Introdução à Computação

MAC0115/IBI5011

Aula 2

17 de Março, 2022

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Hoje

O plano é conversarmos hoje sobre:

1. História dos computadores
2. Começando a conhecer Python
3. Variáveis, expressões e comandos
4. O laço WHILE

História dos computadores

(online slides)

A (BRIEF) HISTORY OF COMPUTING

By Dane Paschal

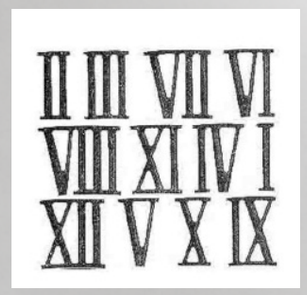
BIASES

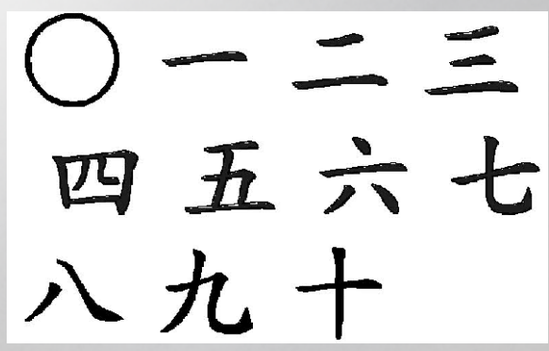
- Amero-Euro centric
- Computer science centric
- Google centric

ANCIENT ORIGINS

❖Counting is hard…

- The Human Brain
- Abacus
- Numerals

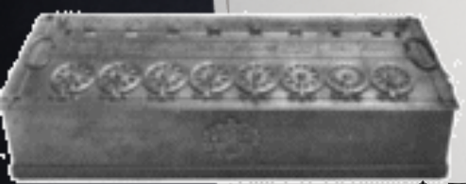




THE 1700'S AND 1800'S

❖Computing as a job

- Moved beyond governmental in a big way
- Industries now need large pools of computing power
- Scientific inquiry requires more brainpower and number crunching



❖Inventions

- Pascal's wheel
- Slide rules
- Napeir's bones
- Jacquard's loom ← programmable!

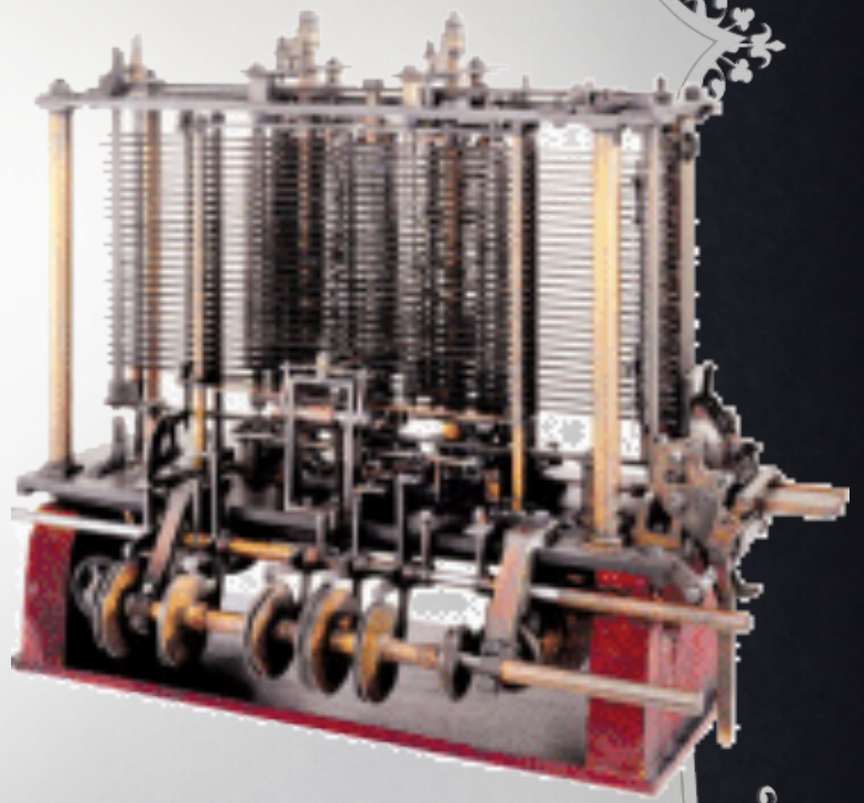
BABBAGE AND LOVELACE

❖Charles Babbage

- Math professor at Trinity College in Cambridge
- Difference engine
- Analytical engine
  - Mill and store (cpu and memory)

❖Ada Augusta, Countess of Lovelace

- Amazing mathematician, helped Babbage
- “first programmer”



(1815 - 1852)

Ada Lovelace descreve um algoritmo para a Máquina Analítica para calcular os números de Bernoulli.
É considerado o primeiro algoritmo publicado especificamente adaptado para implementação em um computador, e Ada Lovelace tem sido frequentemente citada como a primeira programadora de computador por este motivo.

HOLLERITH AND THE CENSUS

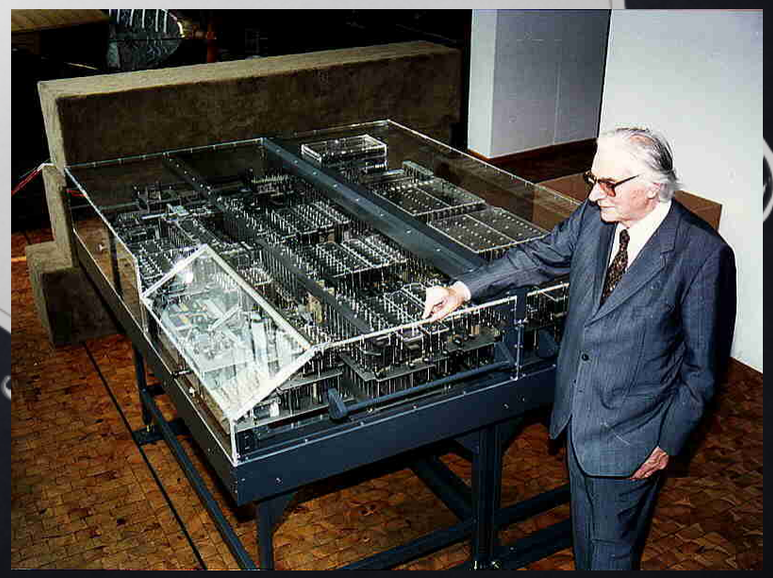
❖U.S. needed help with the 1890 census

- Dr. Herman Hollerith, statistician and inventor was hired to help
- Took punch cards from the Jacquard loom and turned it into a punch card database!
- Cut down the census tabulation by 6 years (from 8 to 2) saving millions
- Founds company that would become IBM
  - Production of punch-card machines and mechanical calculators

ELECTRICITY AND BINARY

❖Konrad Zuse

- Civil engineer
- “you can say I was too lazy to calculate so I invented the computer”
- Created the Z1 using binary and electrical circuits
- Drafted into German military for WWII, but was soon hired to build the Z2
- Saw the use of vacuum tubes for faster computing, but calculated it would take too long to implement.



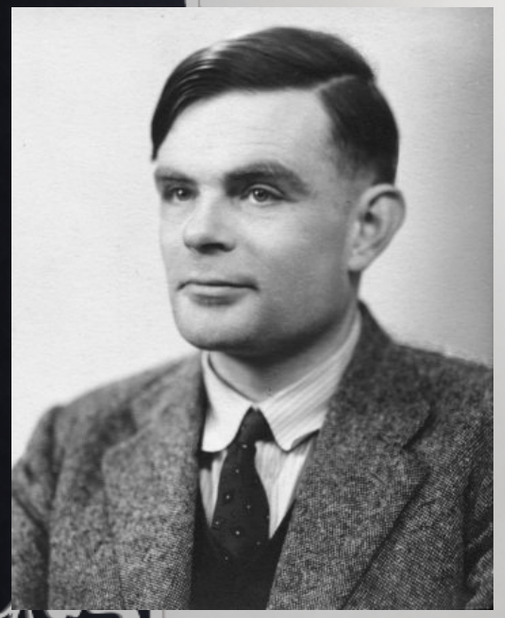
LEARNING TO LOVE THE BOMBE

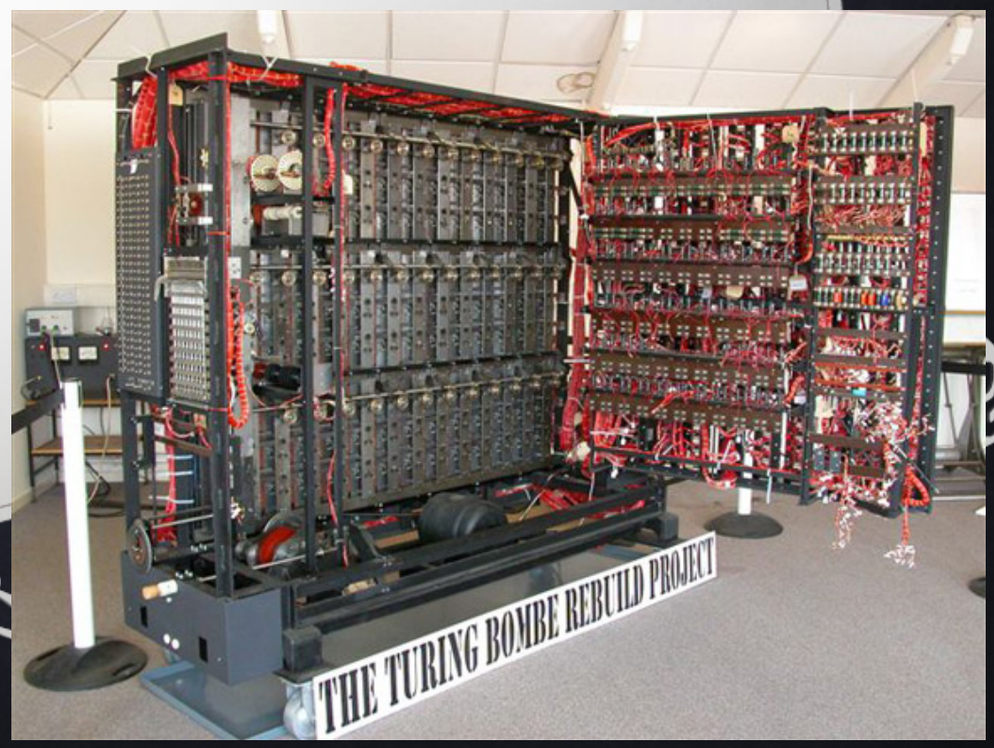
❖Alan Turing

- Hired by England to crack codes set by the enigma machine (the bombe)
  - Electrical machine using logical operators to brute force a solution to enigma settings

Turing machines

Turing test and AI

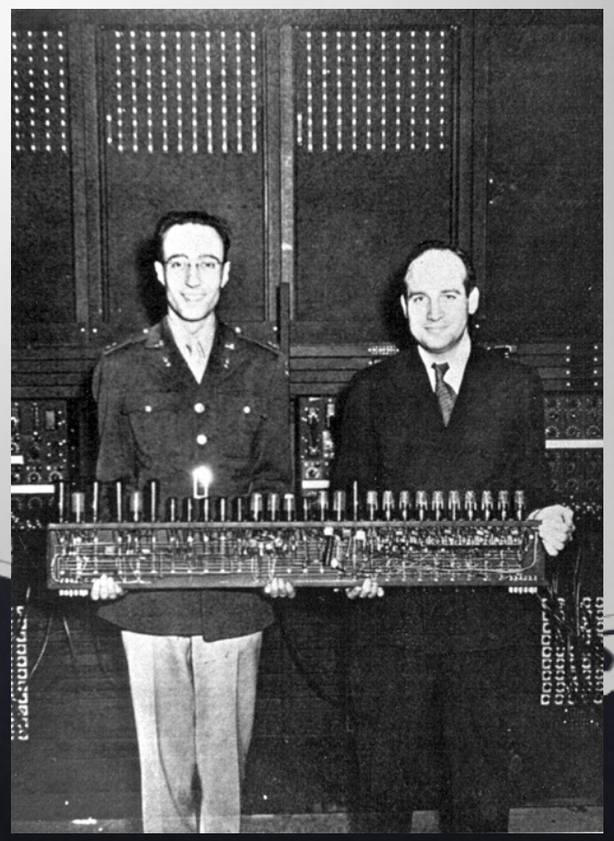




ARTILLERY AND VACUUM TUBES

❖ENIAC (Electronic Numerical Integrator And Computer)

- Artillery and bombing tables took too long
- Military hired Dr. Presper Eckert and Dr. John Mauchly for a solution
- Began in 1943, announced in 1946, cost $500,000, weighed roughly 30 tons, required 18k vacuum tubes!
- Was thought impossible, too unreliable
- Programmed by wire…



TRANSISTORS AND THE UNIVAC

- Transistors came about from research at AT&T's Bell Labs and was the work of Berdeen, Brattain, and Shockley
- was a smaller, faster, safer, cheaper and more reliable version of the vacuum tube
- 1950's census is taking too long, the census needs help again
- Hires the makers of the ENIAC to take advantage of the transistor.
- The result is the UNIVAC I, which predicts the 1952 presidential election, shocking all with Eisenhower's victory

```
      DEFINE FILE 3(100,50,L,I1)
    5 READ(5,100)ICOD,Q
  100 FORMAT(I5,F7.2)
      I1 = MOD (ICOD,997)
    3 READ (3'I1,100) ICO,QUAN
    4 IF (I COD - I CO) 1,2,1
    1 PAUSE 3050
      GO TO 5
    2 QUAN=QUAN+Q
      I1=I1-1
      WRITE (3'I1,100)ICO,QUAN
      GO TO 5
      END
```

LANGUAGES!

- With the success of the UNIVAC and other large computers, more people are taking advantage of them.
- Programming these computers is tough stuff… either it's binay or assembly coding
- FORTRAM (Formula Translation) (John Backus, 1954) comes about the help mathematicians. One of the first "high level" languages
- COBOL (Common Business-oriented Language) (Grace Hopper 1959) comes about to help businesses program.

The OCCURS clause marks an array.

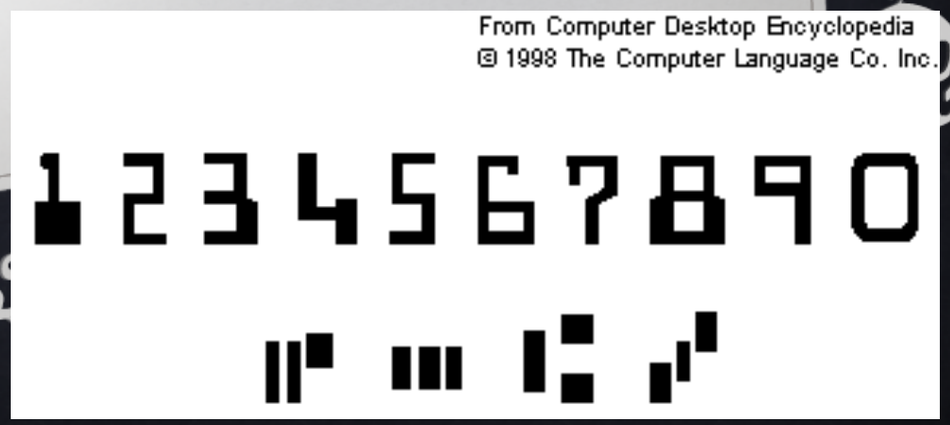
The DEPENDING ON clause marks a counter field for the array, if one exists.

The array ASSIGMENTS is a nested array within COURSES.

```
01  STUDENT.
  20  ID                              PIC 9(8).
  20  FIRST_NAME                      PIC X(32).
  20  LAST_NAME                       PIC X(32).
*                                     YYYYMMDD
  20  DATE_OF_BIRTH                   PIC S9(8) COMP.
  20  NUMOF_COURSES                   PIC 9(4) COMP.
  20  NUMOF_BOOKS                     PIC 9(4) COMP.
  20  COURSES.
    25 COURSE OCCURS 8 TIMES DEPENDING ON NUMOF_COURSES.
      30  COURSE_ID                   PIC 9(8).
      30  COURSE_TITLE                PIC X(48).
      30  INSTRUCTOR_ID               PIC 9(8).
      30  NUMOF_ASSIGNMENTS           PIC 9(4) COMP.
      30  ASSIGNMENTS OCCURS 4 TIMES DEPENDING ON NUMOF_ASSIGNMENTS.
        40  ASSIGNMENT_TYPE           PIC X(12).
        40  ASSIGNMENT_TITLE          PIC X(48).
*                                     YYYYMMDD
        40  DUE_DATE                  PIC S9(8) COMP.
        40  GRADE                     PIC S9V9.
  20  BOOKS.
    25  BOOK OCCURS 1 TO 5 TIMES DEPENDING ON NUMOF_BOOKS.
      30  ISBN                        PIC X(10).
*                                     YYYYMMDD
      30  RETURN_DATE                 PIC 9(8) COMP.
```

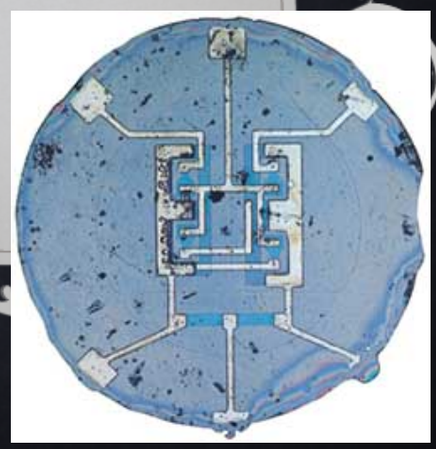
ERMA AND MICR

- 1955, Bank of America announces it's latest project with the Stanford Research Institute: ERMA the Electronic Record Method of Accounting
- Seeks to revolutionize the banking industry with raw computing power
- ERMA comes equipped with MICR (Magnetic Ink Character Recognition) allows computers to read checks and changes the consumer experience forever.



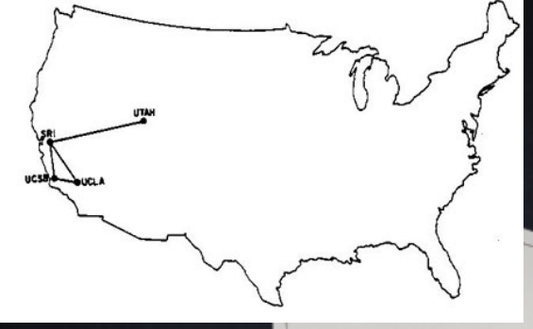
INTEGRATED CIRCUITS AND THE SPACE RACE

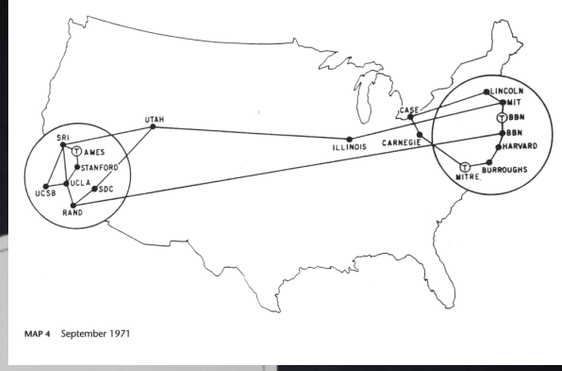
- The "Tyranny of Numbers"
- Seeking to miniaturize transistors, Jock Kilby and Robert Noyce separately come upon the Integrated circuit
- Combines transistors, resistors, capacitors, and all the wiring onto a single chip of semiconductor material
- Smaller, safer, faster, more reliable, easier to make, but more expensive
- Wasn't until the manned mission to the moon that they were put into use on a large scale (1960ish)



OF MICE AND FOLDERS

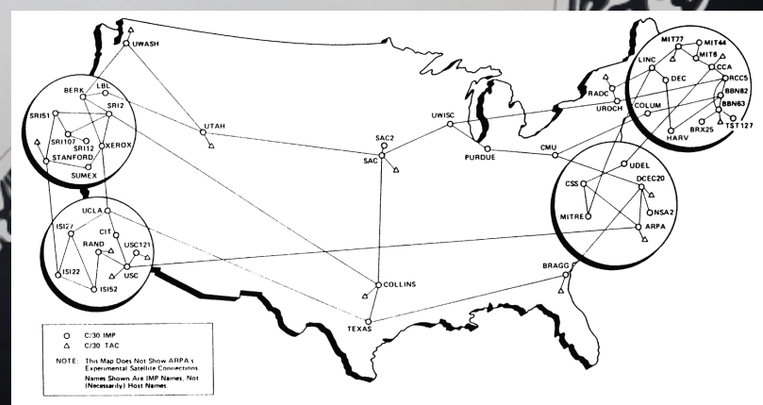
- Much like computer programming, computer interfaces are designed for and by a specialized group. All interaction is either physical or text.
- A wider group of individuals were using computers (they were getting smaller and more prevalent), they required a very specific skill sets to use.
- Machine interaction becomes a field of study
- Doug Engelbart invents mouse, uses it in conjunction with one of the first GUI's (1964)
- Not the first interactive tool, but one that stuck around along with the "office" metaphor (files, folders, projects, desktops)

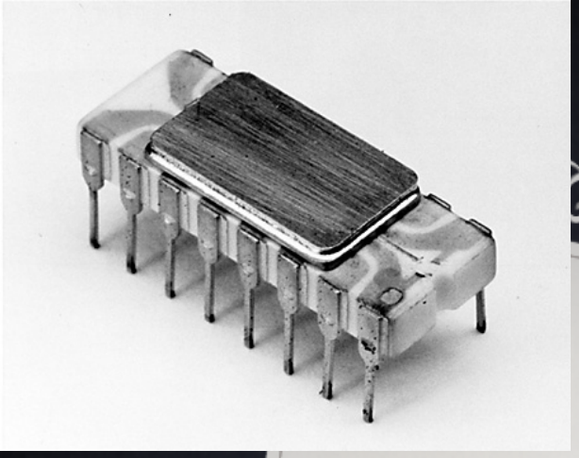




THE INTERNET AND GLOBAL THERMONUCLEAR WAR

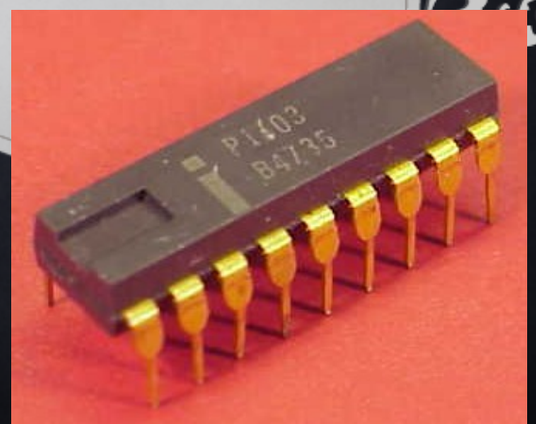
- 1969 ARPAnet, links computers with a standard protocol for the flow of information.
- Started with 4 university computers, grew quickly in both size and structure
- Innovations included: email, telnet (remote computing), and FTP (file transfer protocol).
- As it became larger, became unsafe for strictly military applications (MILnet)
- Spawned Local Area Networks (LAN's)
- NSFnet (National Science Foundation network) starts as a LAN, branches out to connect other LAN's (1986), starts to replace ARPAnet (closed 1990) for universities, evolves into the current internet.





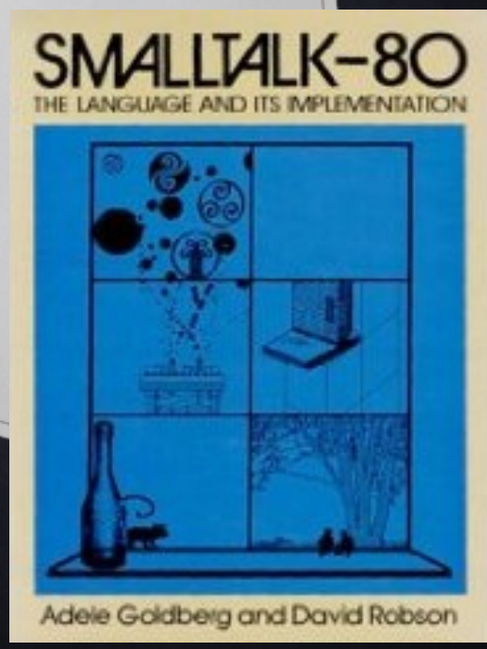
RAMMING SPEED! AND MICROPROCESSORS

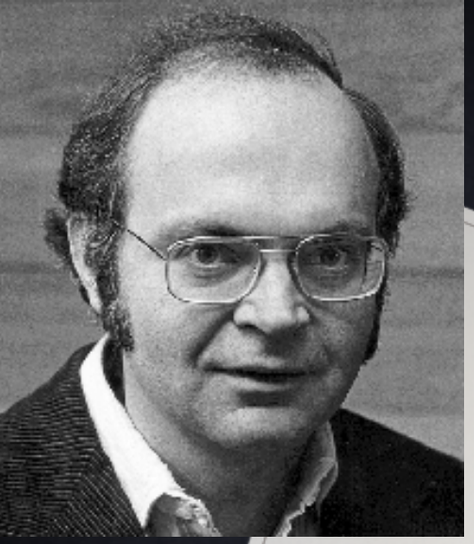
- The integrated circuit improves processing speed so much that memory speed (especially for non-sequential memory) becomes an issue.
- In 1970, Intel comes out with the first Dynamic Random Access Memory (DRAM)
- RAM had been around since 1947, this makes it smaller and faster, mass marketed.
- 1969-1971 Fredrico Faggin at Intel designs the first microprocessor, thus completing all of the hardware components necessary for the personal computer



SMALLTALK AND OBJECTS

- 1960's and 70's saw the rise of many new programming languages including BASIC, C (what comes after B), Pascal, and Smalltalk
- Smalltalk is one of the most influential object oriented languages, based on the ideas of encapsulation, message passing, and modular programming.
- Revolutionized how computer programs were written.

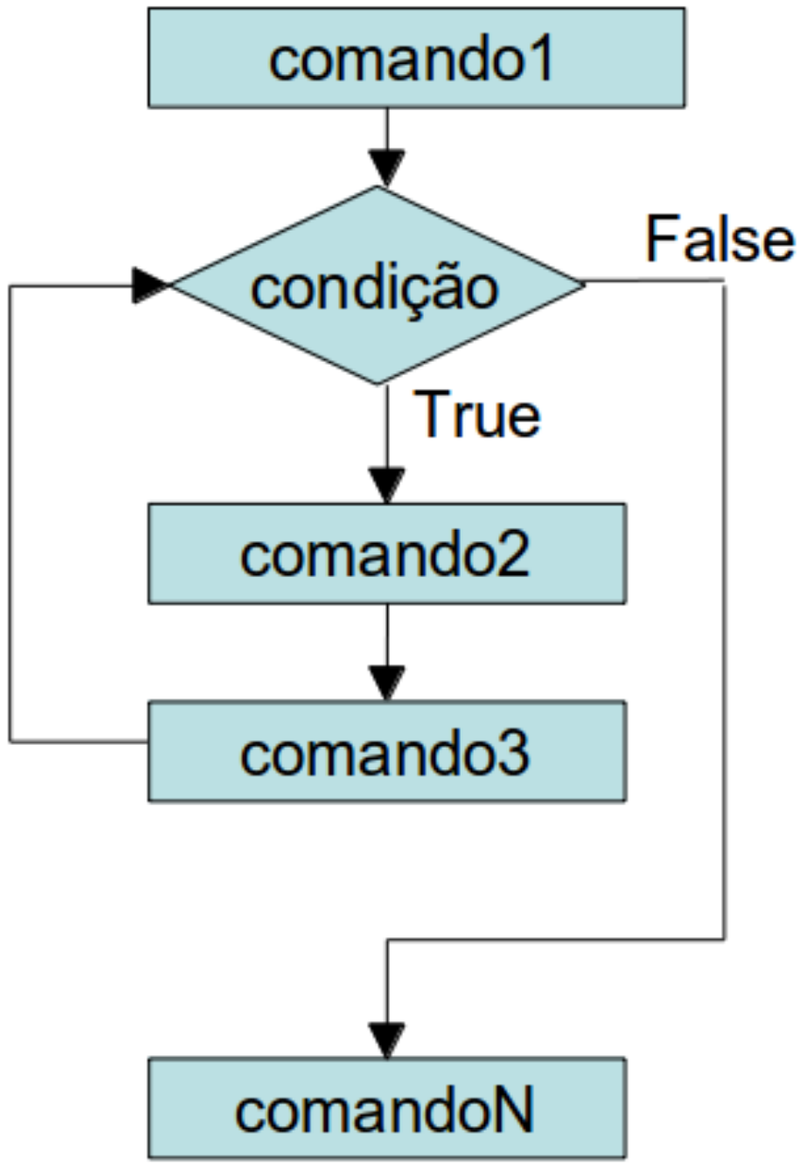




DONALD KNUTH

- Often called the "Father of Computer Science"
- As a child he won an anagram competition for "Ziegler's Giant Bar", finding over 4,500 words that could be made out of those letters (2,000 more than the judges of the competition had found)
- Barely chose physics over music as a major at Case Institute of Technology
- Wrote: "The Art of Computer Programming" a guide to programming algorithms and their analysis that helped set computer science apart form other disciplines.

Começando a conhecer Python




```
comando1
while  condição:
        # bloco de comandos.
        comando2
        comando3
        :

        comandoN
```

Exemplo simples:

$n = 0$
$M = 11$
while $n < M$:
    $n = n + 1$

Exemplo simples:

```
n = 0
M = 11
while n < M:
        n = n + 1
```

```
soma = 0 # vamos definir um outra variável
n = 0
M = 11
while n < M:
        n = n + 1
        soma = soma + n
```

Exemplo simples:

$soma = 0$ # vamos definir um outra variável
$n = 0$
$M = 11$
while $n < M$:
    $n = n + 1$
    $soma = soma + n$

Top 7 excuses for not doing homework

1. I accidentally divided by zero and my paper burst into flames.
2. I could only get arbitrarily close to my textbook. I couldn't actually reach it.
3. I have the proof, but there isn't room to write it in this margin.
4. I was watching the World Series and got tied up trying to prove that it converged.
5. I have a solar powered calculator and it was cloudy.
6. I locked the paper in my trunk, but a four-dimensional dog got into the trunk and ate it.
7. I could have sworn I put the homework inside a Klein bottle, but this morning I couldn't find it.

Se cuidem!