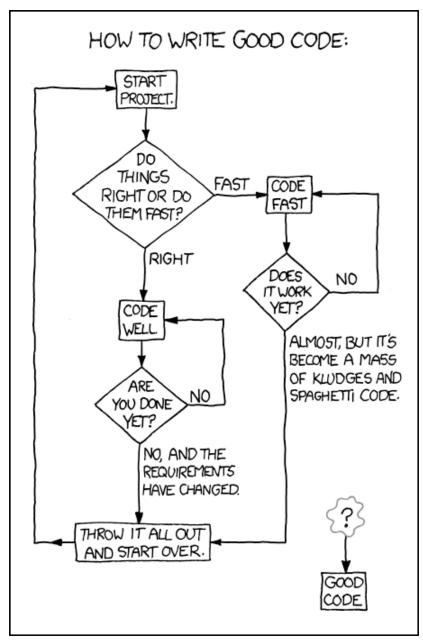
Programming and Flow Diagrams

Course Code: GEEN1064

Course Name: Engineering, Design and Implementation

Credits: 20

Lecturer: Seb Blair BEng(H) PGCAP MIET MIHEEM FHEA



What is programming?

- **?**
- ► Why program?

Types of Programming Languages

- High Level / low level C#, Java, Python, Ruby, C, C++, assembly
- Declarative / imperative/procedural SQL, Curl, Prolog
- General-purpose/domain specific HTML, Markdown/up, MATLAB
- Object-orientated/concurrent C#, Java, Python,
- Command/complied/script language batch, bash, Javascript
- Answer set Prolog

Human Language and Programming Languages

- ► Are all programming languages in English?
- ▶ Does it matter when these are compiled down to machine code?

Some Examples of Non-English Programming Languages

Linotte

It has been a developer for using French keywords, and its "Hello world" program looks like this:

```
BonjourLeMonde:
début
affiche "Bonjour le monde!"
```

Has a web engine for HTML and PHP and JSP.

SAKO

System Automatycznego Kodowania Operacji (Automatic Operation Encoding System) programming language, which uses polish as for its keywords:

K) PROGRAM DRUKUJE NAPIS HELLO WORLD

LINIA

TEKST:

HELLO WORLD

KONIEC

Really only used in the late 1950s and early 1960s for the XYZ computers.

Rapira

Rapira is another awesome example of non-english programming languages. It uses Russian keywords:

```
ПРОЦ СТАРТ()

ВЫВОД: 'Привет, мир!'

КОН ПРОЦ
```

Translated:

```
proc start()
    output: 'Hello, world!!!';
end proc
```

EPL

Chinese engineers developed 易语言 (Easy Programming Language, as known as EPL):

```
公开 类 启动类
  公开 静态 启动()
    控制台.输出("你好,世界!");
public class startup class
  public static start()
    console.output("Hello, World!");
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```

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Learning to Program

You do not need to know how to program in all languages, you only need to know how to program.

- Conditions
 - ∘ if, else if , else
 - switch
- Loops
 - o for
 - while
 - o do

Pseudo Code

So before programming actual code you should write in pseudocode;

```
BEGIN
  NUMBER a
  NUMBER b

IF b > a THEN
     OUTPUT "b is greater than a"
ELSE
  OUTPUT "b is not greater than a"
ENDIF
END
```

Conditional Checks

C

```
a = 200;
b = 33;
if (b > a)
{
  print("b is greater than a");
}
else
{
  print("b is not greater than a");
}
```

Python

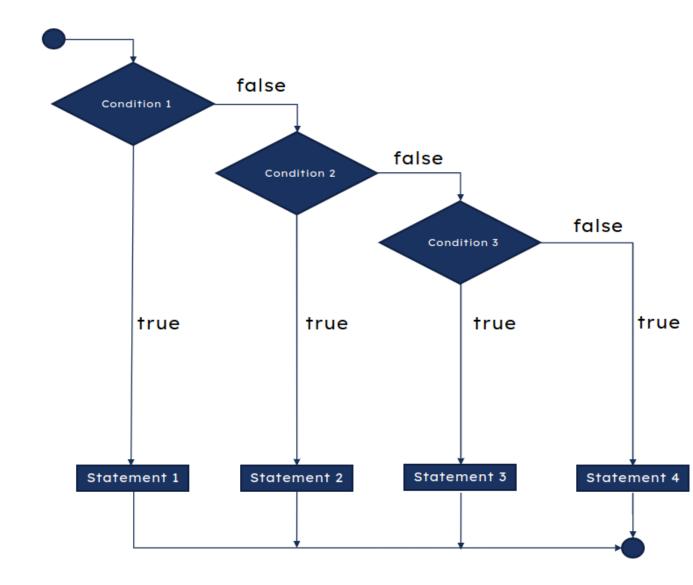
```
a = 200
b = 33
if b > a:
  print("b is greater than a")
else:
  print("b is not greater than a")
```

Matlab

```
a = 200
b = 33
if (b > a)
  print("b is greater than a")
else
  print("b is not greater than a")
end
```

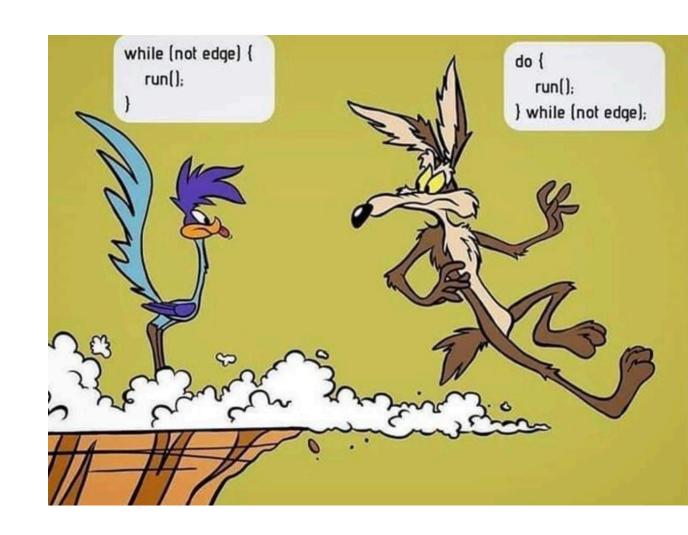
If Flow Diagram

```
if(condition1)
  //code for if condition1 is true
else if(condition2)
  //code for if condition2 is true
else if(condition3)
  //code for if condition3 is true
else
  //code for all the false conditions
```



While Do & Do While Loops

While loops run forever until a condition is met, like our iconic duo on the left are demonstrating.



An Example Looping

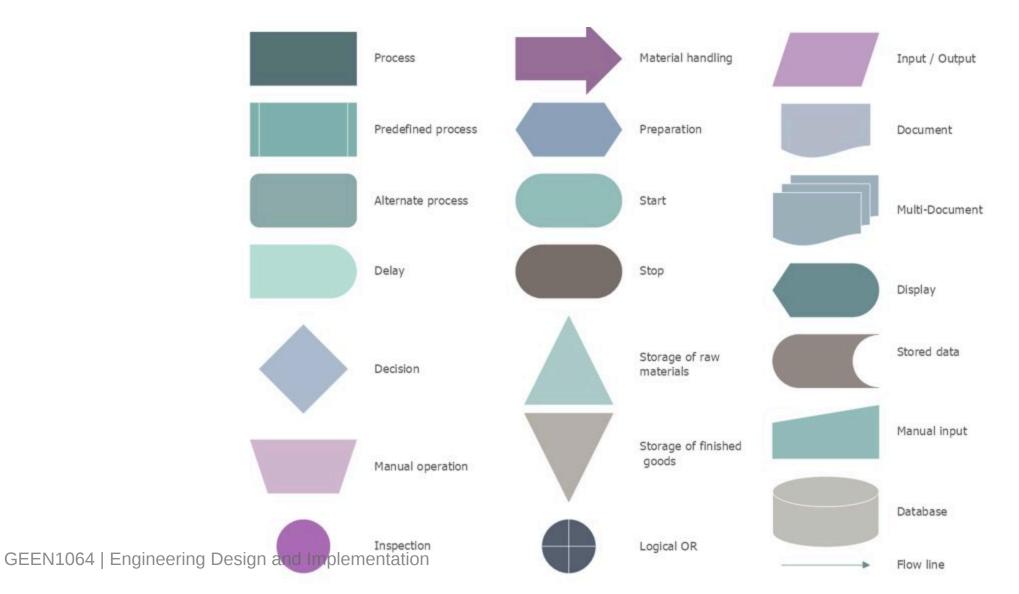
Infinite Loop

```
while (0 < 1)
{
   print("Hello World!");
}</pre>
```

Finite Loop

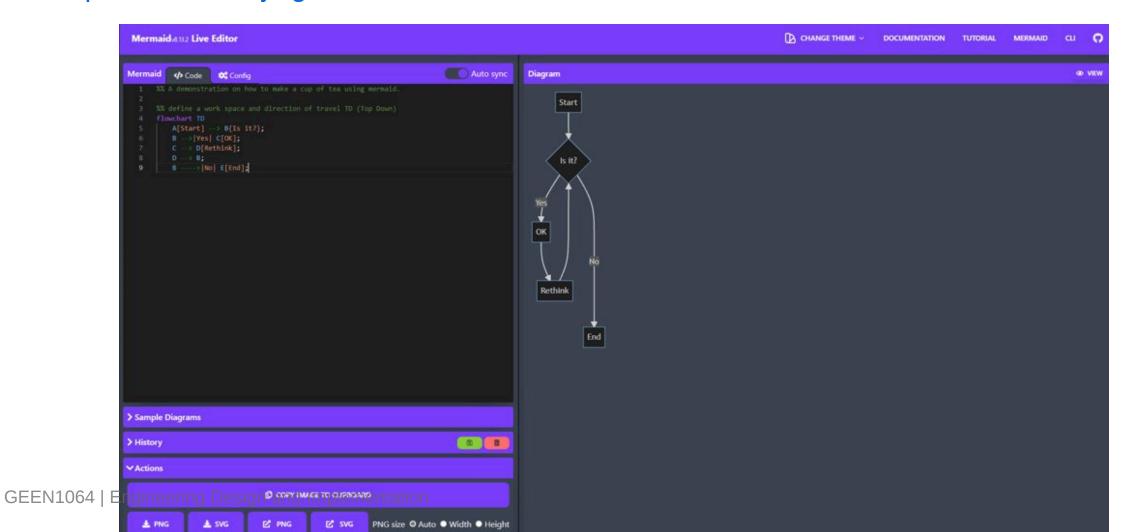
```
int i = 0;
while (i < 10)
{
   print("Hello World!");
   i = i + 1;
}</pre>
```

Flow Diagrams Symbols



Mermaid Editor

https://mermaid-js.github.io/mermaid-live-editor/edit/



Mermaid Exercise

https://mermaid-js.github.io/mermaid-live-editor/edit/ w:800

So now that we have seen mermaid, write out the flow for a robot to make a hot beverage such as tea.

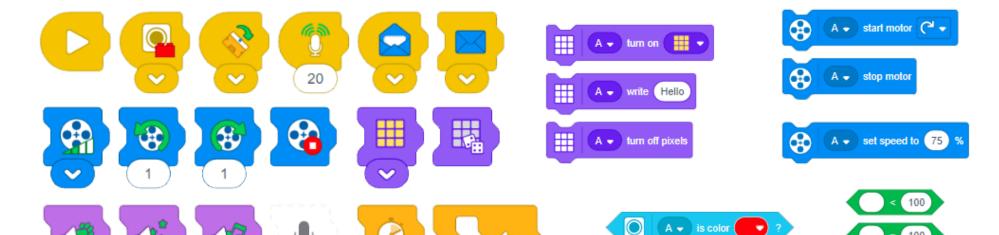
Remember

Computers are not good or bad at a job, it is how well the human programs it.

Blocky

https://blockly.games/?lang=en



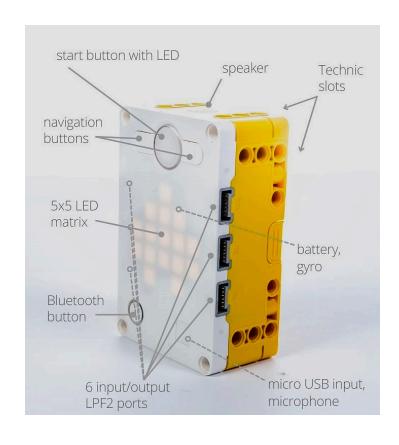


Ev3 Spike

- Icon
- Block
- Python

```
motor_pair = MotorPair('B','D')
23
24
       Kp = 0.04
       Turn = 0
25
26
       Error = 0
       threshold_value = 60
27
       distance value = 0
28
       while True:
29
30
           distance_value = distance_sensor.get_distance_cm(False)
31
           if distance_value != None:
               if distance_value > 14:
32
                   Error = color_sensor_c.get_reflected_light() - threshold_value
33
34
                   Turn = int(Error * Kp)
                   motor_pair.start_tank(15-Turn, 15+Turn)
35
               else:
36
37
                   break
38
       motor_pair.stop()
```

Eve Spike block





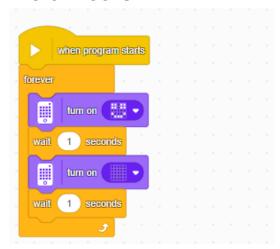


Spike Software

Icon blocks



Word Blocks



Python

```
from hub import light_matrix
import runloop

async def main():
    # write your code here
    light_matrix.show_image(3) # HAPPY
    await runloop.sleep_ms(1000) # 1 sec
    # Eyes
    light_matrix.clear
    await runloop.sleep_ms(1000) # 1 sec

runloop.run(main())
```