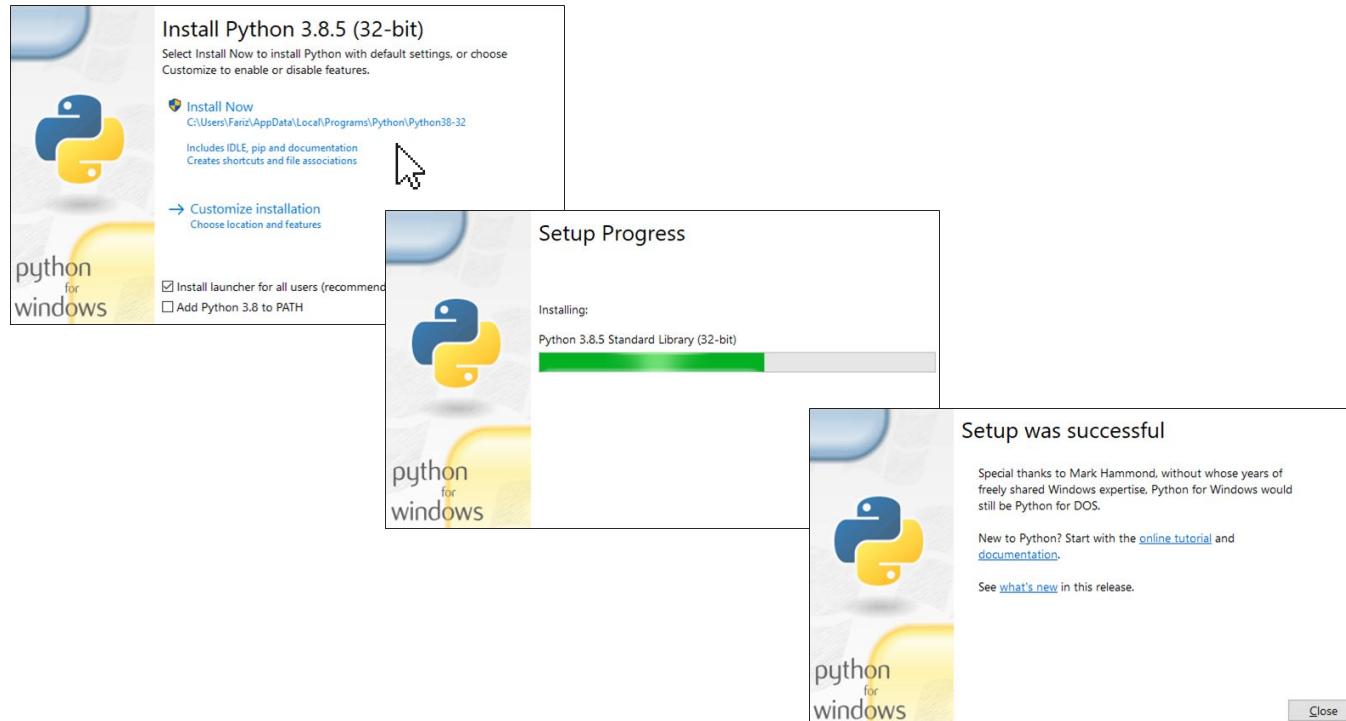
Looking for Python with a different OS? Python for [Windows](#),  
[Linux/UNIX](#), [Mac OS X](#), [Other](#)

Want to help test development versions of Python? [Prereleases](#),  
[Docker images](#)

Looking for Python 2.7? See below for specific releases

<https://www.python.org/downloads/>

# My First Code (2): Installing Python



# My First Code (3): Halo Dunia



# My First Code (4): Halo Dunia



## Triggering Question 2

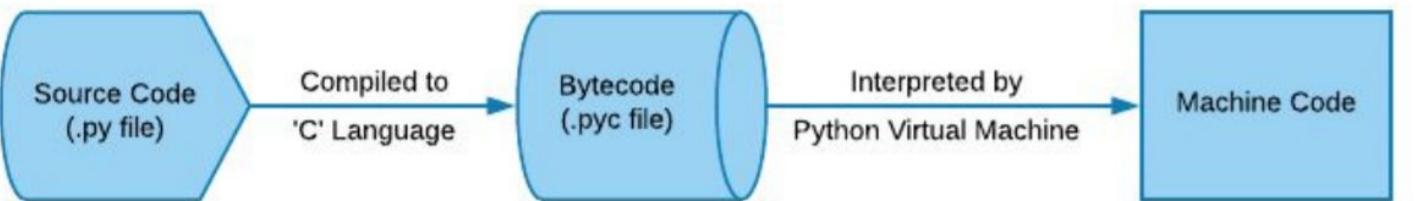
---

**Write a Python program that prints  
“Kuy kita ngoding” and a random sentence of  
your choice, each in two separate lines**

Try it using IDLE and share your experience to your friends



# How Python Works (1)



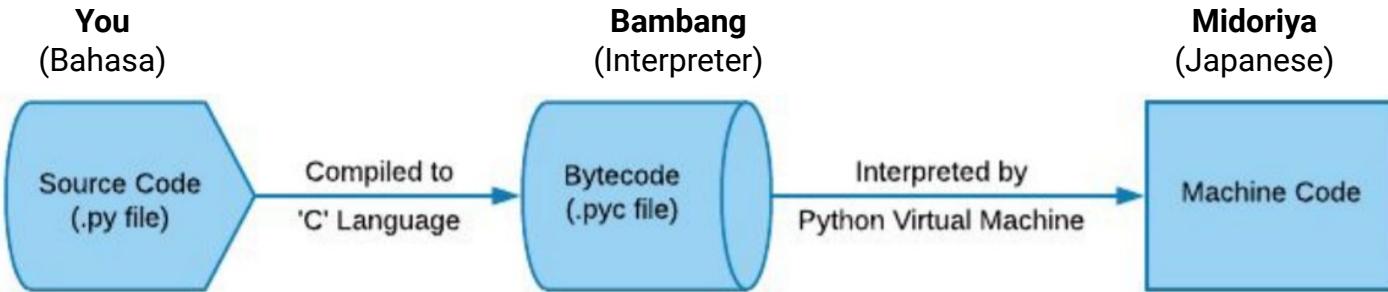
```
# This program says hello  
print('Hello, world!')
```



```
1100 0011 1110 1111  
0000 0101 0110 0111  
...
```

*Note: This is only an illustration*

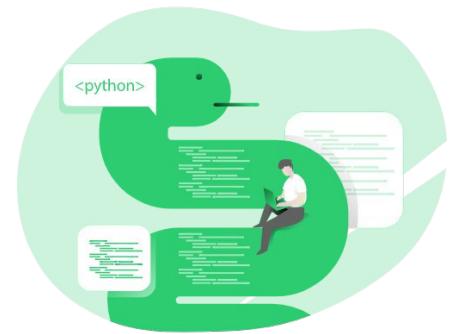
## How Python Works (2)



# A Very Basic Python Syntax

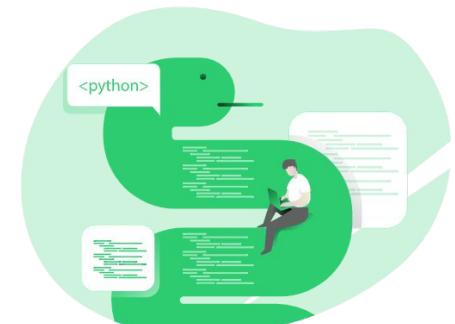
**Sintaks/Syntax** = format, tata cara, dan struktur untuk menulis program

```
# This is a syntax to make comment  
  
input() # to ask user input in the console  
  
print() # to show something in the console  
  
variable_name = "Value" #to assign a variable we will learn it further
```



# Arithmetic Operator

```
# This is a syntax to make comment  
  
a + b # Penjumlahan  
  
a - b # Pengurangan  
  
a / b # Pembagian  
  
a // b # Pembagian (Pembulatan ke bawah)  
  
a * b # Perkalian  
  
a ** b # Perpangkatan (A pangkat B)  
  
a % b # Modulo
```



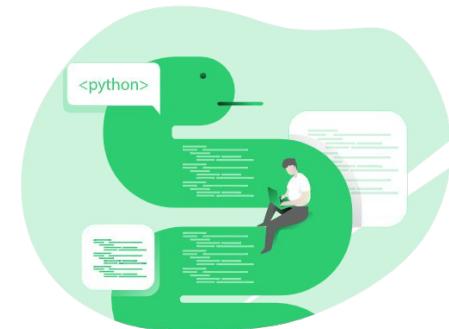
# Comparison Operator

```
# This is a syntax to make comment  
  
== # Sama dengan, return true/false  
  
!= # Tidak sama dengan, return true/false  
  
<> # Tidak sama dengan, return true/false  
  
> # Lebih dari, return true/false  
  
< # Kurang dari, return true/false  
  
>= # Lebih dari sama dengan, return true/false  
  
<= # Kurang dari sama dengan
```



# Assignment Operator

Operator	Description	Example
=	Assigns values from right side operands to left side operand	$c = a + b$ assigns value of $a + b$ into $c$
+= Add AND	It adds right operand to the left operand and assign the result to left operand	$c += a$ is equivalent to $c = c + a$
-= Subtract AND	It subtracts right operand from the left operand and assign the result to left operand	$c -= a$ is equivalent to $c = c - a$
*= Multiply AND	It multiplies right operand with the left operand and assign the result to left operand	$c *= a$ is equivalent to $c = c * a$
/= Divide AND	It divides left operand with the right operand and assign the result to left operand	$c /= a$ is equivalent to $c = c / a$
%= Modulus AND	It takes modulus using two operands and assign the result to left operand	$c %= a$ is equivalent to $c = c \% a$
**= Exponent AND	Performs exponential (power) calculation on operators and assign value to the left operand	$c **= a$ is equivalent to $c = c ** a$
//= Floor Division	It performs floor division on operators and assign value to the left operand	$c //= a$ is equivalent to $c = c // a$



# More Syntax

[https://www.tutorialspoint.com/python/python\\_basic\\_syntax.htm](https://www.tutorialspoint.com/python/python_basic_syntax.htm)

- This page provides **IMPORTANT INFO** regarding Python Identifiers, Reserved Words, Multi-Line Statements, Quotation in Python, Comments in Python, Using Blank Lines, etc. (**Obligatory reading material!**)

[https://www.tutorialspoint.com/python/python\\_basic\\_operators.htm](https://www.tutorialspoint.com/python/python_basic_operators.htm)

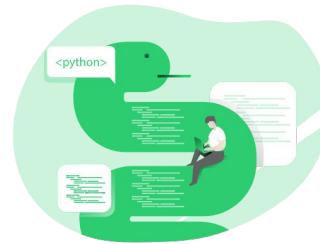
- This page provides **IMPORTANT INFO** regarding Python arithmetic, comparison, assignment, logical, etc. (**Also an obligatory reading material!**)

# General Steps in Programming



## Desain solusi masalah

Pikirkan alur terlebih dahulu sebelum menulis kode, misalnya dengan flowchart atau pseudocode



## Menulis kode program

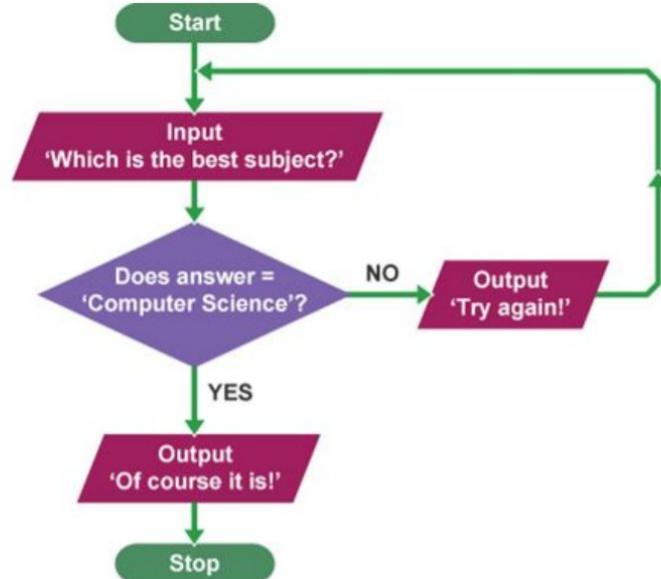
Menulis solusi yang dirancang dengan sintaks bahasa pemrograman tertentu



## Debugging

Memeriksa dan memperbaiki error yang muncul

# Designing Solution: Flowchart



# Designing Solution: Pseudocode (1)



**Yaki Udon Ayam Saus Gochujang**

Takumi-kun  
@cook\_28485572  
© Yokohama



## Bahan-bahan

8 - 2 - 3 porsi

2 bungkus mie udon

2-3 sendok makan minyak wijen

1 sendok makan minyak goreng

2 siung Bawang putih

## Bumbu

3 sendok makan saus gochujang

2 sendok makan mirin (bisa pakai merk Kikkoman)

3 sendok makan Soba Shoyu (bisa pakai merk Kikkoman)

2 sendok makan kecap manis

## Isian

Sesuai selera ayam suwir (rebus dan air fry terlebih dahulu)

Sesuai selera wortel (bersihkan, potong memanjang)

Sesuai selera daun bawang (iris tipis)

## Garnish

Sesuai selera Beni Shoga (Acar Jahe Merah Jepang)

Sesuai selera Aonori (Serbuk rumput laut olahan)

## Langkah

- ➊ Siapkan bahan sesuai petunjuk. Campur bahan bumbu hingga merata, letakkan dalam gelas atau wadah kecil. Siapkan udon dengan direndam dalam air panas dalam sebuah wadah hingga tidak lengket.
- ➋ Pindahkan udon ke wadah kaca/mangkok, lumuri dengan 2 - 3 sendok makan minyak wijen. Aduk merata.
- ➌ Panaskan wajan dengan 1 sendok makan minyak goreng, masukkan bawang putih, tumis hingga harum. Lalu masukkan bahan isian (ayam suwir, wortel, dan daun bawang). Tumis, aduk merata [-2 menit]
- ➍ Masukkan udon ke wajan lalu sirami dengan bumbu. Aduk hingga merata. [-2 menit]
- ➎ Sajikan dengan garnishing Beni Shoga (tidak wajib) dan Aonori (tidak wajib).

# Designing Solution: Pseudocode (2)



**Yaki Udon Ayam Saus Gochujang**

Takumi-kun  
@cook\_28485572  
© Yokohama

## Variables

### Bahan-bahan

± 2 - 3 porsi

2 bungkus mie udon

2-3 sendok makan minyak wijen

1 sendok makan minyak goreng

2 siung Bawang putih

### Bumbu

3 sendok makan saus gochujang

2 sendok makan mirin (bisa pakai merk Kikkoman)

3 sendok makan Soba Shoyu (bisa pakai merk Kikkoman)

2 sendok makan kecap manis

### Isian

Sesuai selera ayam suwir (rebus dan air fry terlebih dahulu)

Sesuai selera wortel (bersihkan, potong memanjang)

Sesuai selera daun bawang (iris tipis)

### Garnish

Sesuai selera Beni Shoga (Acar Jahe Merah Jepang)

Sesuai selera Aonori (Serbuk rumput laut olahan)



## Instructions

### Langkah

- ➊ Siapkan bahan sesuai petunjuk. Campur bahan bumbu hingga merata, letakkan dalam gelas atau wadah kecil. Siapkan udon dengan direndam dalam air panas dalam sebuah wadah hingga tidak lengket.
- ➋ Pindahkan udon ke wadah kaca/mangkok, lumuri dengan 2 - 3 sendok makan minyak wijen. Aduk merata.
- ➌ Panaskan wajan dengan 1 sendok makan minyak goreng, masukkan bawang putih, tumis hingga harum. Lalu masukkan bahan isian (ayam suwir, wortel, dan daun bawang). Tumis, aduk merata [~2 menit]
- ➍ Masukkan udon ke wajan lalu sirami dengan bumbu. Aduk hingga merata. [~2 menit]
- ➎ Sajikan dengan garnishing Beni Shoga (tidak wajib) dan Aonori (tidak wajib).

# An example: A simple problem

Buat program  
**kalkulator konversi nilai huruf mahasiswa UI**

Nilai	Min	Maks
A	85	100
A-	80	85
B+	75	80
B	70	75

# Steps 1: Design a solution (pseudocode)

Buat program kalkulator nilai huruf mahasiswa UI

Masukkan nilai angka

Jika nilai mahasiswa lebih dari sama dengan 85,  
maka nilai huruf adalah A

Jika nilai mahasiswa lebih dari sama dengan 80,  
maka nilai huruf adalah A]

Jika nilai mahasiswa lebih dari sama dengan 75,  
maka nilai huruf adalah B+

Jika nilai mahasiswa lebih dari sama dengan 70,  
maka nilai huruf adalah B

Cetak nilai huruf

Nilai	Min	Maks
A	85	100
A-	80	85
B+	75	80
B	70	75

## Steps 2: Convert to code

### Konversi Pseudocode ke Sintaks Python

```
nilai_angka = input('Masukkan nilai angka')
nilai_huruf = ''

if nilai_angka >= 85:
    nilai_huruf = 'A'
elif nilai_angka >= 80:
    nilai_huruf = 'A-'
elif nilai_angka >= 75:
    nilai_huruf = 'B+'
elif nilai_angka >= 70:
    nilai_huruf = 'B'

print(nilai_huruf)
```

Nilai	Min	Maks
A	85	100
A-	80	85
B+	75	80
B	70	75

This is **conditional**.  
Don't worry, we will learn more about this later ^^

## Steps 3: Run the code (Debug error, if any)

Jika kode ini dijalankan apakah akan terjadi error?

```
nilai_angka = input('Masukkan nilai angka')
nilai_huruf = ''

if nilai_angka >= 85:
    nilai_huruf = 'A'
elif nilai_angka >= 80:
    nilai_huruf = 'A-'
elif nilai_angka >= 75:
    nilai_huruf = 'B+'
elif nilai_angka >= 70:
    nilai_huruf = 'B'

print(nilai_huruf)
```

Nilai	Min	Maks
A	85	100
A-	80	85
B+	75	80
B	70	75

```
>>> Masukkan nilai angka7
Traceback (most recent call last):
  File "C:\Users\Lintang_matahari\Documents\KODINGAN\slide-1-2-error-konversi-nilai-huruf.py", line 4, in <module>
    if nilai_angka >= 85:
TypeError: '>=' not supported between instances of 'str' and 'int'
```

## Steps 3: Run the code (Debug error, if any)

An alternative solution:

```
nilai_angka = int(input('Masukkan nilai angka'))
nilai_huruf = ''

if nilai_angka >= 85:
    nilai_huruf = 'A'
elif nilai_angka >= 80:
    nilai_huruf = 'A-'
elif nilai_angka >= 75:
    nilai_huruf = 'B+'
elif nilai_angka >= 70:
    nilai_huruf = 'B'

print(nilai_huruf)
```

Nilai	Min	Maks
A	85	100
A-	80	85
B+	75	80
B	70	75

## Steps 4: The code is ready

Masukkan nilai angka

Jika nilai mahasiswa lebih dari sama dengan 85,  
maka nilai huruf adalah A

Jika nilai mahasiswa lebih dari sama dengan 80,  
maka nilai huruf adalah A]

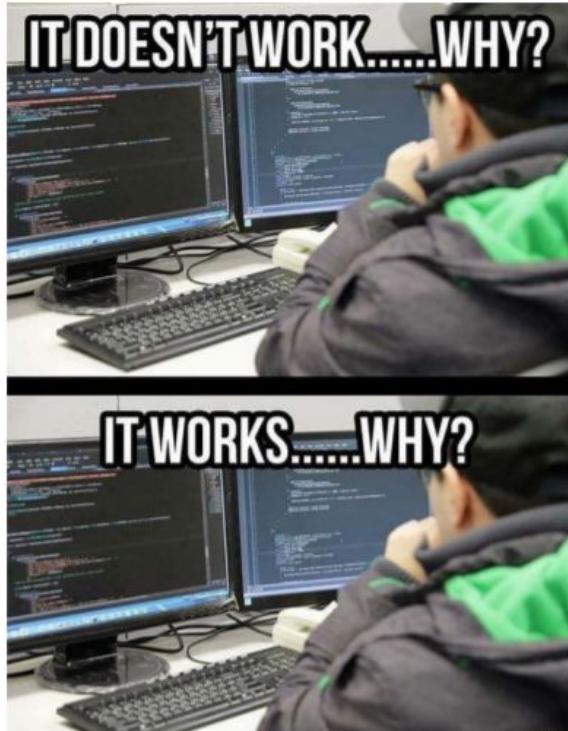
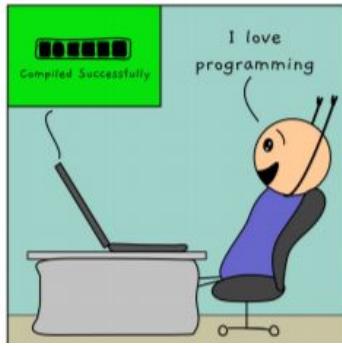
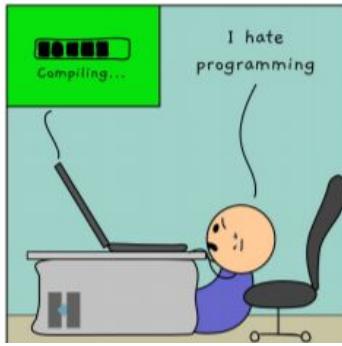
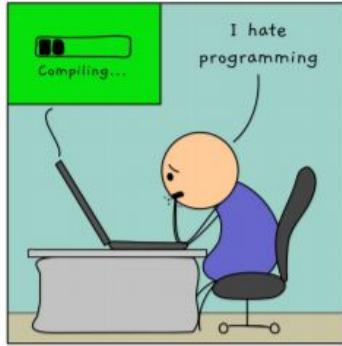
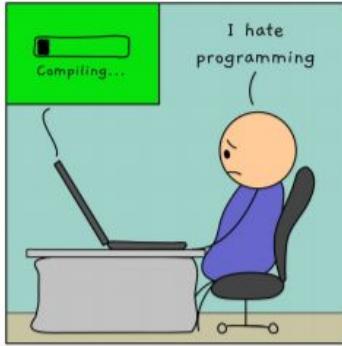
Jika nilai mahasiswa lebih dari sama dengan 75,  
maka nilai huruf adalah B+

Jika nilai mahasiswa lebih dari sama dengan 70,  
maka nilai huruf adalah B

Cetak nilai huruf



```
nilai_angka = int(input('Masukkan nilai angka'))  
nilai_huruf = ''  
  
if nilai_angka >= 85:  
    nilai_huruf = 'A'  
elif nilai_angka >= 80:  
    nilai_huruf = 'A-'  
elif nilai_angka >= 75:  
    nilai_huruf = 'B+'  
elif nilai_angka >= 70:  
    nilai_huruf = 'B'  
  
print(nilai_huruf)
```



### Triggering Question 3

---

Nilai	Min	Maks
A	85	100
A-	80	85
B+	75	80
B	70	75

**What if those who got Score >100 get “A+” ?**

Write your idea/pseudocode in the comment section



## Practice at Home

- <https://codingbat.com/python/Warmup-1>
- <https://hackerrank.com/> (Delicious problem, Oishii~)



# Review Questions

**What is computer? How we define it? Is this a computer?**

**What is programming? Why we create pseudocode?**

**What is computational thinking?**

**How python is executed?**



## Weekly Challenges 1

---

**Write a simple Python program that uses  
input() and print()**

**The program is up to you.  
Express your creativity. ^▽^**

## Weekly Challenges 2

# Write a simple Python program that does the addition of inputted numbers

example:

Input:

```
first number: 1  
second number: 2
```

Output:

```
The result is: 3
```

Post it here (<https://forms.gle/qYyKNL9on8xRAjsp7>)  
before August 6, 2021 [23.55]





# Q&A Session

