Computer Programming I

Ming-Feng Tsai (Victor Tsai)

Dept. of Computer Science
National Chengchi University

Course Introduction

Course Information (1)

- Instructor
  - Name: Ming-Feng Tsai (Victor Tsai)
  - 姓名：蔡銘峰
  - Email: mftsai@cs.nccu.edu.tw
  - Office: 大仁樓 413 室
  - Office Hours: Wed. 1-2pm or by arrangement
- Time
  - Lecture: Wed. 2-4 sessions (09:00 - 12:00)
  - Lab: Thur. FG sessions (19:00 - 21:00)
- Place
  - Lecture (正課): **大仁 301 教室**
  - Lab (實習課): **資科系電腦教室**

Course Information (2)

- Teaching Assistants (TAs)
  - Name: 吳武峰、簡傑、洪睿宸、陳弈玄
  - Office Hours: **TBA**
- Textbooks
  - C: How to Program (9th Edition), Paul Deitel and Harvey M. Deitel. (全華代理) (ISBN-13: 978-0132990448)
  - The C Programming Language (2nd Edition), K&R. (全華代理) (ISBN-13: 978-0131103627)
  - UNIX Unbounded a beginning approach (5th Edition), Amir Afzal. (ISBN-13: 978-0131194496)

Course Information (3)

- Enrollment: Freshmen of CS department
- Prerequisites: Basic PC knowledge
- Grading
  - Midterm: 30%
  - Final Exams: 35%
  - Labs & Assignments: 35%
  - ~~Bonus (participation): < 5%~~
- Assignments: 8 to 10 programming assignments
- Late Policy
  - Original points - n * 20 points (n = the number of delay days)
  - For example, 80 - 3 * 20 = 20 points with 3 days delay
  - Basically, no points after 5 days

Course Information (4)

- Grade Appeal
  - Student has two weeks (from the date handed back) to request a re-grade or appeal the grade recorded in the GradeBook. A re-grade will be performed on the entire Lab/Assignment/Exam and can lower the score!!
  - In any appeal procedure, it's the student's responsibility to keep possession of his/her Lab/Assignment/Exam. In the process of a re-grade, a student has to arrange for a TA to modify the grade in the presence of the student. A student should not hand over any material to the TA for keeping.
  - A lost or missing Lab/Assignment/Exam is no reason for a modification of a grade.

Course Information (5)

- Account: UNIX account on ghost.cs.nccu.edu.tw
- Website: http://wm5.nccu.edu.tw
- Assignment Submission
  - Electronic Submission
    - Submit your codes via “submit” program
    - Make sure if your submission is correct!!

Course Information (6)

- SEVER PENALTIES ARE APPLIED FOR THE FOLLOWINGS
  - Actively sharing (or copying) all or parts of someone else's code/answers on Assignment/Exam
  - Passively allowing the sharing (or copying) of your own codes/answers on Assignment/Exam
- What is Cheating?
  - On Assignments: allowing others to view your code or reading some else's source code constitutes cheating. Students should protect their own work so that anther student cannot copy any part of their code. Therefore, if copying has been detected, it will be assumed that cheating has occurred by all parties involved.
  - On Exams: allowing others to view your answers or reading someone else's answer constitutes cheating.

Course Information (7)

- Cheating
  - **Don’t do it!!**
  - We’ll catch you, and we’ll punish you!!
- Penalties
  - A zero score for the assignment and a deduction of 20 points from the student’s course point total.
  - A second occurrence of cheating will mean an automatic grade of **ZERO** in the course and the notification of a Dean in student’s college.

Course Outline (1)

- 本課程將以C 語言並且以UNIX 環境為主，介紹程式設計所需的基礎知識，包括：
  - 使用電腦搜尋資料、編輯文件的基礎技能
  - 使用文字編輯器及程式編譯器編譯程式的能力
  - 使用整合基工具進行編譯及偵錯的能力
  - 瞭解C 語言的基本組成與資料型態
  - 結構化程式設計
  - 程式流程控制
  - C 函式
  - 陣列與指標
  - 結構與列舉
  - 輸出與輸入
  - 基本資料結構
  - 其他進階主題

Tentative Schedule (1)

Week	Topics
1	Course Introduction; World of Programming
2	Unix Environment; Utilities of Development
3	Introduction of the C language
4	Structured Program Development
5	Program Control Flow Statements
6	Function; Array
7	Pointer (I)
8	Pointer (II)
9	**Midterms**

Tentative Schedule (2)

Week	Topics
10	Strings
11	Structure; Union and enum
12	Formatted I/O
13	File Processing
14	Basic Data Structure
15	Problem Solving
16	Other C topics
17	OOP and Review
18	**Final Exams**

Questions?

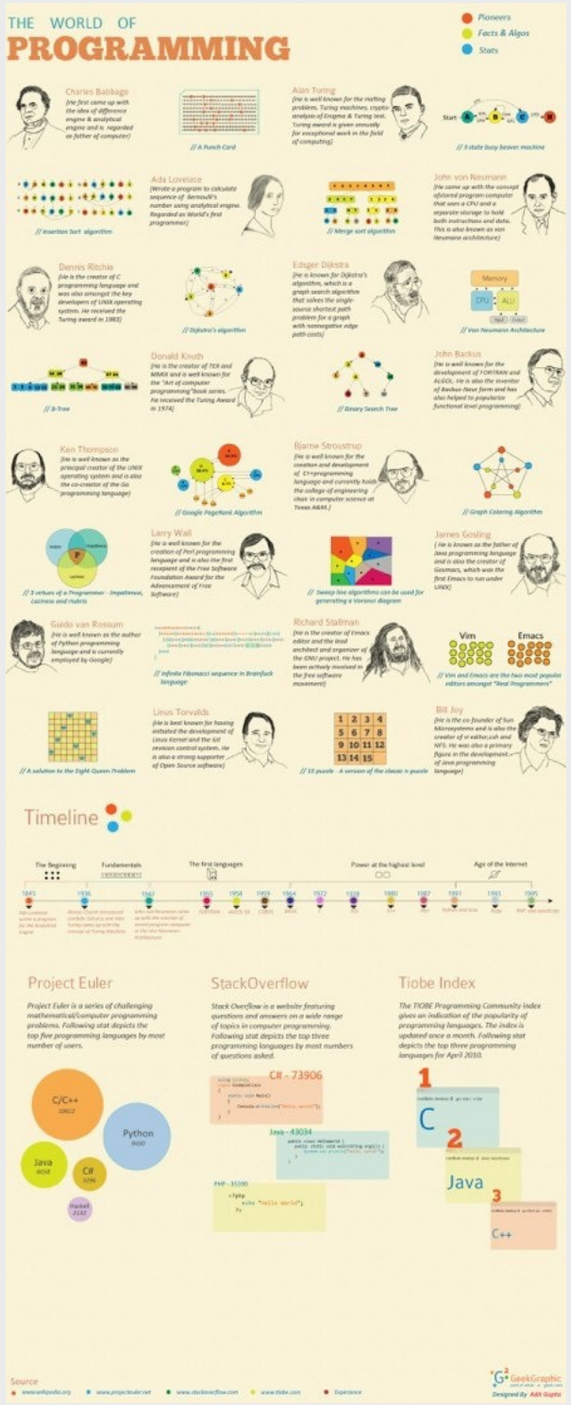
加簽順序

- 本課程為**資科系大一基礎必修課**，加簽順序為:
  - 1.本系本班、轉系
  - 2.重修
  - 3.雙修
  - 4.輔系
  - 5.其他（依加簽序號遞補）
- **待選課加退選開始後，請於將正課加簽單列印出來帶至課堂上手動加簽，依上述順序進行加簽至雙輔生結束為止！（如沒有加簽到，歡迎旁聽）**

World of Programming

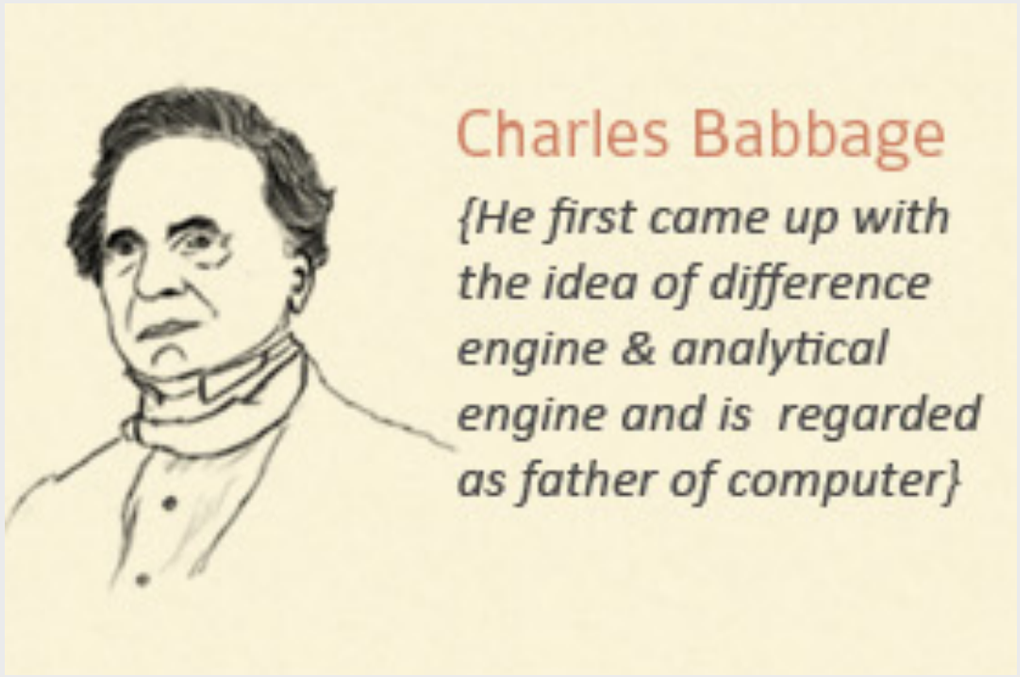
World of Programming (1)

- Infographic
  - Pioneers in the field of programming
  - History and current statistics of various programming languages



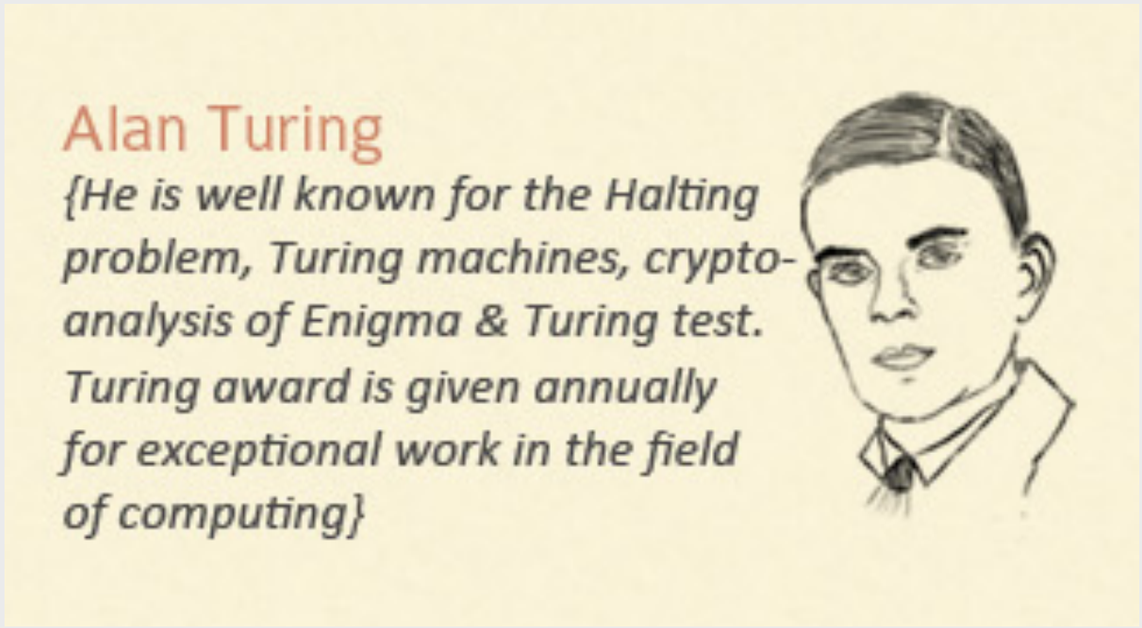
World of Programming (2)

- Charles Babbage
  - In 1791 – 1871, an English mathematician, philosopher, inventor, and mechanical engineer who originated the concept of a programmable computer
  - In 1991, a perfectly functioning difference engine was constructed from Babbage's original plans
  - Considered a "Father of the Computer", Babbage is credited with inventing the first mechanical computer that eventually led to more complex designs



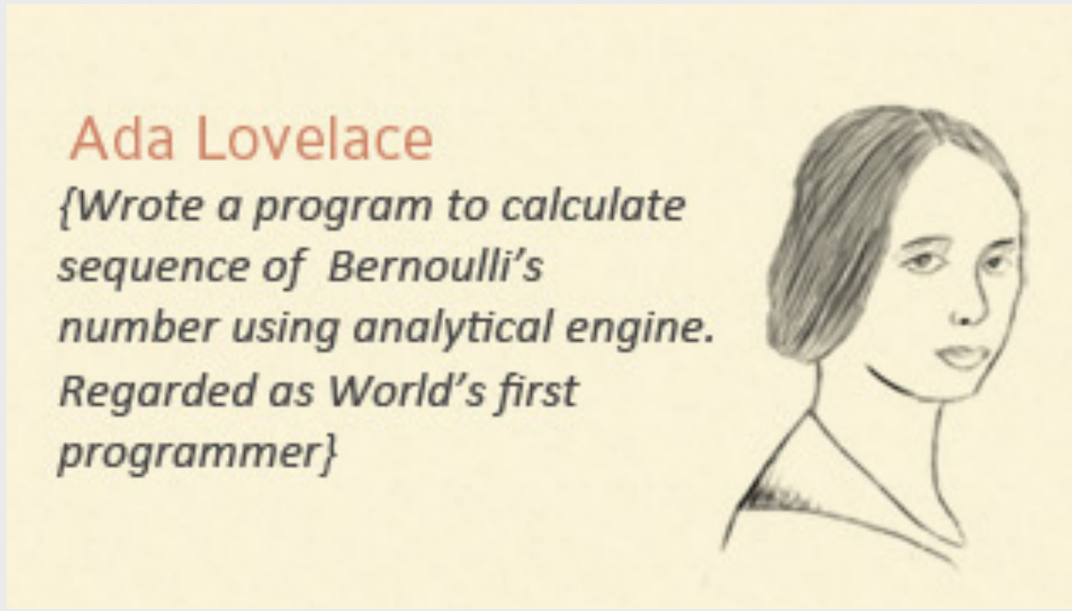
World of Programming (3)

- Alan Turing
  - The Turing Machine was described by Alan Turing in 1937, who called it an "automatic-machine".
  - Alan Turing proved in 1936 that a general algorithm to solve the Halting Problem for all possible program-input pairs cannot exist. We say that the halting problem is undecidable over Turing machines.



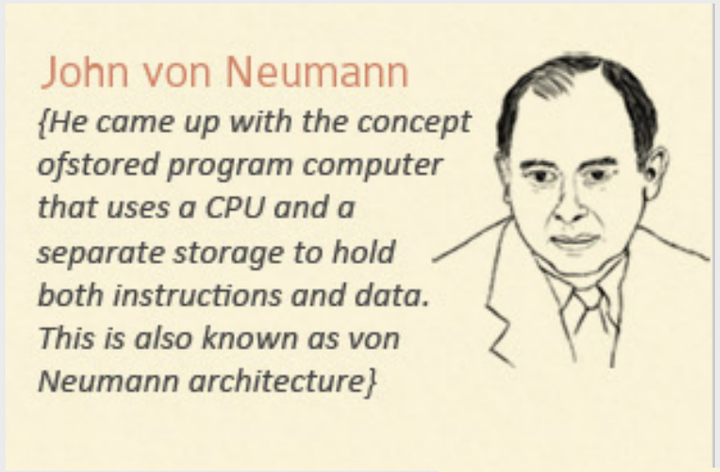
World of Programming (4)

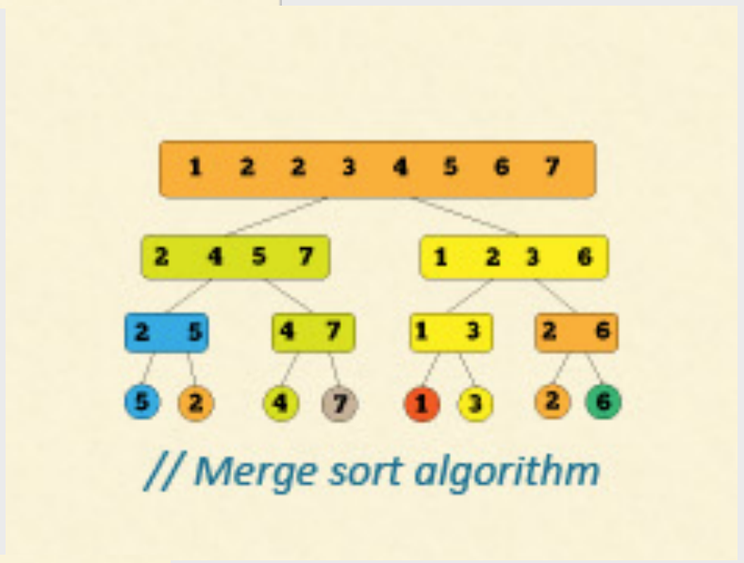
- Ada Lovelace
  - An English writer chiefly known for her work on Charles Babbage's early mechanical general-purpose computer, the analytical engine
  - Her notes on the engine include what is recognized as the first algorithm.
  - She is sometimes portrayed in popular culture as the "world's first computer programmer."

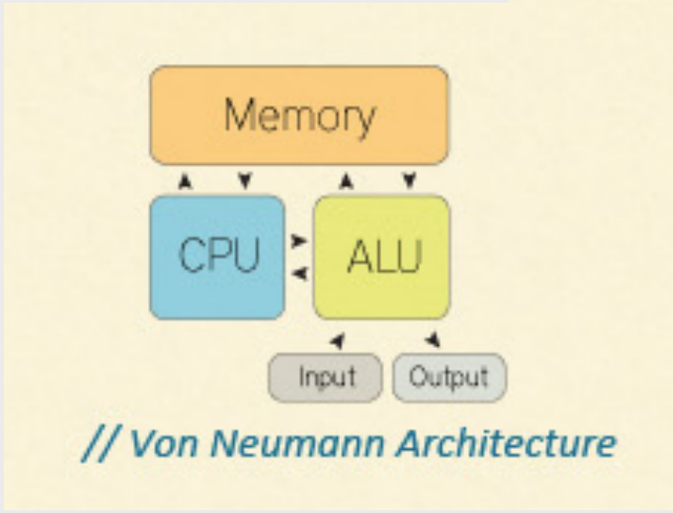


World of Programming (5)

- John von Neumann
  - A Hungarian American mathematician who made major contributions to a vast range of fields, including set theory, functional analysis, numerical analysis
  - In 1945, he invented Merge Sort.
  - Invented Von Neumann Architecture, the most popular architecture in the world

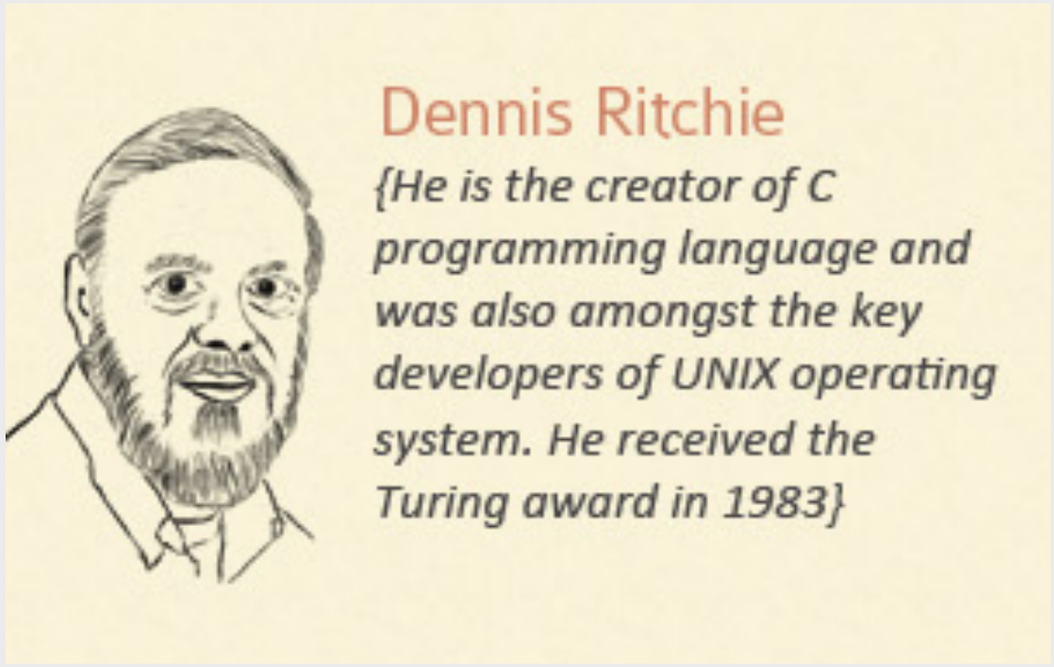






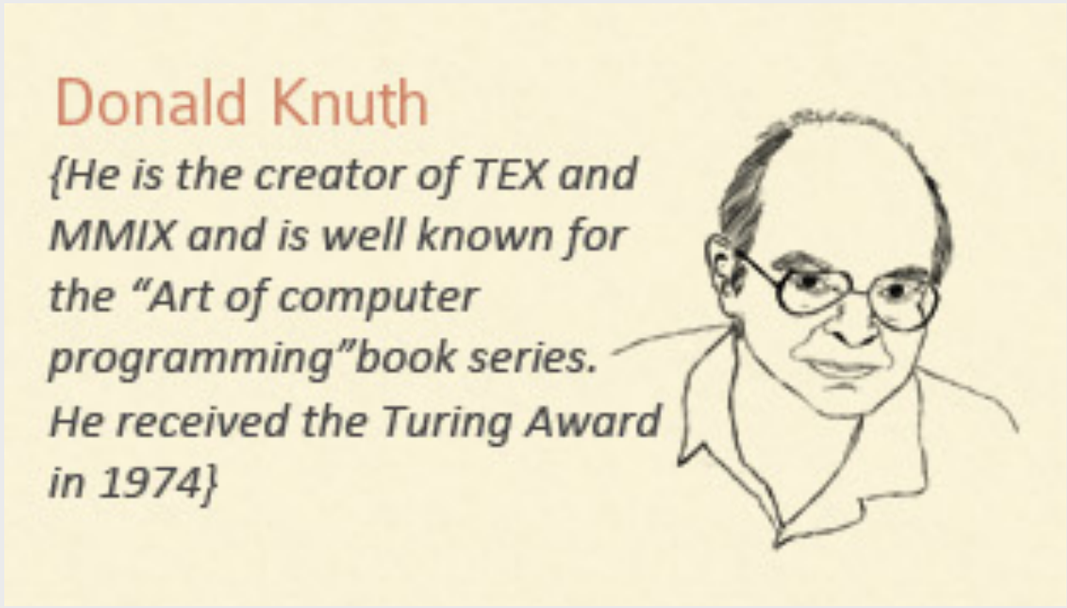
World of Programming (6)

- Dennis Ritchie
  - An American computer scientist notable for developing C and for having influence on other programming languages, as well as operating systems such as Multics and Unix
  - He received the Turing Award in 1983.
  - One of the authors of "The C Programming Language, K&R"



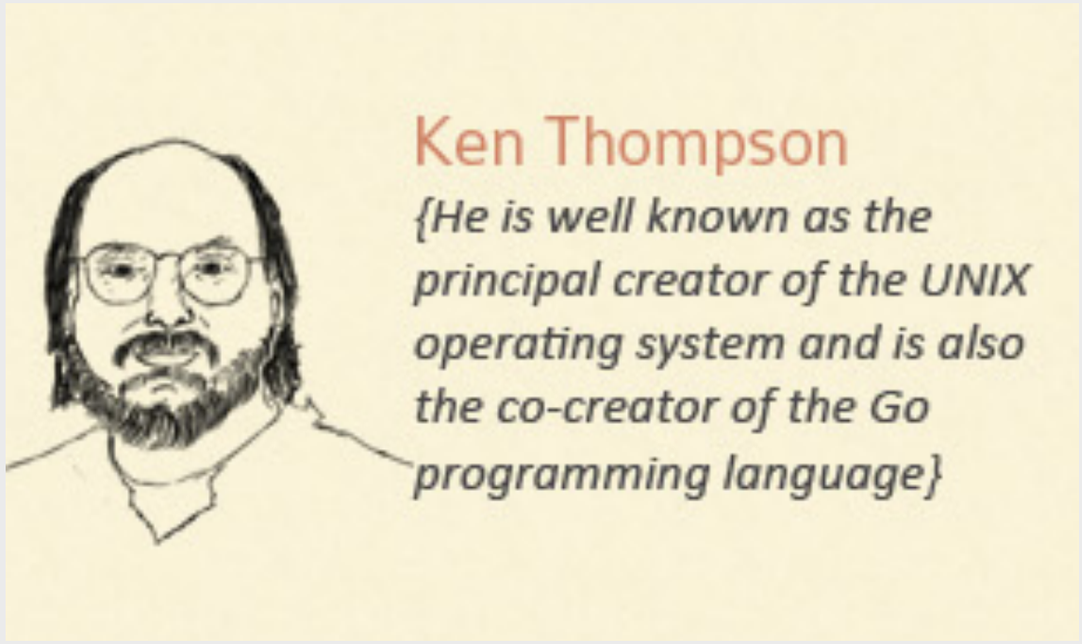
World of Programming (7)

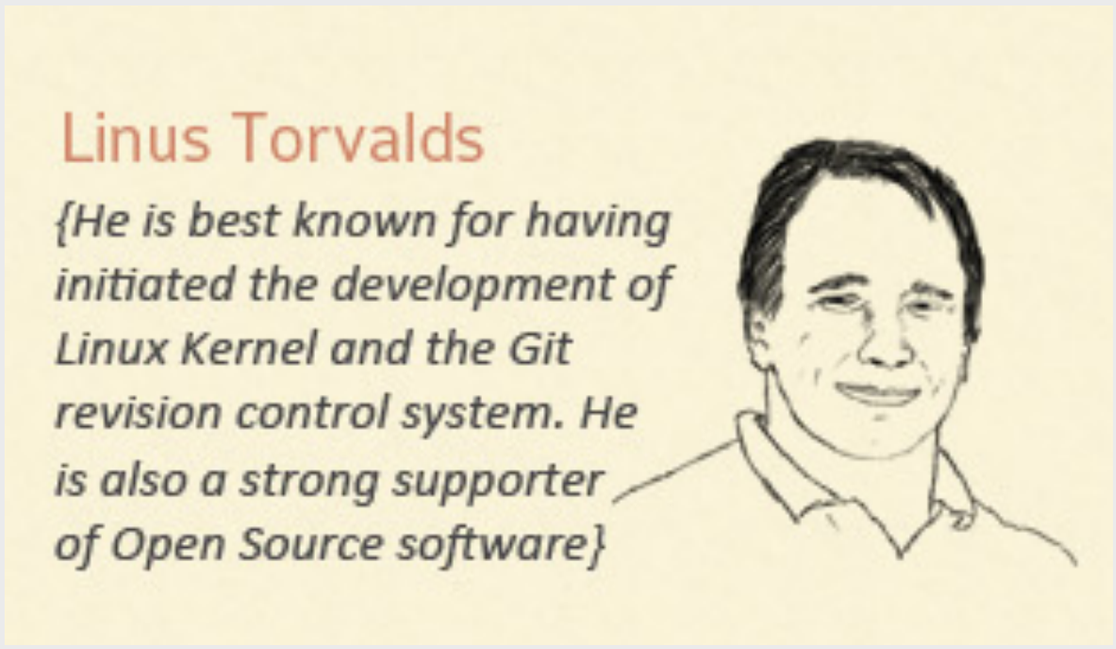
- Donald Knuth
  - A computer scientist and Professor Emeritus at Stanford University
  - Author of the seminal multi-volume work The Art of Computer Programming
  - Knuth has been called the "father" of the analysis of algorithms.
  - Creator of TEX
  - Received Turning Award in 1974



World of Programming (8)

- Ken Thompson
  - An American pioneer of computer science who is the principal creator of Unix system
  - In 2007, co-invented the Go programming language at Google
- Linus Torvalds
  - A Finnish software engineer and hacker, best known for having initiated the development of the Linux kernel
  - He also created the revision control system git.

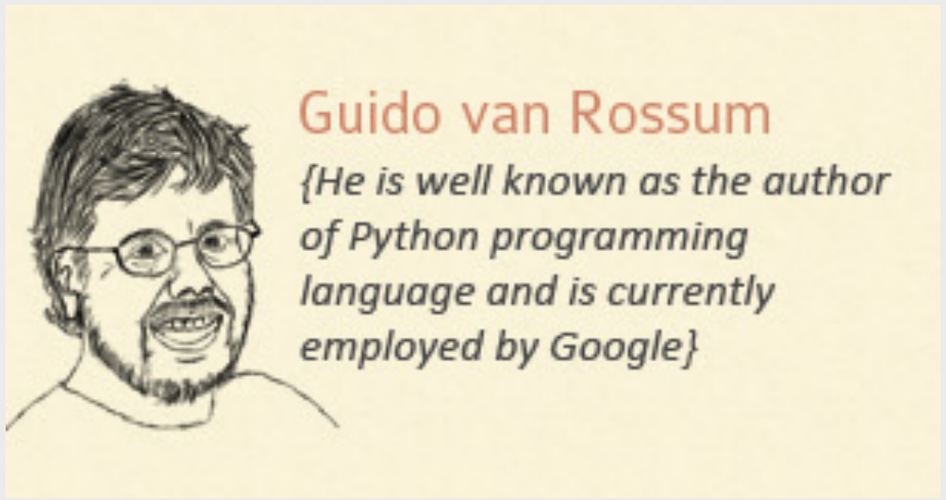




World of Programming (9)

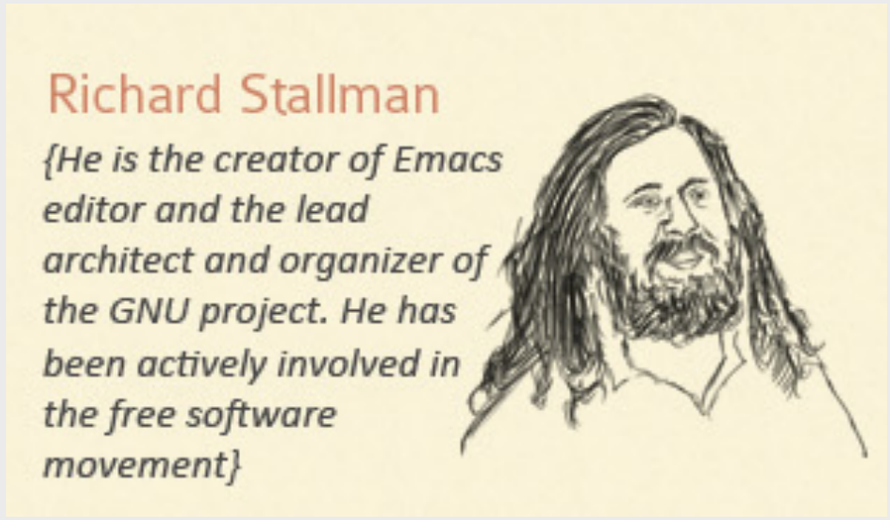
- Larry Wall
  - A programmer and author, most widely known for his creation of the Perl programming language in 1987.

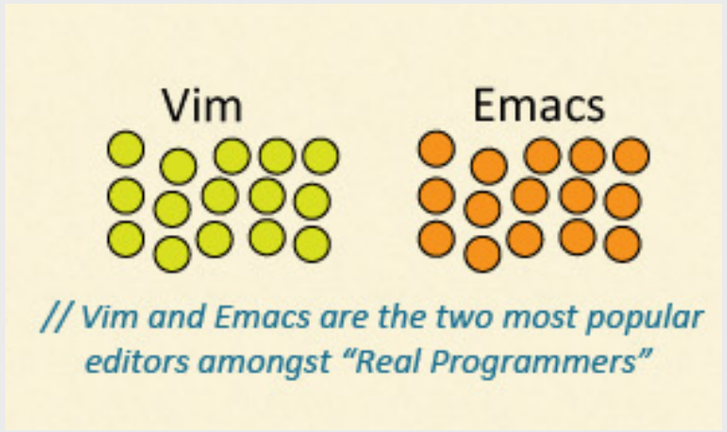
- Guido van Rossum
  - A Dutch computer programmer who is best known as the author of the Python programming language
  - He is currently employed by Google, where he spends half his time working on Python development.



World of Programming (10)

- Richard Stallman
  - An American software freedom activist and computer programmer
  - Launched the GNU Project
  - Founded the Free Software Foundation
  - Also invented Emacs
- Bill Joy (William Nelson Joy)
  - An American computer scientist
  - Co-founded Sun Microsystems in 1982
  - Some of his most notable contributions were the vi editor, NFS, and csh.





World of Programming (11)

- Brainfuck language
  - An esoteric programming language noted for its extreme minimalism
  - Urban Müller created brainfuck in 1993 with the intention of designing a language which could be implemented with the smallest possible compiler.
  - Also known as brainf***, brainf*ck, brainfsck, b****fuck or BF language

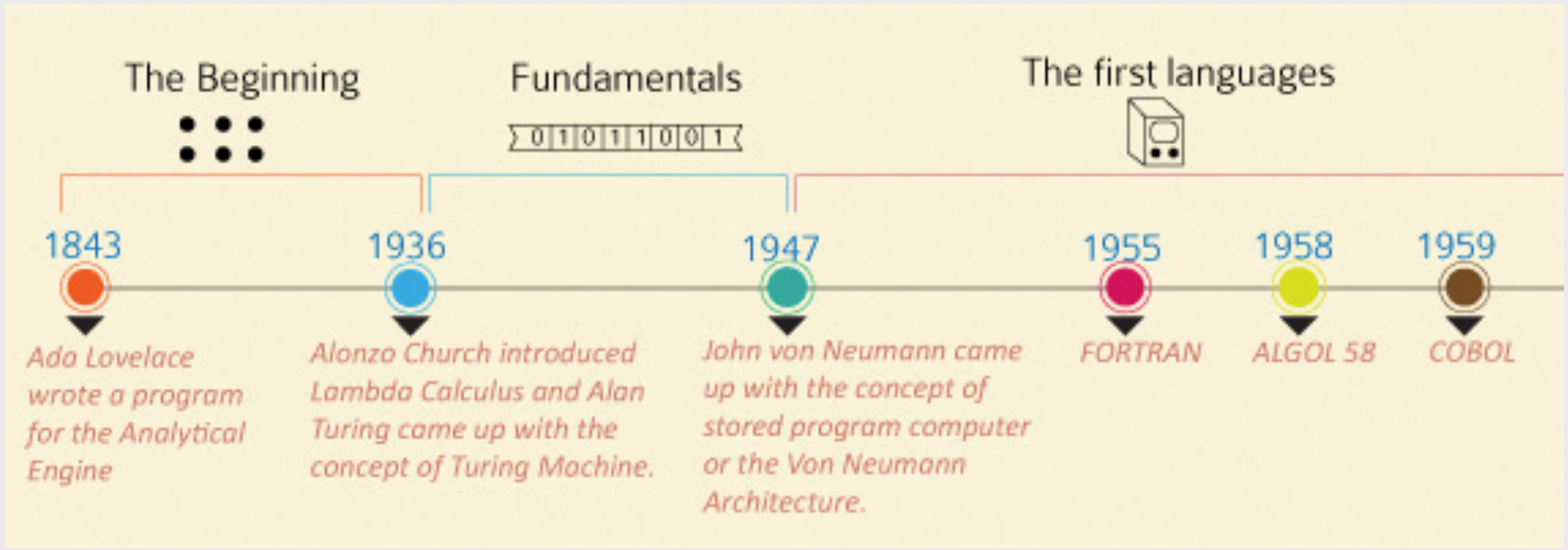
```
>++++++++++>+>+[
  [+++++[>++++++++<-]>.<++++++[>-------<-]+<<<]>.>>[
    [-]<[>+<-]>>[<<+>+>-]<[>+<-[>+<-[>+<-[>+<-[>+<-[>+<-
      [>+<-[>+<-[>+<-[>[-]>+>+<<<-[>+<-]]]]]]]]]]+>>>
  ]<<<
]

// Infinite Fibonacci sequence in Brainfuck
   language
```

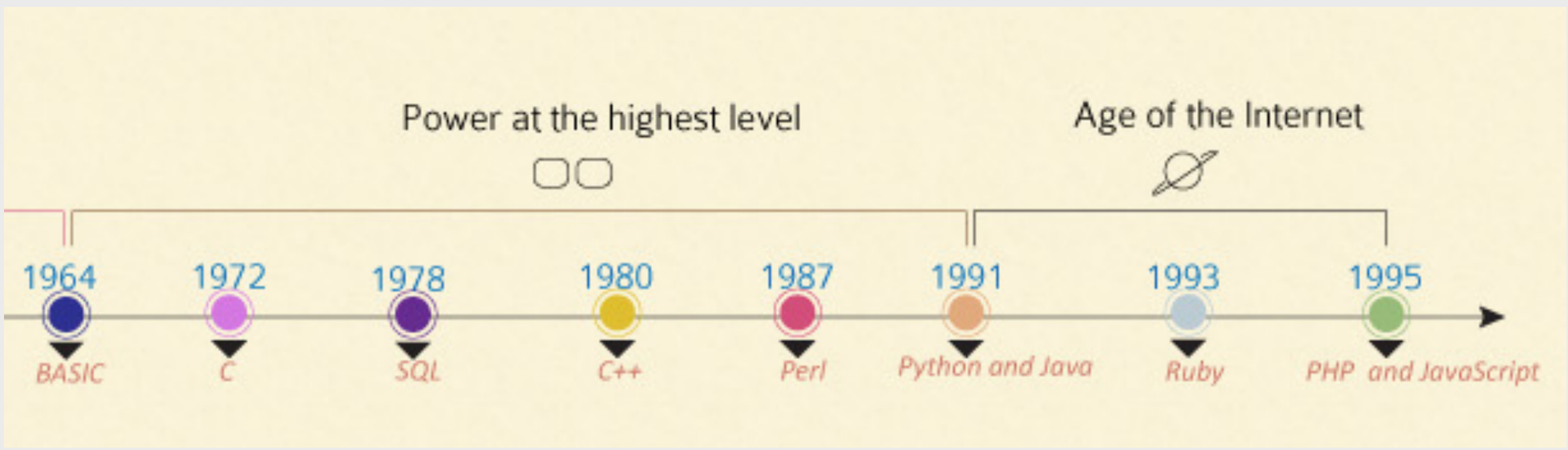
```
+++++ +++++             initialize counter (cell #0) to 10
[                       use loop to set the next four cells to 70/100/30/10
    > +++++ ++              add  7 to cell #1
    > +++++ +++++           add 10 to cell #2
    > +++                   add  3 to cell #3
    > +                     add  1 to cell #4
    <<<< -                  decrement counter (cell #0)
]
> ++ .                  print 'H'
> + .                   print 'e'
+++++ ++ .              print 'l'
.                       print 'l'
+++ .                   print 'o'
> ++ .                  print ' '
<< +++++ +++++ +++++ .  print 'W'
> .                     print 'o'
+++ .                   print 'r'
----- - .               print 'l'
----- --- .             print 'd'
> + .                   print '!'
> .                     print '\n'
```

Hello World!

World of Programming (12)

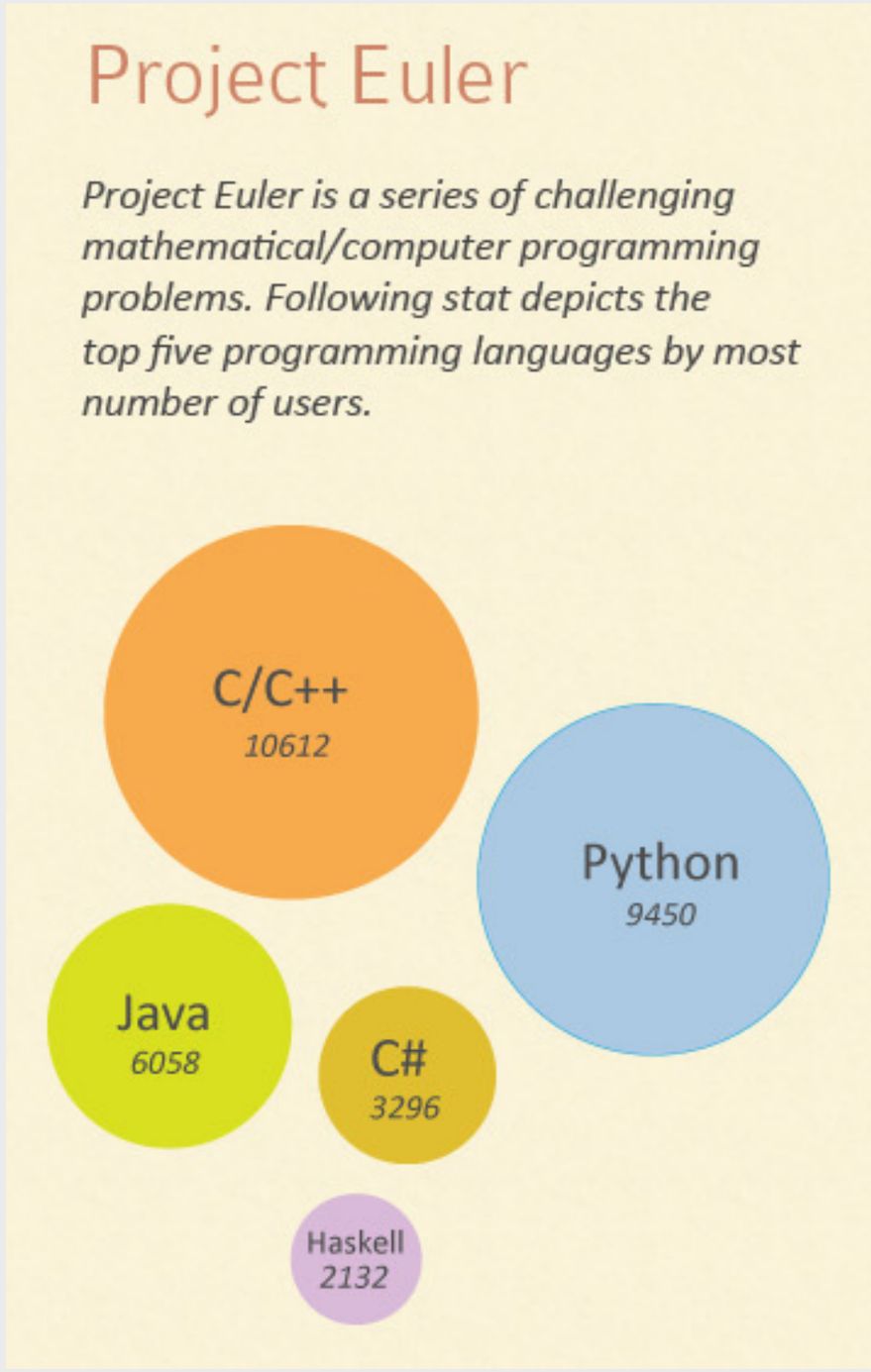
Timeline





World of Programming (13)

- Project Euler
  - A website dedicated to a series of computational problems intended to be solved with computer programs
  - The project attracts adults and students interested in mathematics and computer programming.



World of Programming (14)

- Tiobe Index
  - An ordered list of programming languages, sorted by the frequency of web search using the name of the language as the keyword
  - The index covers searches in Google, Google Blogs, MSN, Yahoo!, Wikipedia and YouTube. The index is updated once a month.

World of Programming (15)

- Stack Overflow
  - A website part of the Stack Exchange network featuring questions and answers on a wide range of topics in computer programming
  - A must-have programming resource