

Cross-platform object oriented C++

- Part 1 – Why choose C / C++?
Why object orientation?
(technology and strategy)
- version: 2012_02_12
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 - www.sbVB.com.br
 - sbvb@sbvb.com.br

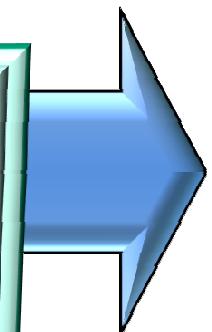




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Apresentação do professor

Apresentação
do professor



versão 2012_02_16 UFRJ



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Resumo da formação acadêmica

- MBA em gestão do conhecimento e inteligência empresarial pelo CRIE em 2000 (www.crie.coppe.ufrj.br).
- Ph.D. em Engenharia de Controle, por Chiba University (Japão) em 1998 (www.chiba-u.ac.jp).
- M.Sc. em Engenharia Elétrica pela COPPE-UFRJ em 1991 (www.coppe.ufrj.br).
- Engenheiro Eletrônico pelo DEL-UFRJ em 1987 (www.del.ufrj.br)
- Técnico Eletrônico pelo CEFET-RJ em 1981 (www.cefet-rj.br)



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Atividades

- Professor Associado da UFRJ
 - desde 1991
 - Graduação
 - DEL (Departamento de Engenharia Eletrônica e de Computação da UFRJ – www.del.ufrj.br)
 - ECI (Engenharia de Computação e Informação)
 - ECA (Engenharia de Controle e Automação)
 - Pós graduação
 - PESC (Programa de Engenharia de Sistemas e Computação –<http://www.cos.ufrj.br/>), na área de otimização.



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Professor / consultor

- Tópicos em tecnologia
 - cloud computing (web-services)
 - mobile devices (smartPhones e tablets)
 - computação científica (numérica)
 - otimização & pesquisa operacional
- Desenvolvimento de software
 - com ênfase em utilização de tecnologias gratuitas, padrões abertos e múltiplas plataformas.



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Atividade de Extensão

- Coordenação de curso de extensão pela Escola Politécnica da UFRJ
“Software para Cloud Computing e Dispositivos Móveis”
- Desde 2011
- <http://www.poli.ufrj.br/sbvb/>

The screenshot shows a web browser window with the title bar "UFRJ-POLI-sbVB". The address bar contains the URL "www.poli.ufrj.br/sbvb/". The page content features the UFRJ Politécnica logo on the left and the Universidade Federal do Rio de Janeiro Escola Politécnica logo on the right. A Facebook-like interface shows "+1 Like" and "4 Send". Below this, the text "Conjunto de cursos de extensão na área de Software para Cloud Computing e Dispositivos Móveis" is displayed, followed by the subtitle "reinventando a sociedade com as tecnologias do século 21". A section titled "Android Básico:" includes a green Android robot icon and descriptive text about the course's purpose and content.

"Software para Cloud Computing e Dispositivos Móveis" é o nome de um conjunto de cursos, que podem ser feitos separadamente. O primeiro curso desse conjunto é o "Android Básico", descrito abaixo.

Android Básico:

A finalidade desse curso é ensinar técnicas básicas de desenvolvimento de software para smartPhones e tablets com sistema Android.

Serão mostradas algumas possibilidades de arquitetura de sistemas de software contendo software para Android ligado a software na cloud.



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Interesses em tecnologia

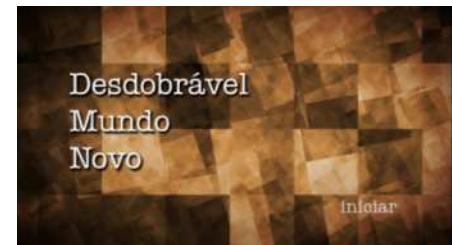
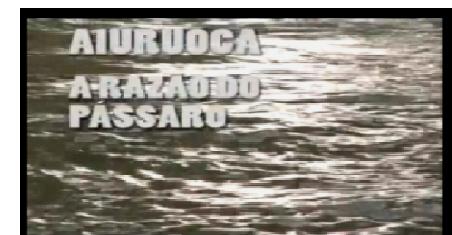
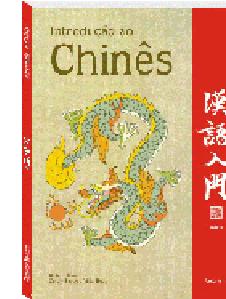
- **Tecnologias para desenvolvimento de software**
 - Software for smartPhones: Android, iOS
 - Cloud-computing, web-services, tomcat, MVC
 - Computação científica e numérica
 - HPC – High Performance Computing (OpenMP, MPI, GPGPU)
 - Orientação a objetos, C++, Java, Objective-C, CUDA.
 - Desenvolvimento de software multiplataforma
 - Interface GUI: wxWidgets, Qt (cross-platform)
 - Linux (como alternativa para baixar o custo de implantação de sistemas, reduzindo a “gordura” que representa o Windows)
 - Scrum (metodologia para desenvolvimento ágil de software / metodologia para gestão de projetos)
- **Otimização & pesquisa operacional**
 - Clusterização & data-mining
 - Otimização com e sem restrições
 - Suavização & penalização hiperbólica



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Algumas Produções

- 2009: livro
 - “Introdução ao Chinês” – livro que dá referências culturais básicas sobre a civilização chinesa, inclusive vários aspectos do idioma chinês. Ideal para quem está em fase inicial de interesse pela China.
 - ISBN 978-85-7650-202-9
 - www.selectos.net/livros/introducaoaochines
- 2010: documentário: “Aiuruoca - A Razão do Pássaro”
 - Documentário a respeito do desenvolvimento local da região do vale do Aiuruoca (cidade de Itamonte, MG)
 - Trailer: www.youtube.com/watch?v=XjN2Rfx41pg
- 2012: documentário: “DMN – Desdobrável Mundo Novo”
 - Documentário a respeito da psicologia do empreendedor, pesquisando vários tipos de empreendimento
 - Trailer: www.youtube.com/watch?v=TJUnGDio3Ho





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Algumas Produções

- 2011_10_04: AgileMessage
 - Aplicativo gratuito no Android Market
 - Panfleto eletrônico divulgando o curso de Android
 - <https://market.android.com/details?id=am.android>

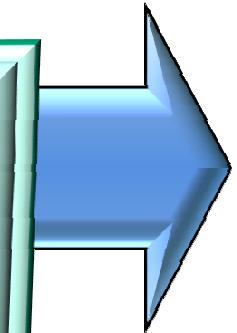
The screenshot shows the Google Play Store page for the 'AM Android Course' application. The main image features a green Android icon with the letters 'AM'. Below it is a rating of 5 stars from 1 user. A large blue 'INSTALL' button is prominent. To the right, there's a 'Description' section with the text: 'Advertisement of course of software development for Android'. Below the description is a link to 'Visit Developer's Website'. Underneath the main image, there's a 'Users who viewed this also viewed' section listing other apps like 'Blackboard Mobile™ Learn', 'My Class Schedule (free)', and 'History Eraser'. On the right side of the page, there are two screenshots of the app interface. The top screenshot shows a menu with sections like 'Informações sobre Curso de Android', 'Software para Cloud Computing e Dispositivos Móveis', and 'Android Básico'. The bottom screenshot shows a social networking interface with icons for 'Info', 'Videos', 'Inscreva-se', 'Social', 'Avisar Amigos', and 'Sobre'.



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Course contents

course contents





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Breve História de todas as coisas (do Big Bang aos smartPhones)

- Formação do sistema solar e da Terra
- Evolução da vida no planeta Terra
- O meteoro e a extinção dos dinossauros
- Evolução & surgimento do ser humano
- Civilização
- Tecnologia da Informação





algorithm to calculate grade

```
// code to calculate grade and
// call approved() or fail()
// all grades are in the range 0 to 10

double calculate_grade(double presence,
    double test_1, double test_2, double test_3,
    double practical_work, double final_test)
{
    double partial_grade = (presence + test_1 +
        test_2*2 + practical_work*2 + test_3*2) / 8;

    double final_grade;
    if (partial_grade >= 7.0)
        final_grade = partial_grade; // direct approve
    else
        final_grade = (partial_grade + final_test) / 2;

    // approved or fail, processed by
    // UFRJ academic system
    if (final_grade >= 5.0)
        approved();
    else
        fail();

    return final_grade;
}
```



Items of final grade

1. Presence (weight 1)
2. Test 1 (weight 1)
3. Test 2 (weight 2)
4. Practical Work - PW (weight 2)
5. Test 3 (weight 2)



Adjusting grades

- There's no second call for tests. If you're absent, the grade is zero.
- If there's need to place a grade for absence in a test, or to “round up” a grade to help approve, the “extra grade” must come from excellence of the practical work.

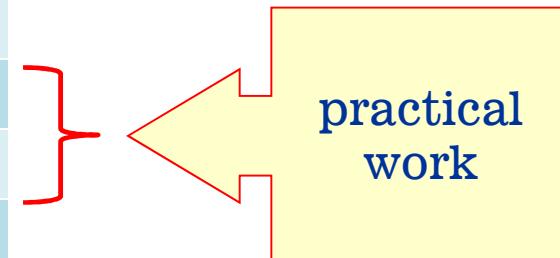


Outline of course

Part / test	#class
1	2
2	9
test_1	1
3	9
4	6
test_2	1
5	3
6	4
7	6
test_3	1
8	1
9	1
final test	1
TOTAL	45

one class = 2 hours

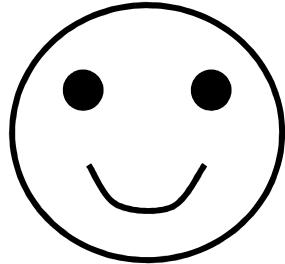
Laboratory is done
“on the fly”



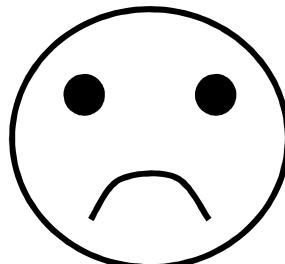


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Practical Work



- Positive stars
 - code in English
 - good coding standards
 - software to be actually used, or inspired in real necessity
 - usage of “extra features”, such as
 - database (SQLAPI)
 - GUI (Qt, wxWidgets)
 - XML (Xerces), Json, etc.
 - other (sound, image, socket, thread, etc.)
 - deliver work before deadline
 - sophisticated software architecture
 - e.g. powerful marriage (late bind and explicit link)



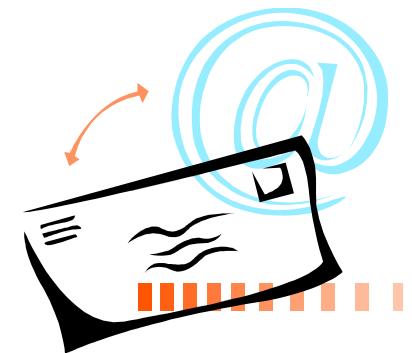
- Negative stars
 - deliver work after deadline
 - code not in English
 - bad coding standards



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Getting support by email

- Email your questions to the group below to get email support
- http://groups.google.com/group/cpp_oo_scientific
- cpp_oo_scientific@googlegroups.com





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Brief history of everything

brief history
of everything



version 2012_02_12



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formation of universe

formation of
the universe



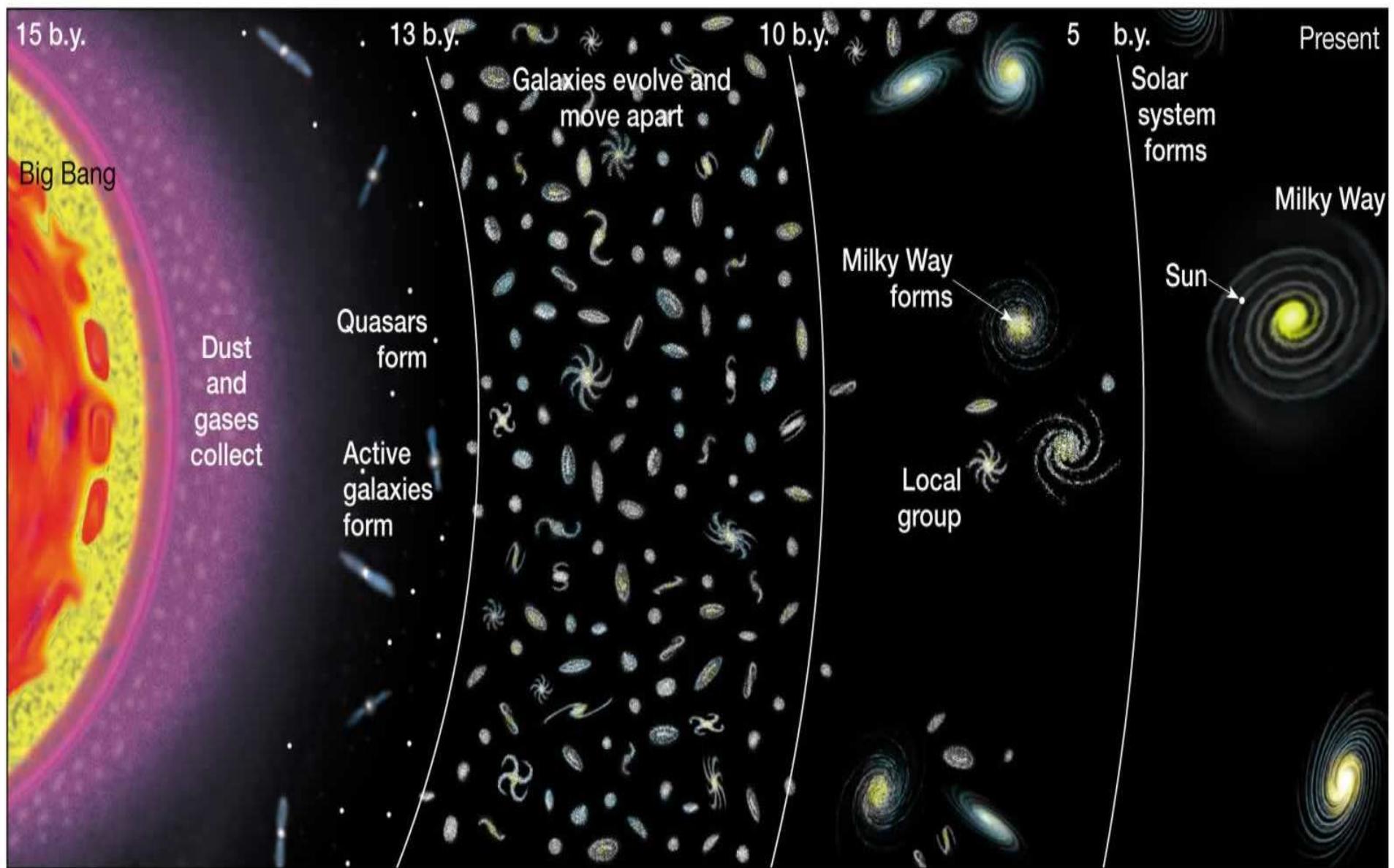


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Big Bang 15 G years ago

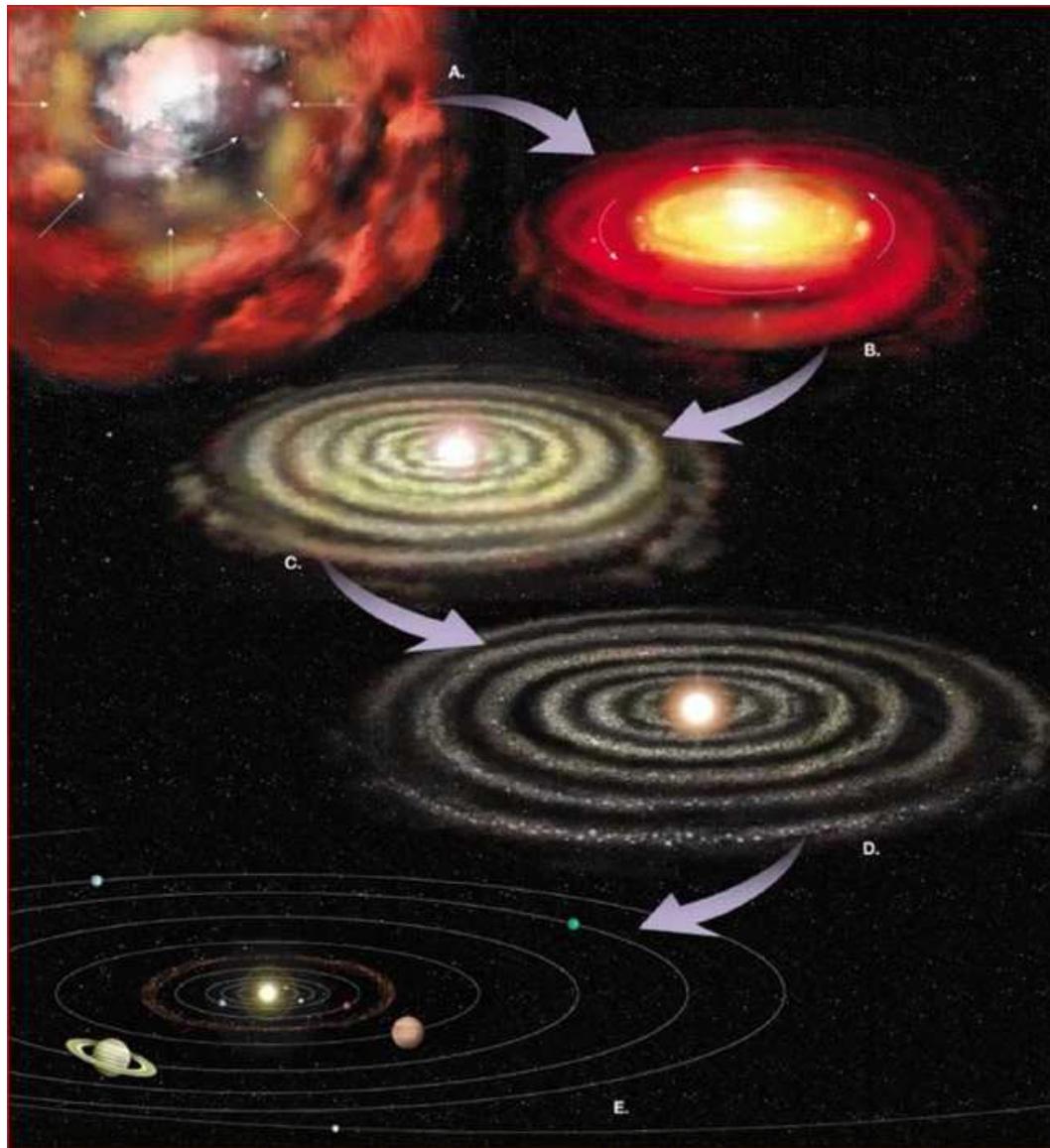


Formation of solar system



Formation of solar system

The Nebular hypothesis



- A. solar nebula
- B. contraction into rotating disk
- C. Cooling causing condensing into tiny (dust sized) solid particles
- D. Collisions between these form larger bodies
- E. Large bodies become planets



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Solar system 5 G years ago



Origin of earth and moon

theories for the formation of the moon

- 4.5 G years ago
- the moon came out of the crust of the Earth
- the moon was captured by the Earth
- the Earth and moon formed together out of the primordial nebula





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life on earth

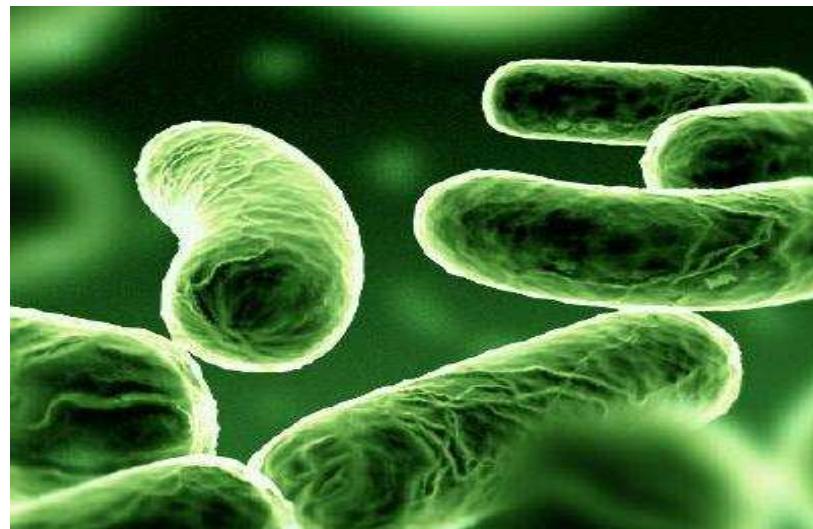
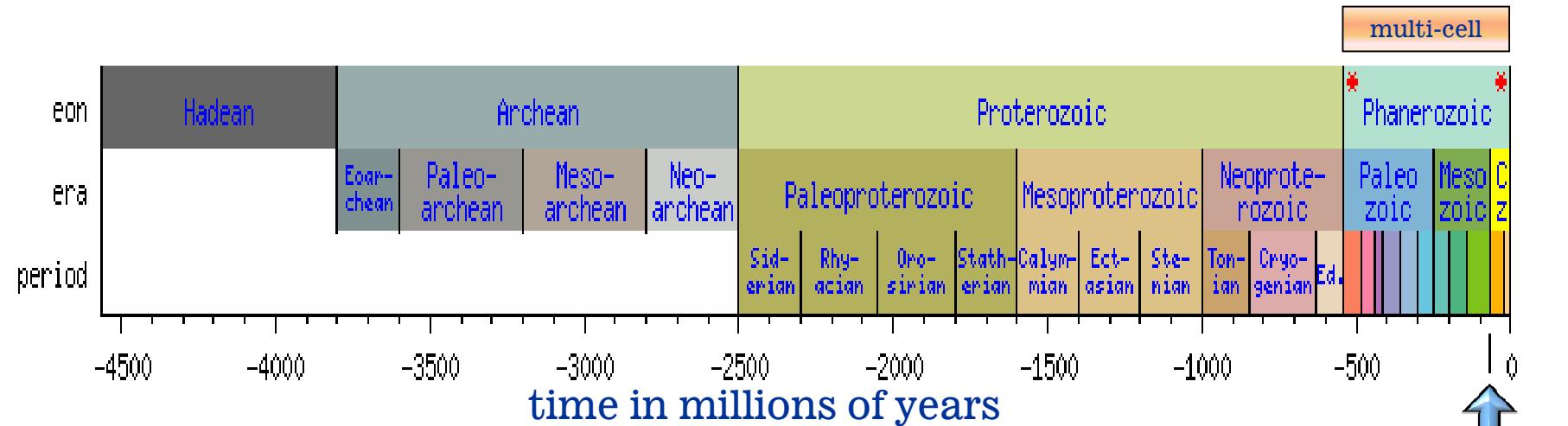
life on earth





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life on earth

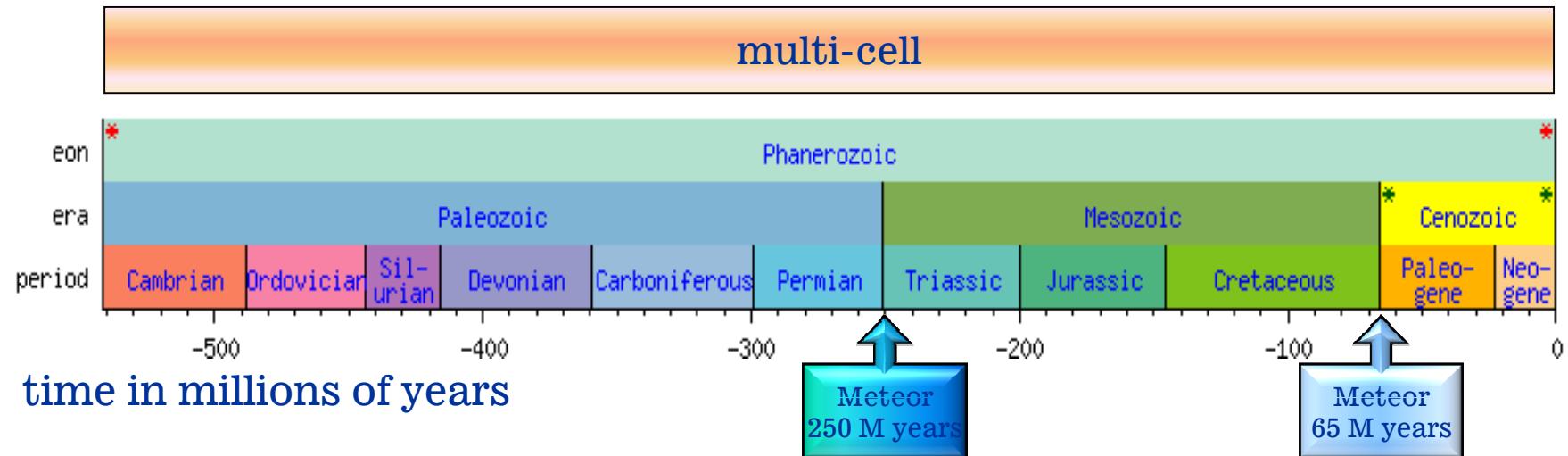


25

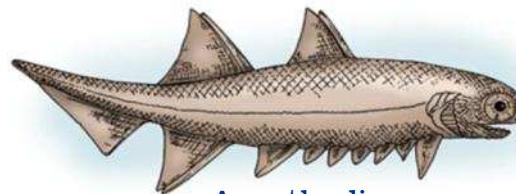


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life on earth (2)



Trilobite
spinal cord
526 My



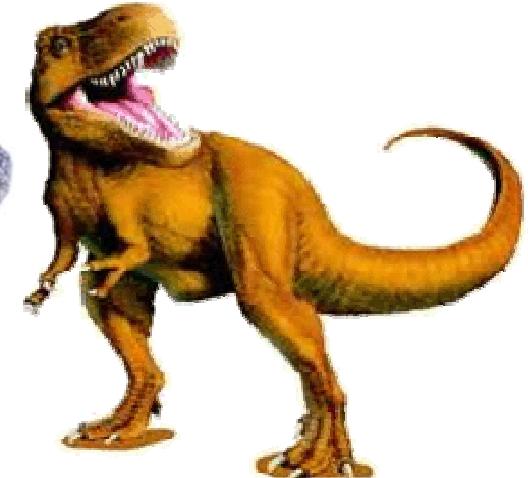
Acanthodian
jaws
410 My



Casineria
amniotic egg
310 My



Acanthostega
tetrapod fish
365 My

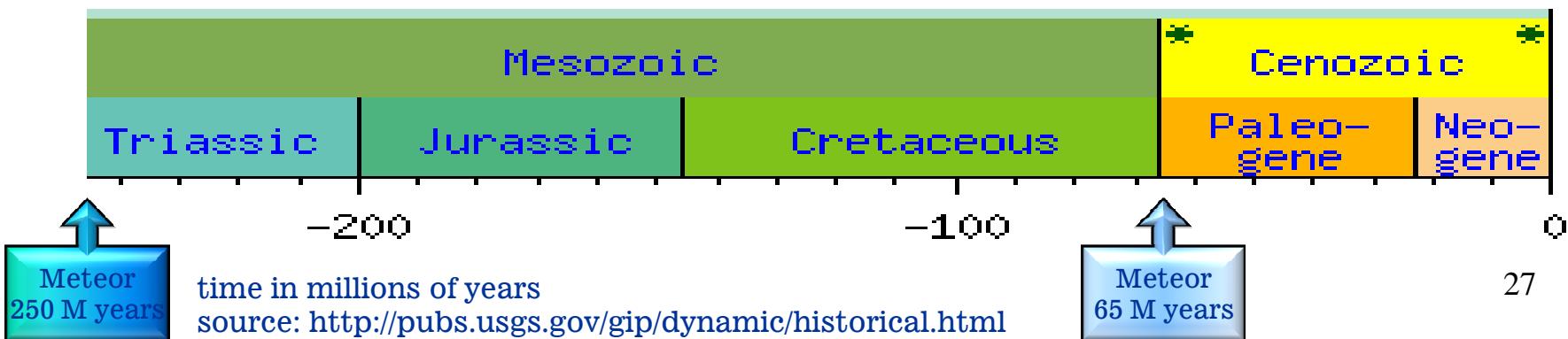
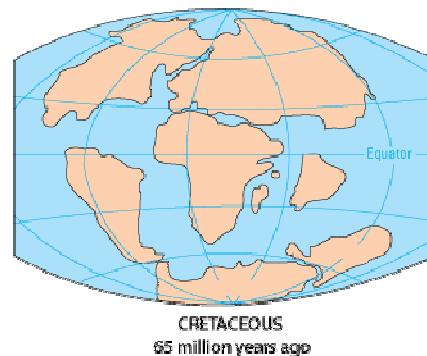
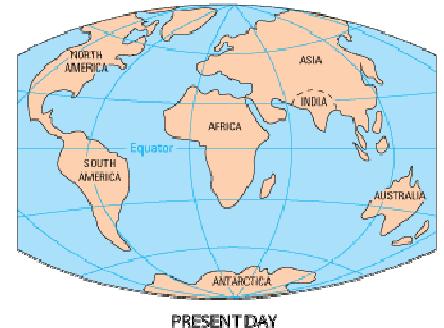
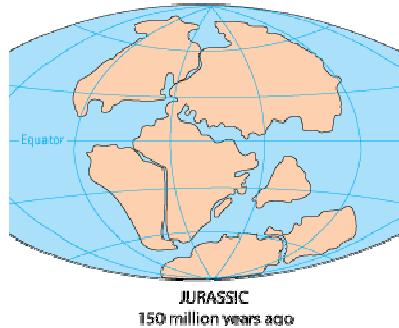
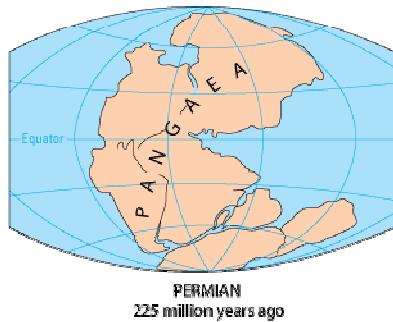


Tyrannosaurus Rex
67 My



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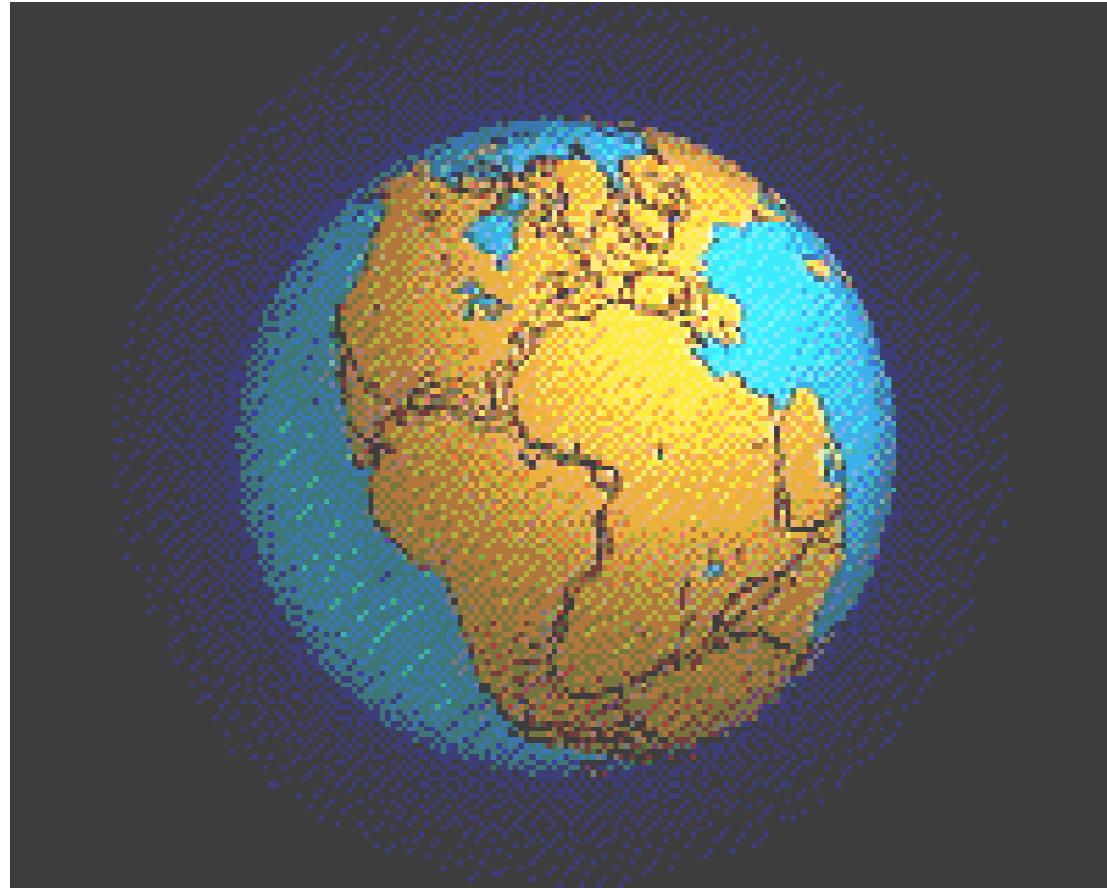
evolution of continents





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Pangeia Gondwana + Laurásia



See also

<http://www.youtube.com/watch?v=cQVoSyVu9rk>

<http://www.youtube.com/watch?v=WaUk94AdXPA>



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Meteor impacts

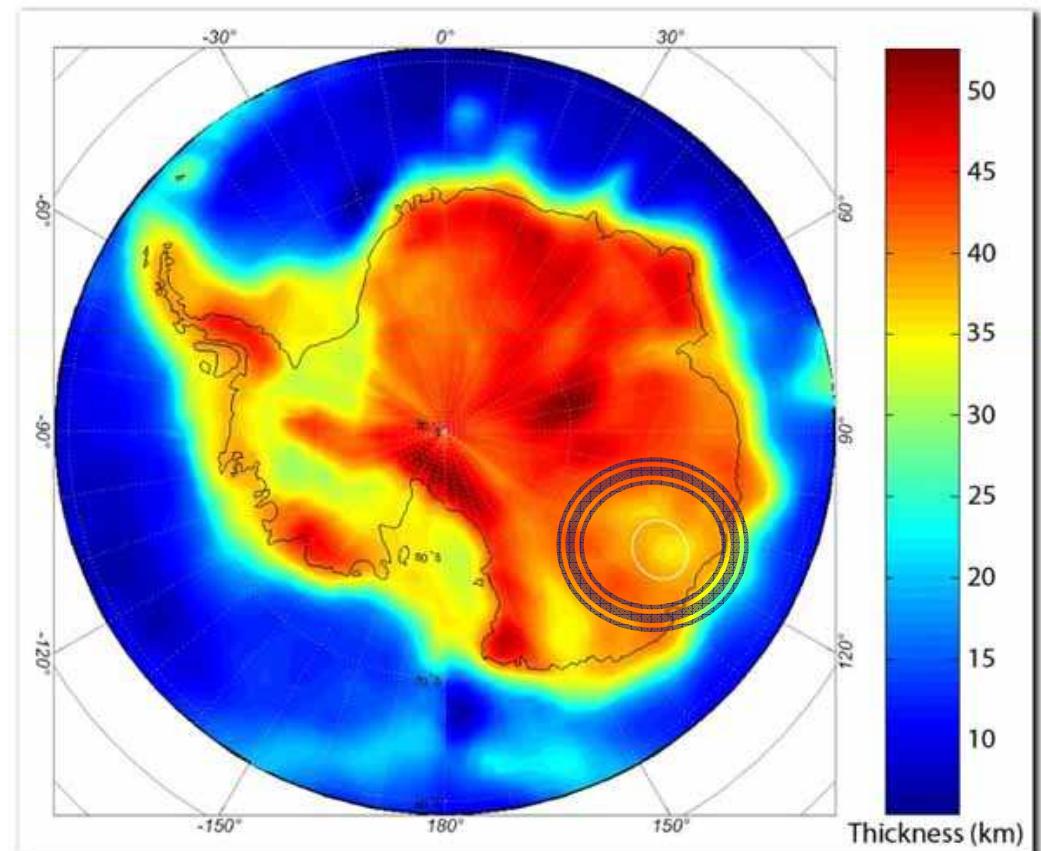




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Wilkes land crater: the place where the meteor hit 250M years ago

Antarctic: 70° S 120° E

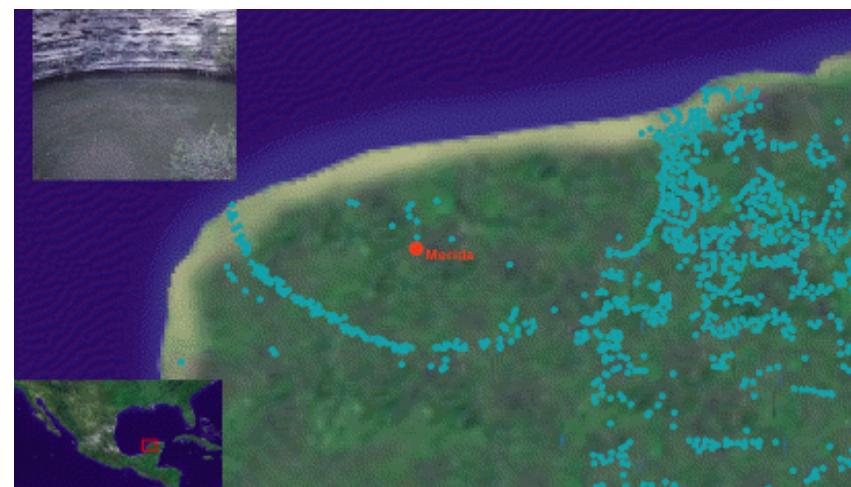
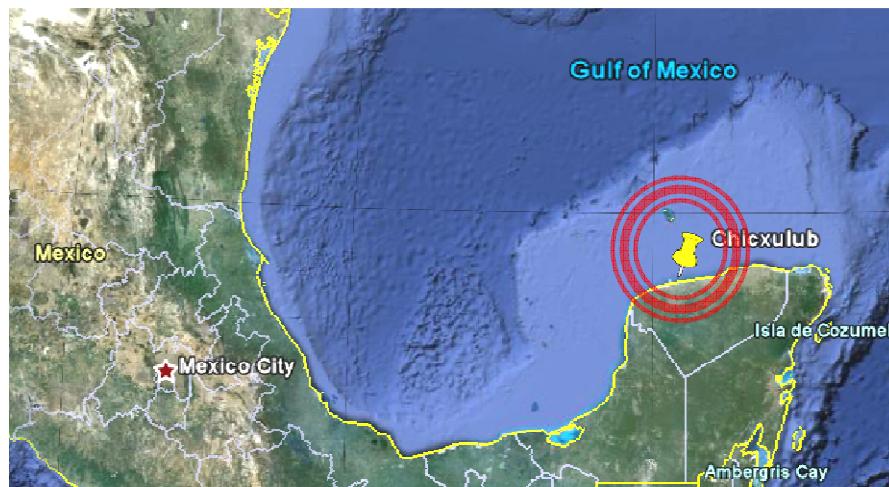
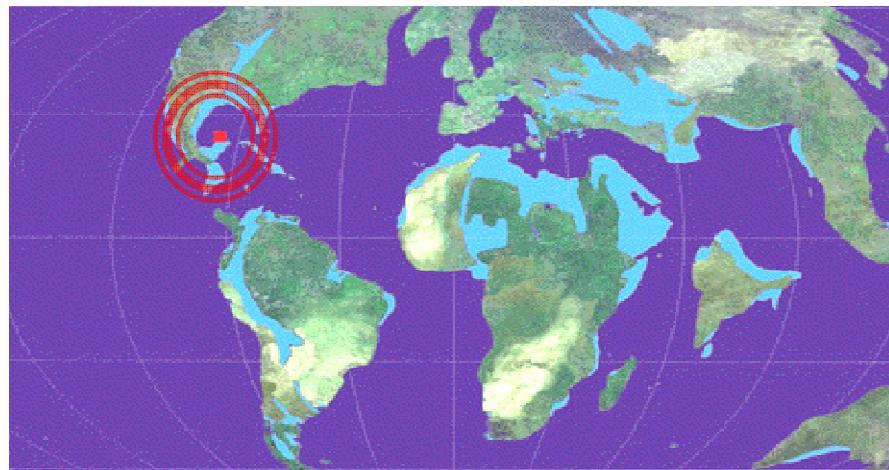




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Chicxulub crater: the place where the meteor hit 65M years ago

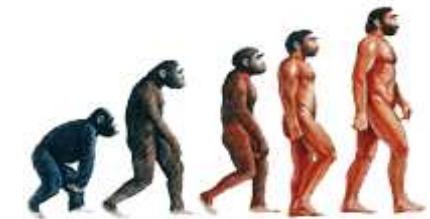
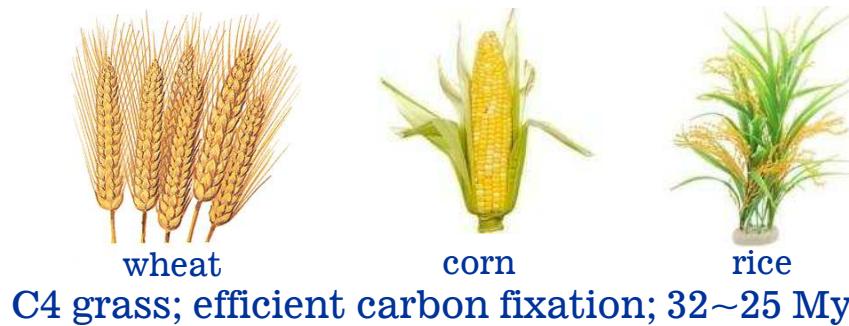
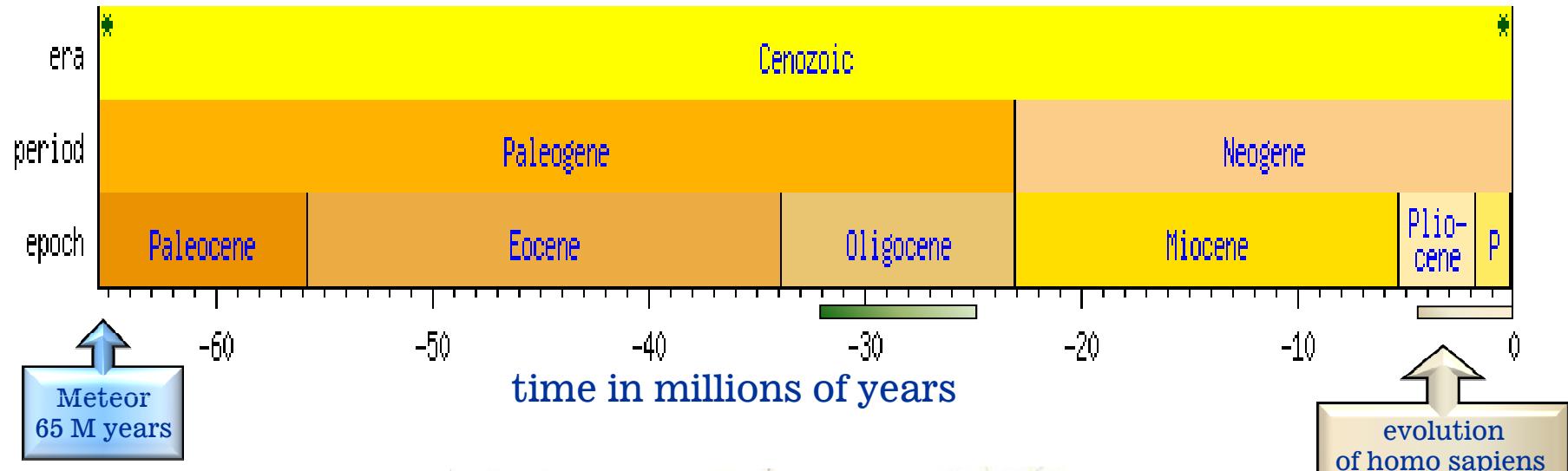
Mexico: $21^{\circ} 24' 0''$ N, $89^{\circ} 31' 0''$ W





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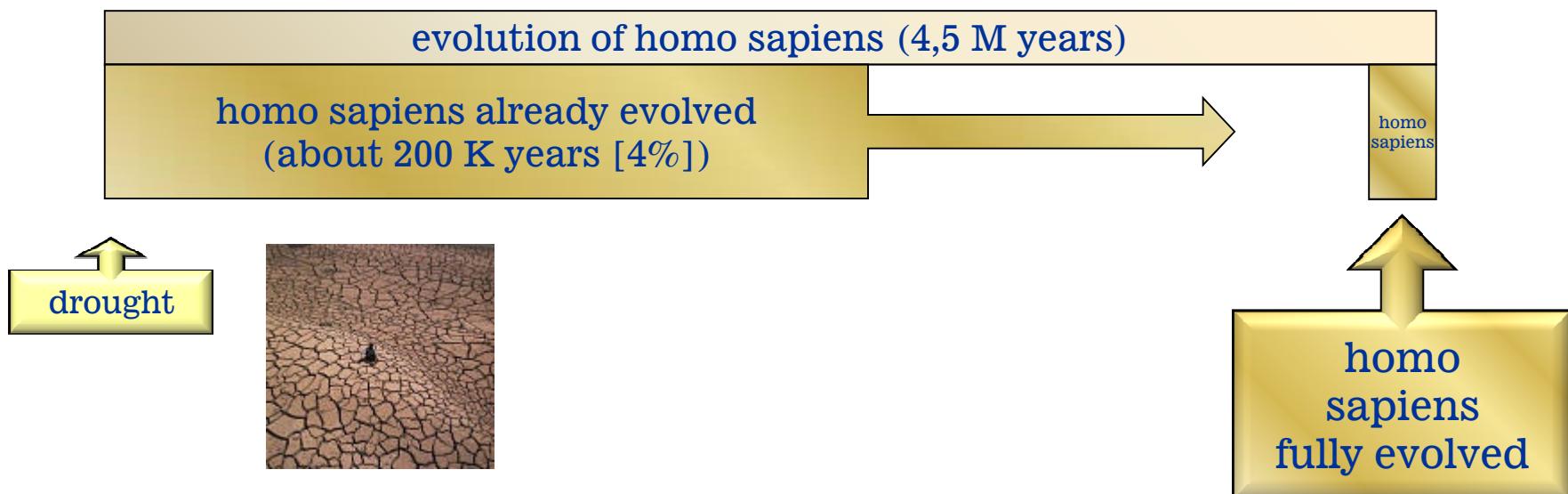
life & homo sapiens



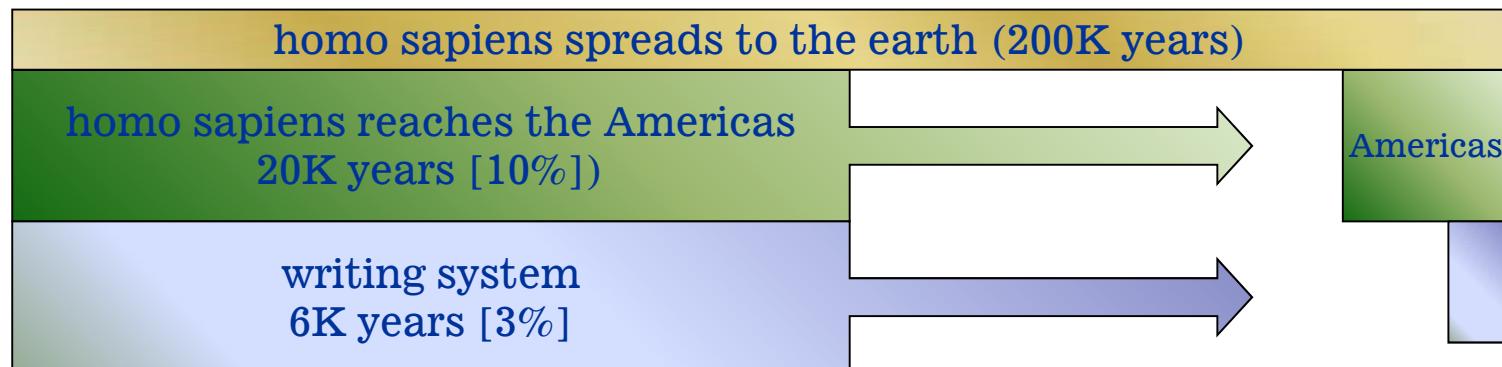
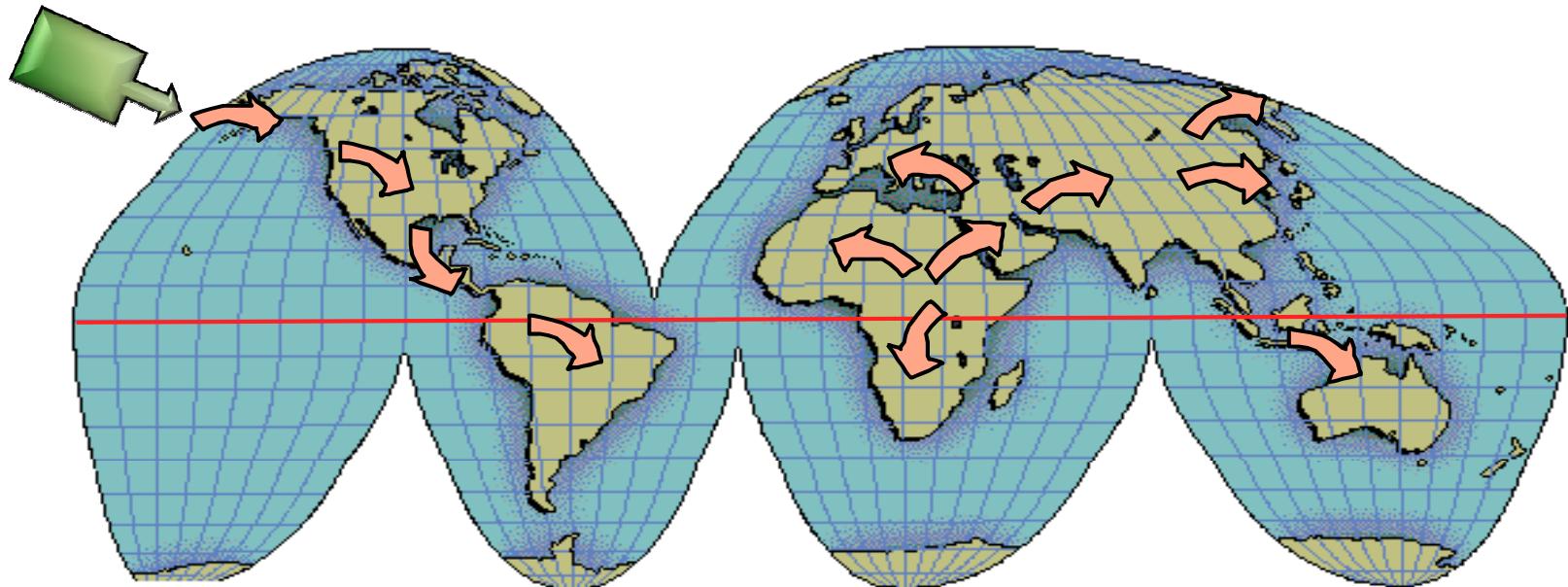


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life & homo sapiens (2)

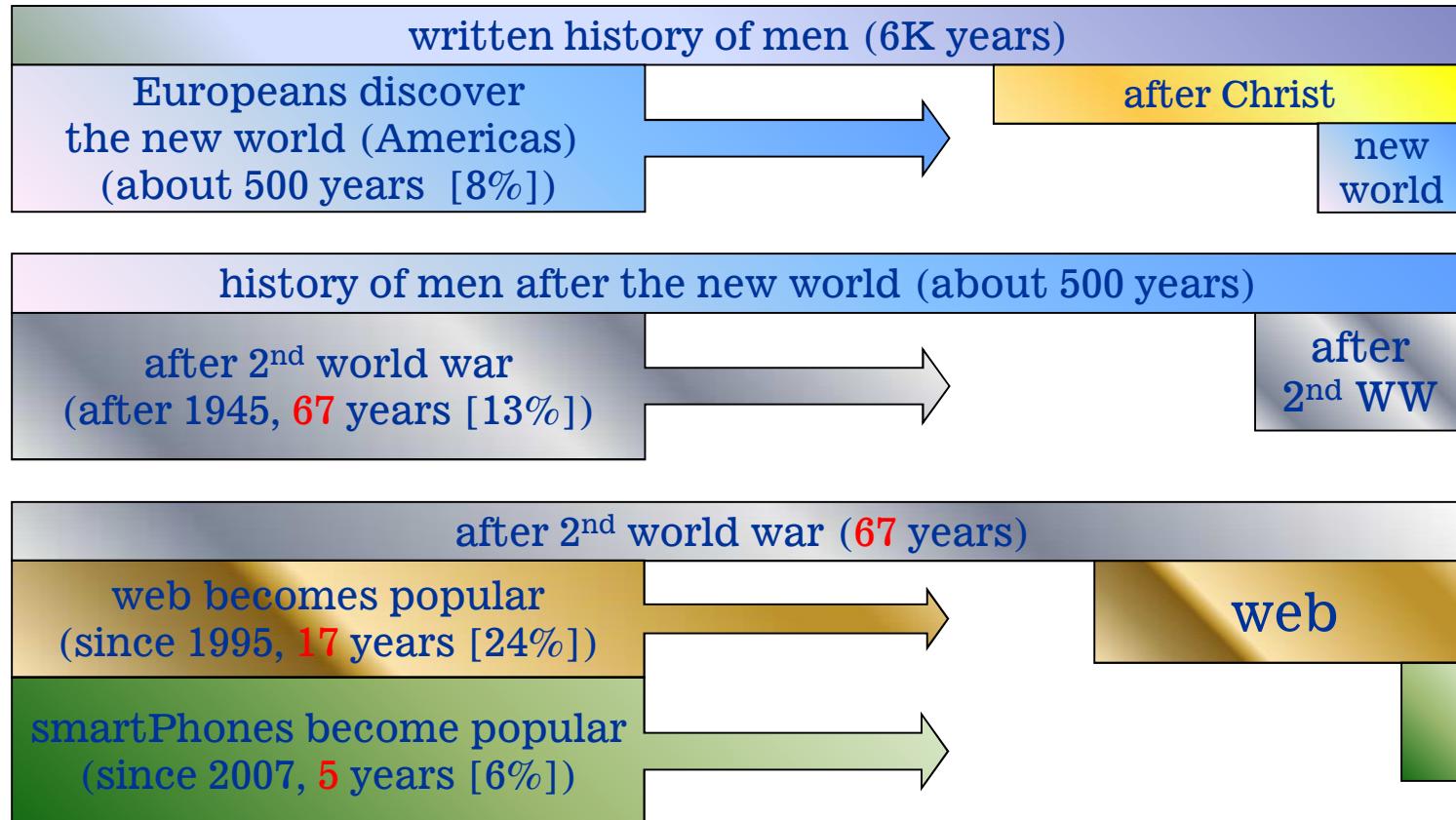


life & homo sapiens (3)





life & homo sapiens (4)



Now, in **2012**, intensive use of Internet and web for only **17** years, smartPhones for only **5** years.

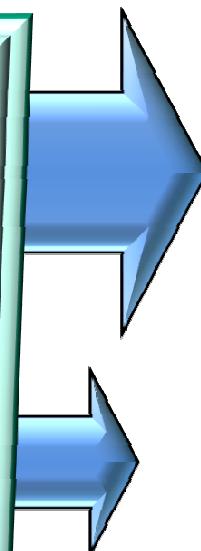
We, humans, go faster and faster !!!



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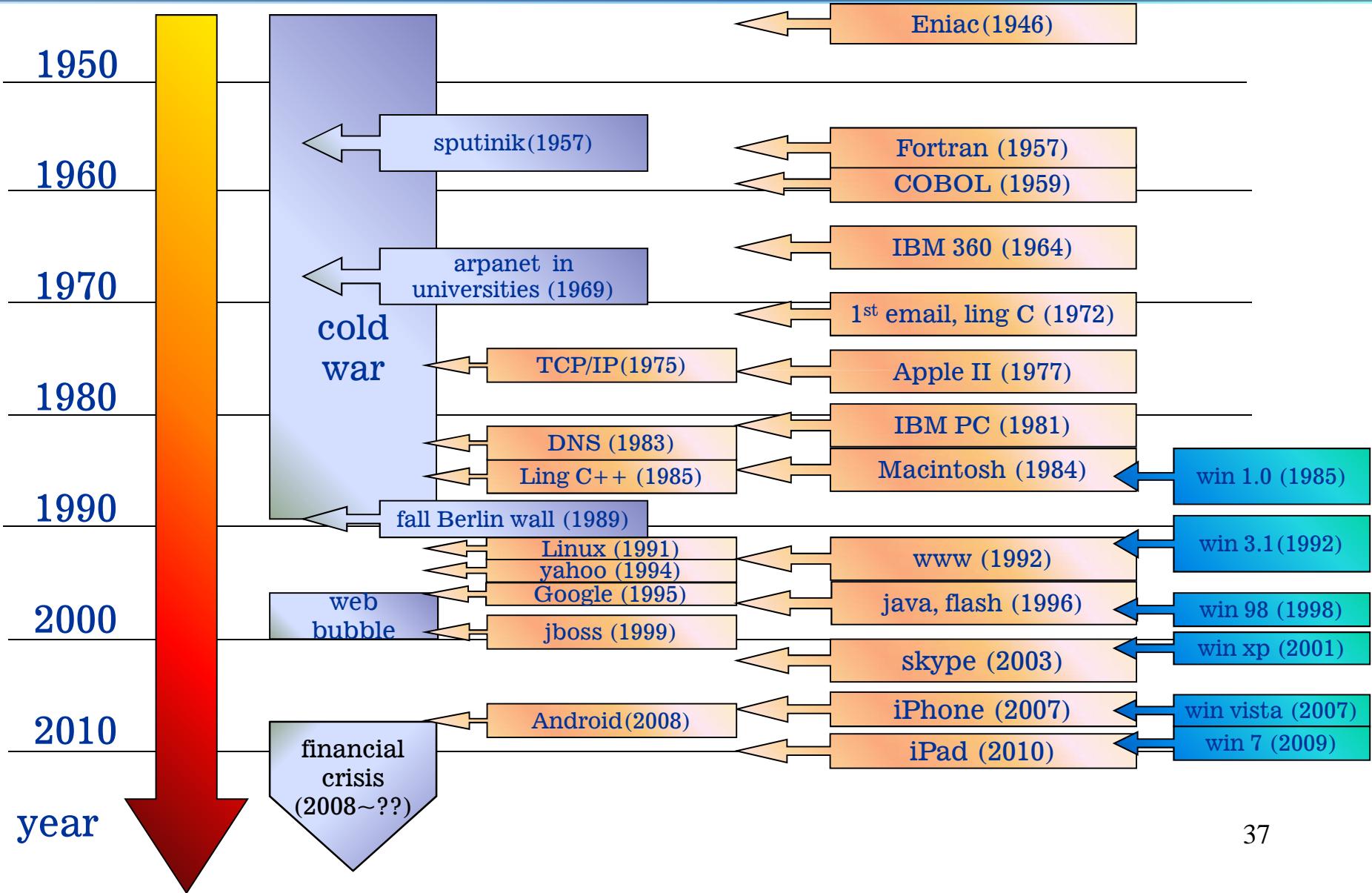
Some moments of history of information technology

history of
information
technology

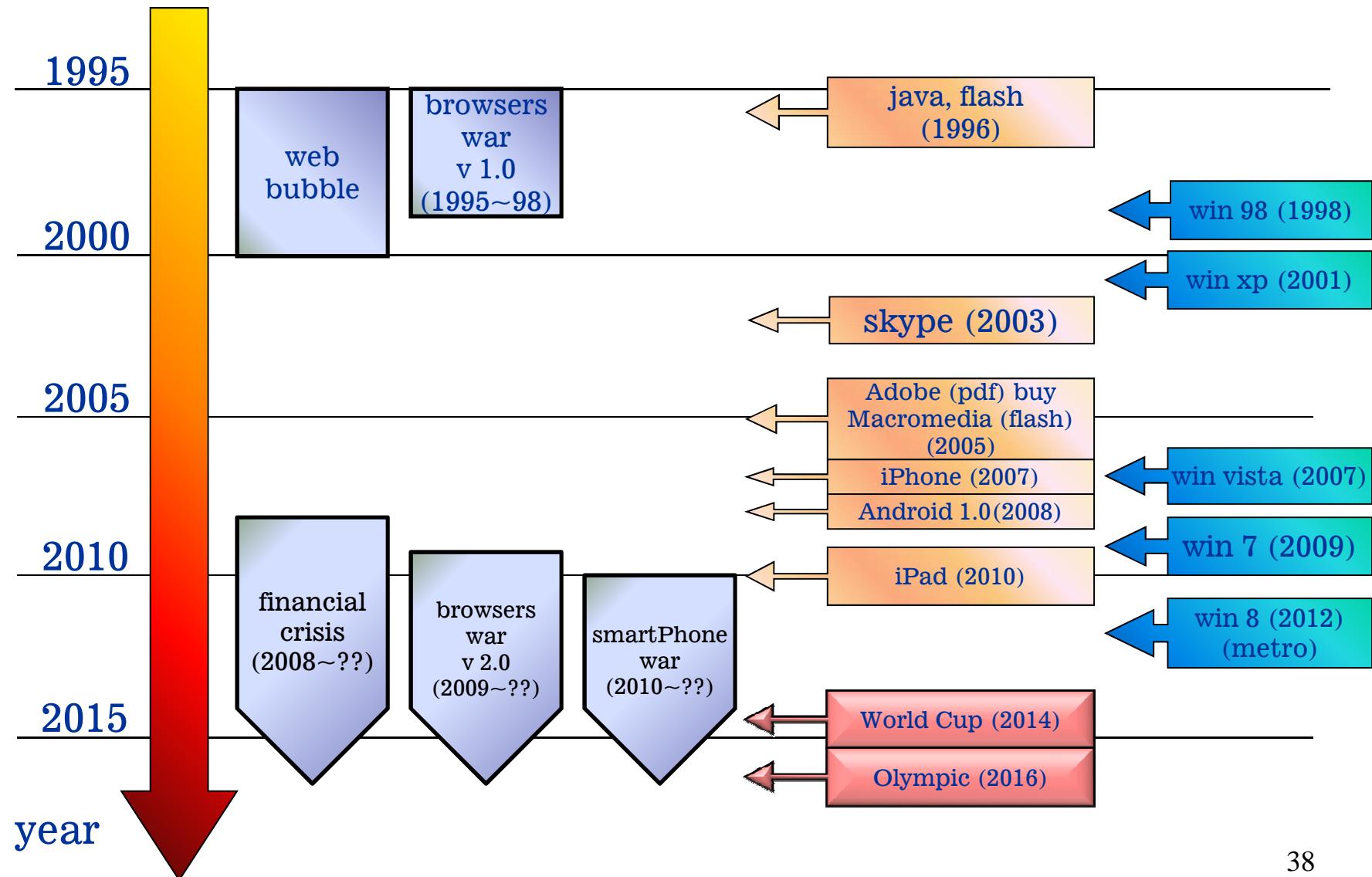




Selected moments of history of IT



History of IT (recent)



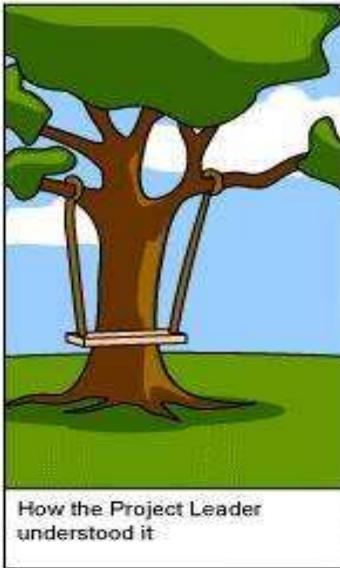


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Humor



How the customer explained it



How the Project Leader
understood it



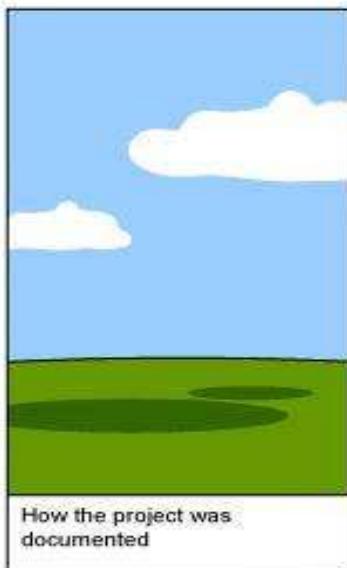
How the Analyst designed it



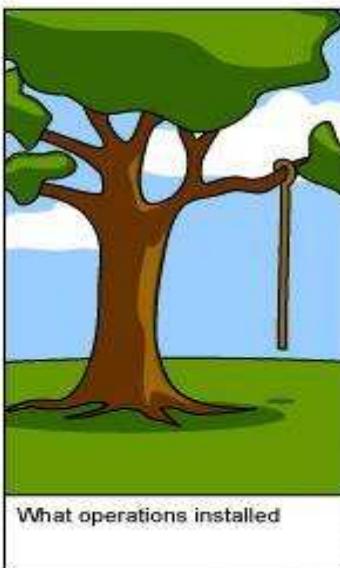
How the Programmer wrote it



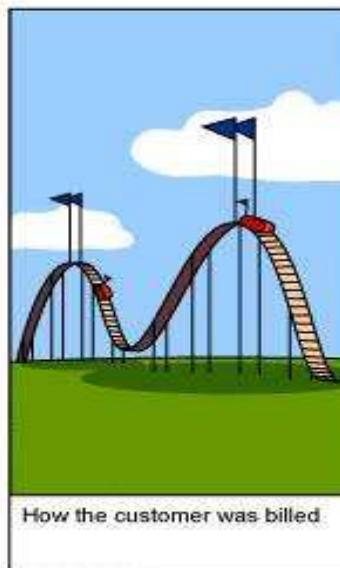
How the Business Consultant
described it



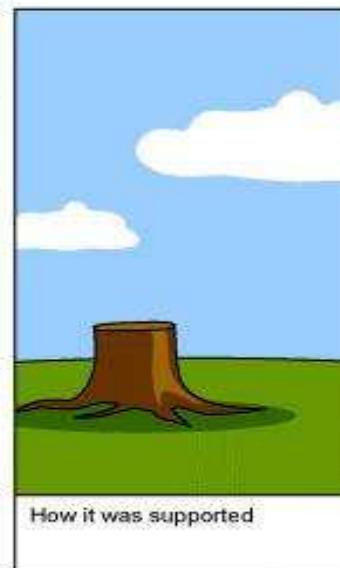
How the project was
documented



What operations installed



How the customer was billed



How it was supported



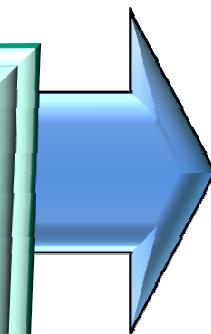
What the customer really
needed



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Why C/C++ ?

Why C/C++ ?





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Arousing students desire to learn the contents of this class

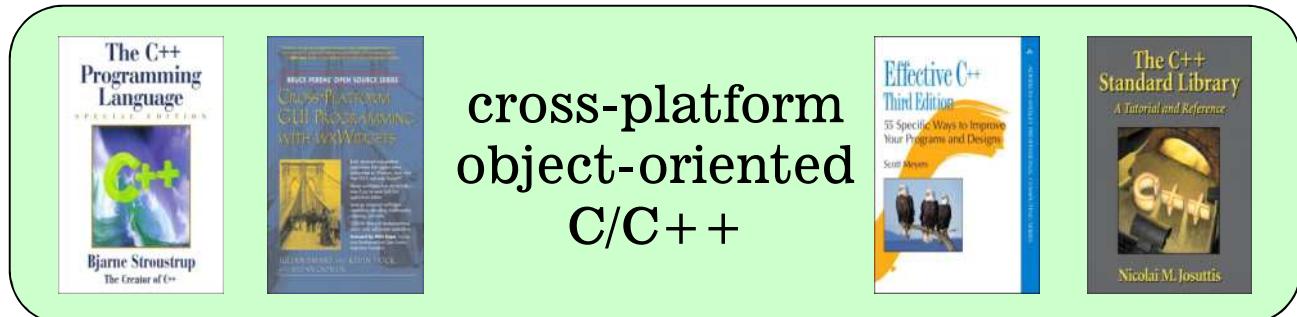
- There are several options of computer programming language and software development technology
 - students might desire to study something else than C / C++ and Object Orientation





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Arousing students desire to learn the contents of this class (2)



cross-platform
object-oriented
C/C++



we will
study this
contents in
our class

these are
some of the
alternative
contents
we won't
study in
our class



Computer languages usage (tiobe index)

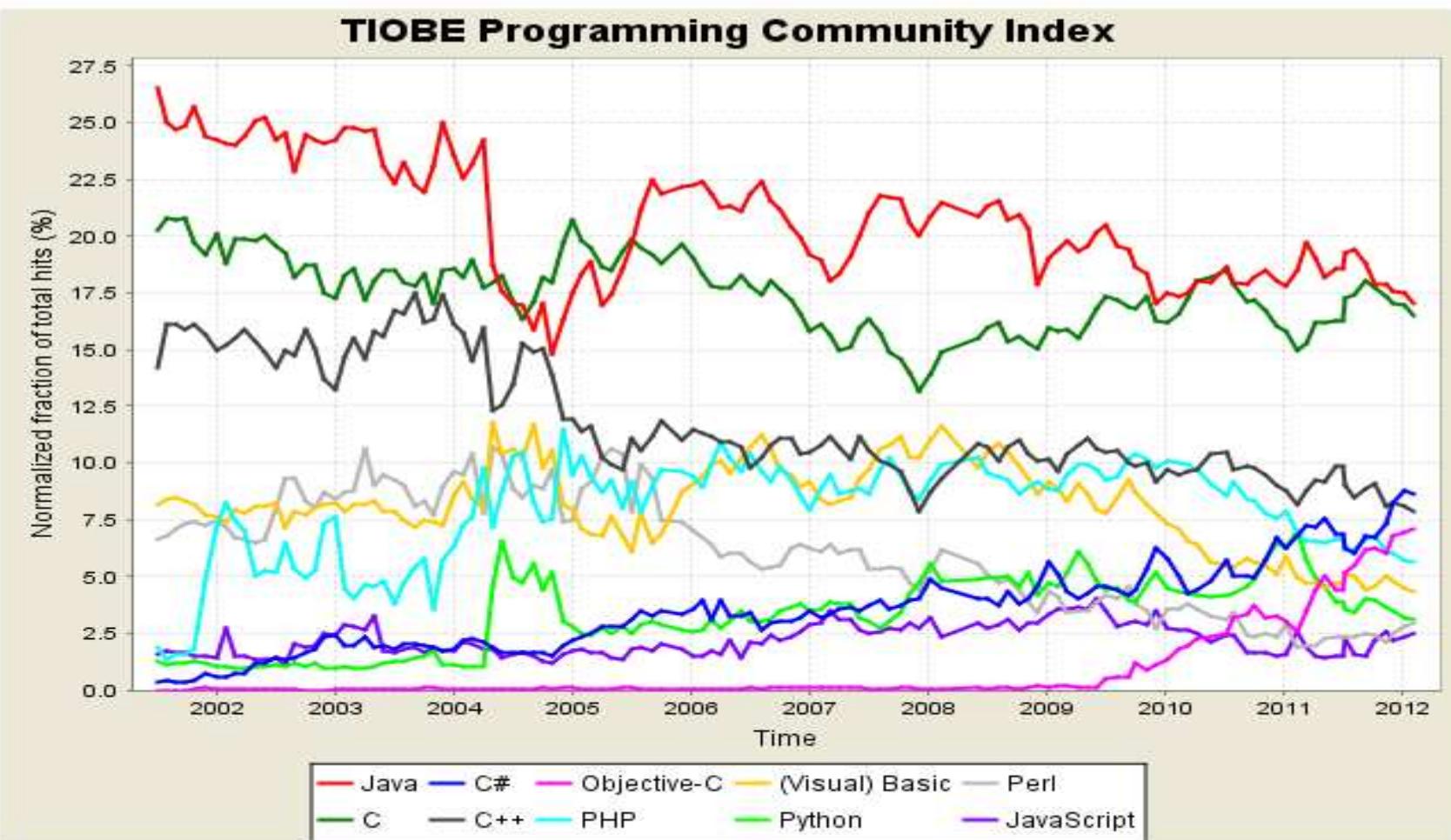
Position Feb 2012	Position Feb 2011	Delta in Position	Programming Language	Ratings Feb 2012	Delta Feb 2011	Status
1	1	=	Java	17.050%	-1.43%	A
2	2	=	C	16.523%	+1.54%	A
3	6	↑↑	C#	8.653%	+1.84%	A
4	3	↓	C++	7.853%	-0.33%	A
5	8	↑↑	Objective-C	7.062%	+4.49%	A
6	5	↓	PHP	5.641%	-1.33%	A
7	7	=	(Visual) Basic	4.315%	-0.61%	A
8	4	↓↓↓	Python	3.148%	-3.89%	A
9	10	↑	Perl	2.931%	+1.02%	A
10	9	↓	JavaScript	2.465%	-0.09%	A
11	13	↑↑	Delphi/Object Pascal	1.964%	+0.90%	A
12	11	↓	Ruby	1.558%	-0.06%	A
13	14	↑	Lisp	0.905%	-0.05%	A
14	26	↑↑↑↑↑↑↑↑↑↑	Transact-SQL	0.846%	+0.29%	A
15	17	↑↑	Pascal	0.813%	+0.08%	A
16	22	↑↑↑↑↑↑↑↑	Visual Basic .NET	0.796%	+0.21%	A--
17	32	↑↑↑↑↑↑↑↑↑↑	PL/SQL	0.792%	+0.38%	A
18	24	↑↑↑↑↑↑	Logo	0.677%	+0.10%	B
19	16	↓↓↓	Ada	0.632%	-0.17%	B
20	25	↑↑↑↑	R	0.623%	+0.06%	B

- Source <http://www.tiobe.com/> (tiobe index)



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Tiobe index

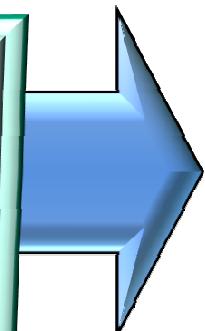




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Some moments of history of electronic computing

history of
electronic
computing





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1938, Z1, Konrad Zuse

- The original Z1 was destroyed by the war in 1943. Z1 was rebuilt for museum in 1989
- It was the first general-purpose digital computer, but it was electromechanical.
- Specifications
- Memory: 64 words of 22 bits
- Clock speed: 1 Hz
- Registers: Two floating-point registers of 22 bit each
- Arithmetic Unit: Four basic operations (add, subtract, multiply, divide) for binary floating point numbers
- Weight: 1,000 kilograms (2,200 lb)
- Average calculation speed: addition 5 seconds, multiplication 10 seconds



picture of museum of Berlin



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1941, Z3, Konrad Zuse

- It was the world's first working programmable, fully automatic computing machine
- Specifications
- Frequency: 5.3 Hertz
- Arithmetic Unit: Floating point, 22 bit, add, subtract, multiply, divide, square root
- Average calculation Speed: Addition 0.8 seconds Multiplication 3 seconds
- Power Consumption: Around 4000 watts
- Weight: Around 1,000 kilograms (2,200 lb)
- Elements: Around 2,600 relays
- Memory: 64 words with a length of 22 bits



picture of museum of Berlin



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1944, IBM's ASCC

Automatic Sequence Controlled Calculator

- It solved addition and multiplication problems in less than six seconds. The ASCC was operated by a system of thousands of vacuum tubes.



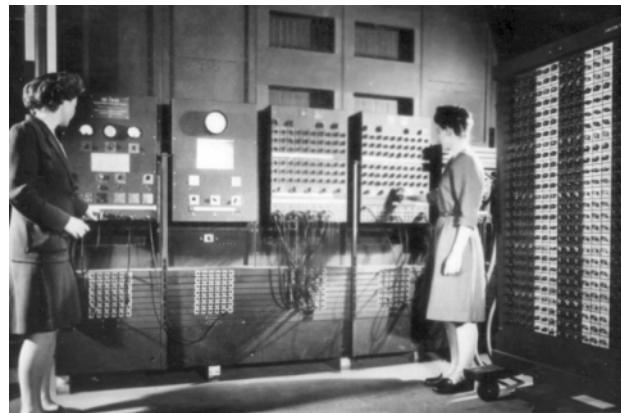
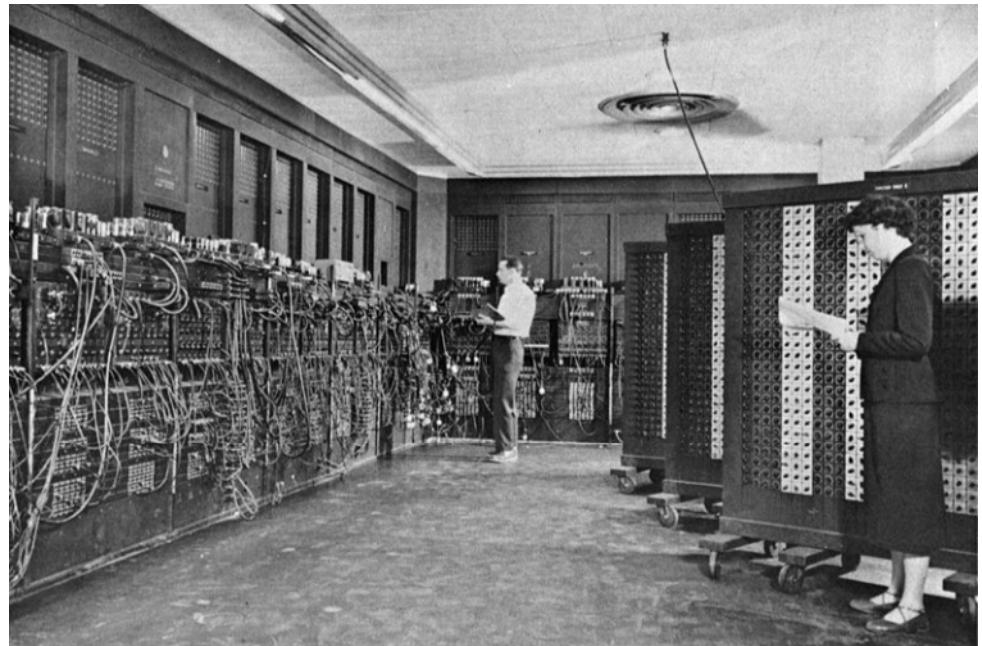


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1946, Eniac

Electronic Numerical Integrator And Computer

- the first general-purpose electronic computer
- Clock speed: 5K Hz
- Programmed directly in binary machine language, using switches

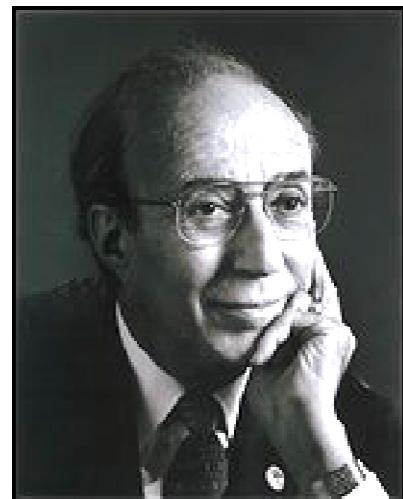


1947 - Numerical Inverting of Matrices of High Order

- 1947 – paper by John von Neumann and Herman Goldstine, “Numerical Inverting of Matrices of High Order” . It is one of the first papers to study rounding error and include discussion of what today is called “scientific computing”.



John von Neumann



Herman Goldstine



Fortran moments

- Fortran is the first 3GL computer language
 - 1GL is binary (machine level)
 - 2GL is assembly
- 1954 – draft specification for IBM mathematical FORmula TRANslating system
- 1957 – first FORTRAN compiler.
- 1958 - IBM's FORTRAN II
 - introduction of SUBROUTINE, FUNCTION, END, CALL, RETURN, COMMON
- 1959 - COBOL

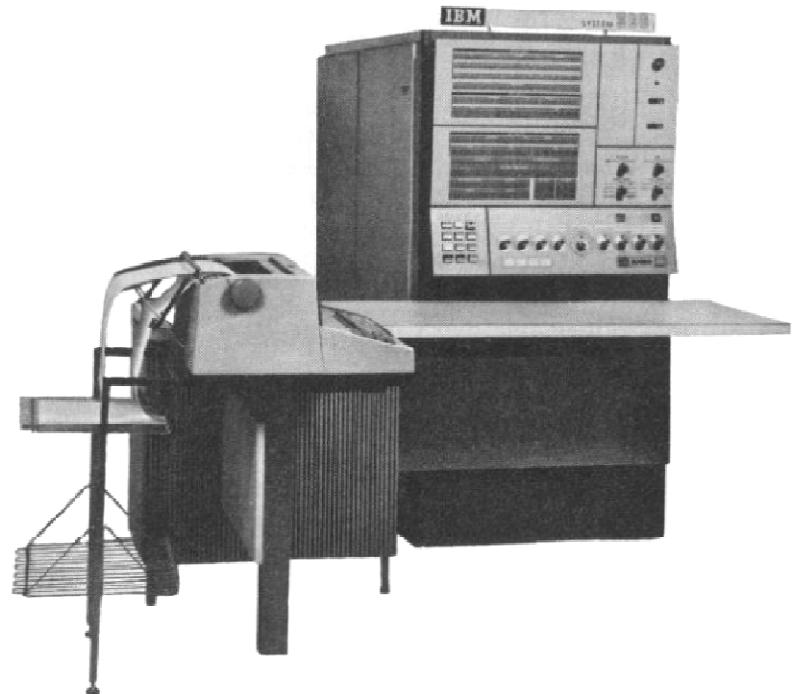


IBM 704
mainframe (1954)



Fortran moments (2)

- 1960 – versions of FORTRAN were available for the IBM 709, 650, 1620, and 7090 computers.
- 1961 – FORTRAN IV
- 1965 – Fortran IV was supposed to be the “standard” and in compliance with American Standards Association X3.4.3 FORTRAN Working Group



console of mainframe IBM 360 (1964)

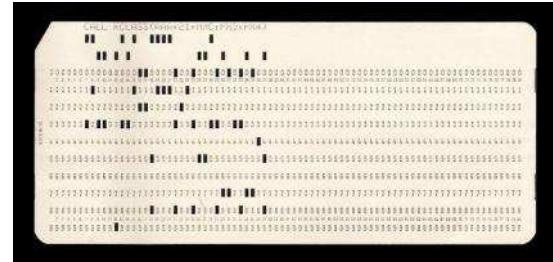
first family of computers designed to cover the complete range of applications, from small to large, both commercial and scientific



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Fortran moments (3)

- 1966 – FORTRAN 66
 - COMMON, DIMENSION, and EQUIVALENCE, INTEGER, REAL, DOUBLE PRECISION, COMPLEX, DO loops, READ, WRITE, BACKSPACE, REWIND, and ENDFILE statements for sequential I/O, FORMAT statement
- 1977 – FORTRAN 77
 - major upgrade
 - block IF and END IF statements, with optional ELSE and ELSE IF, OPEN, CLOSE, INQUIRE, IMPLICIT



punched card or
hollerith card



IBM 29
card punch machine



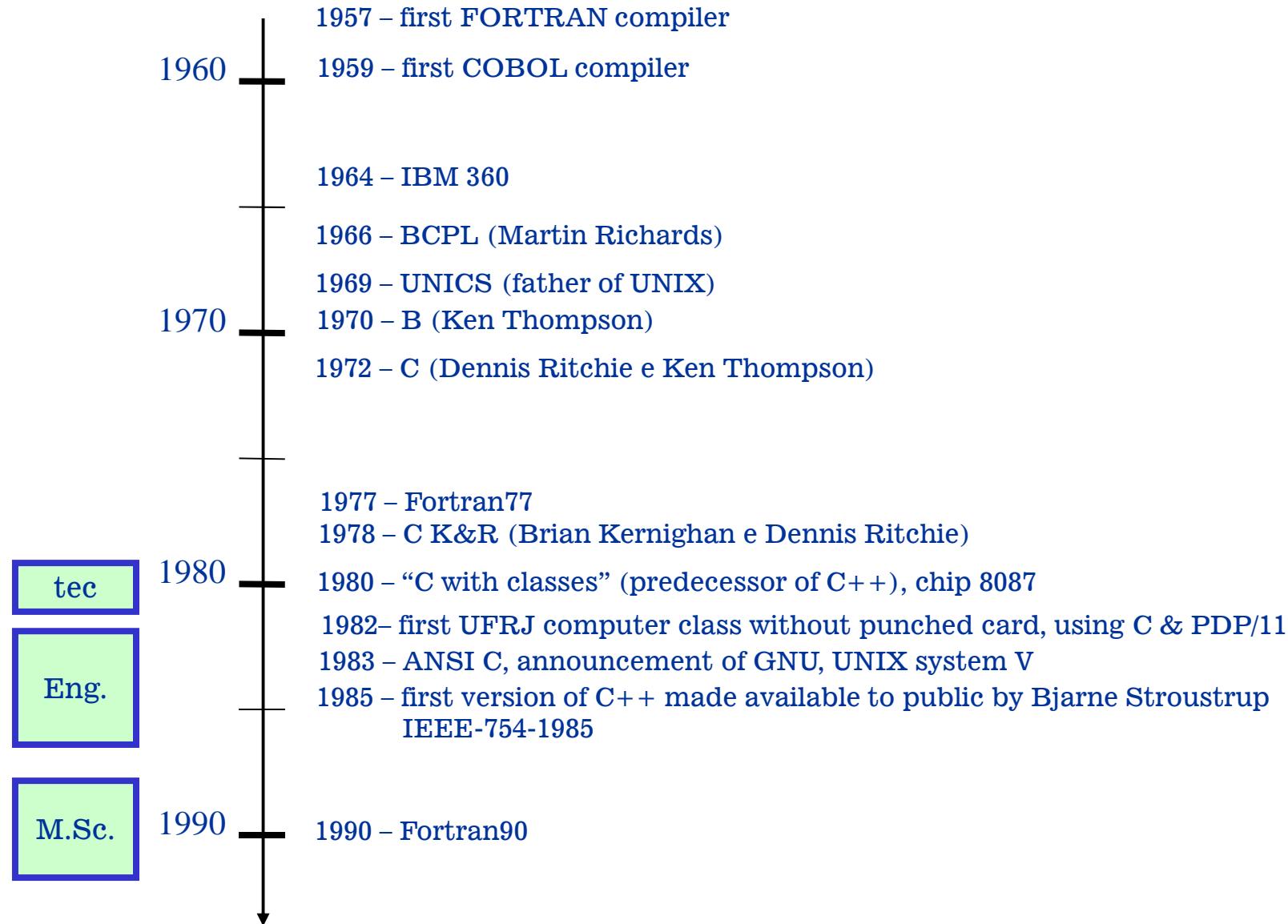
Fortran moments (4)

- 1990 – FORTRAN 90
 - Free-form source input, also with lowercase Fortran keywords
 - Identifiers up to 31 characters in length
 - Inline comments
 - whole, partial and masked array assignment statements and array expressions, such as
 $X(1:N)=R(1:N)*COS(A(1:N))$
- 1995 – FORTRAN 95
 - minor revision
- 2003 – FORTRAN 2003
 - OO support
 - unicode
- 2008 – FORTRAN 2008
 - minor revision





Some landmarks in history





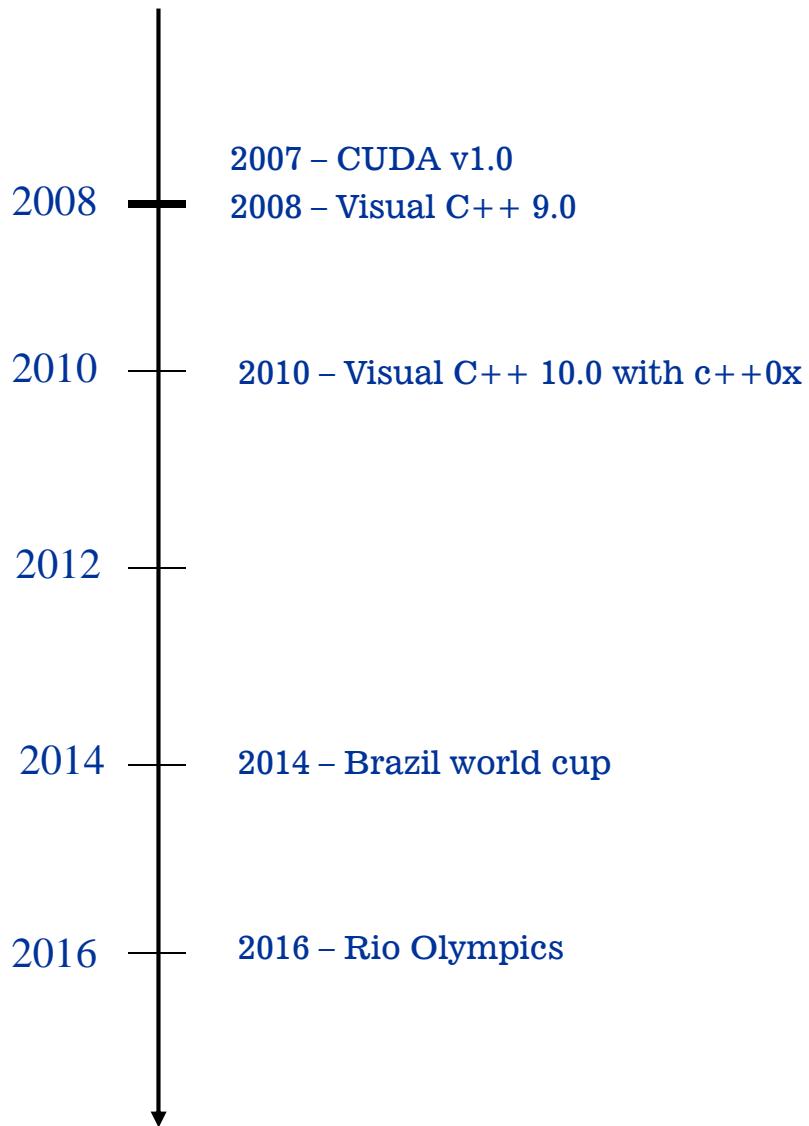
Some landmarks in history (2)





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Some landmarks in history (3)





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Humor learn C++ in 21 days

Days 1 - 10

Teach yourself variables, constants, arrays, strings, expressions, statements, functions,....



Days 11 - 21

Teach yourself program flow, pointers, references, classes, objects, inheritance, polymorphism,



Days 22 - 697

Do a lot of recreational programming. Have fun hacking but remember to learn from your mistakes.



Days 698 - 3648

Interact with other programmers. Work on programming projects together. Learn from them.



Days 3649 - 7781

Teach yourself advanced theoretical physics and formulate a consistent theory of quantum gravity.



Days 7782 - 14611

Teach yourself biochemistry, molecular biology, genetics,...



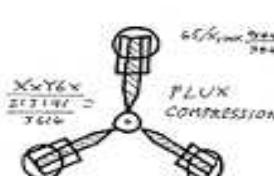
Day 14611

Use knowledge of biology to make an age-reversing potion.



Day 14611

Use knowledge of physics to build flux capacitor and go back in time to day 21.



Day 21

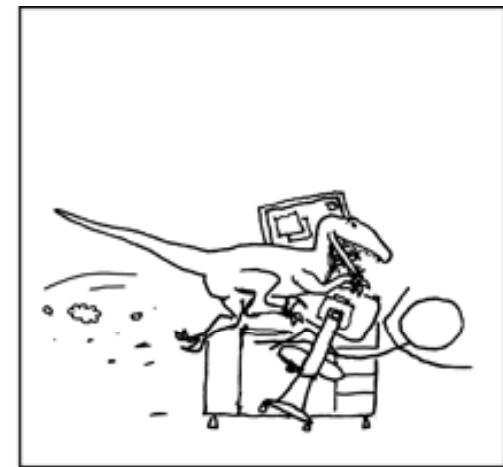
Replace younger self.





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Humor goto ok to use?

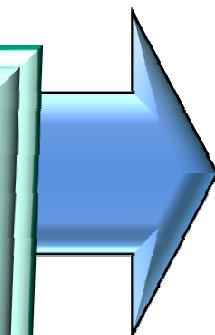




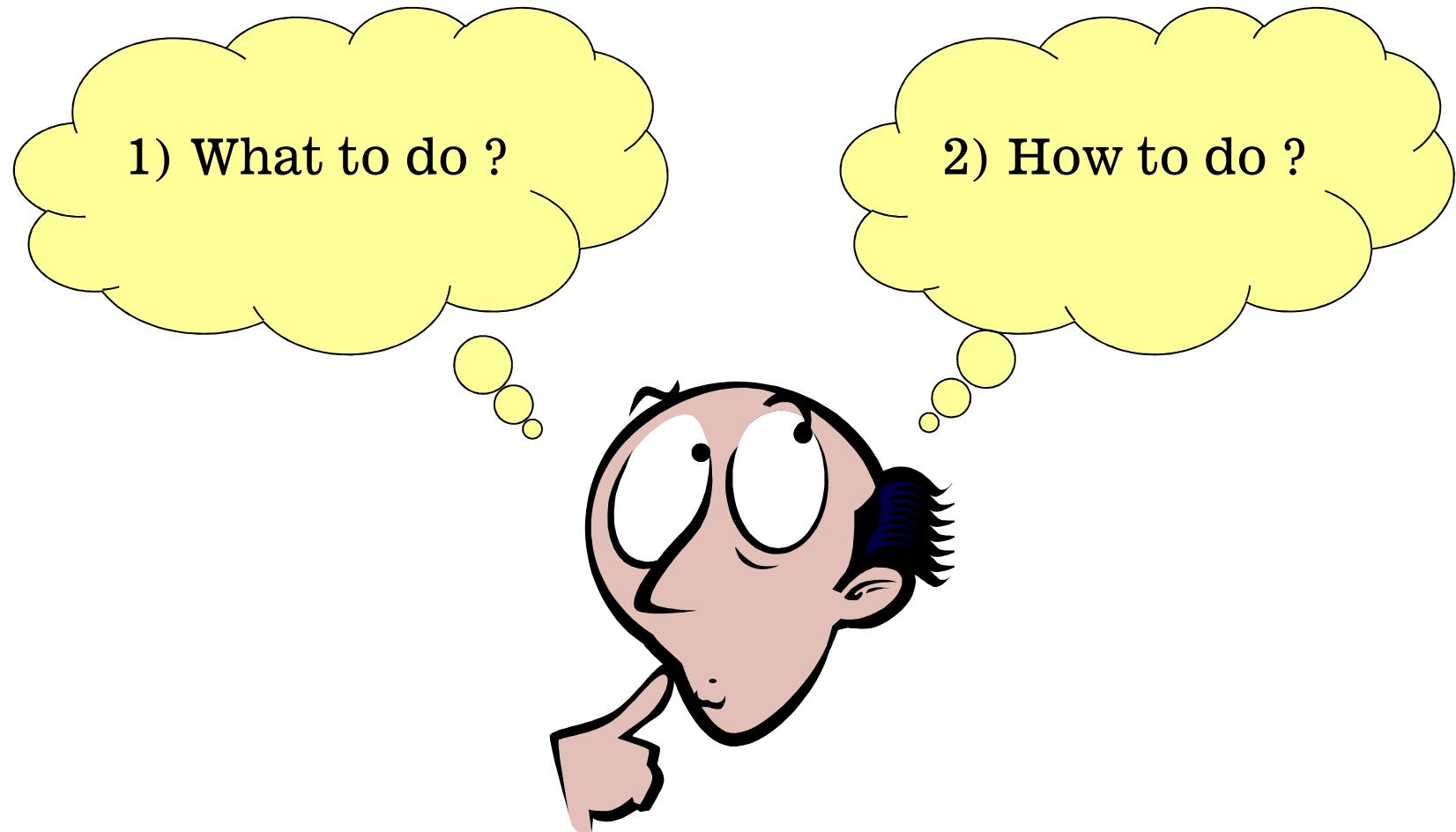
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Economy & Strategy

economy &
strategy



Strategic questions



Leadership is doing the right things; management is doing things right
- Peter Drucker



Strategic questions (2)

- “strategic” means “putting emphasis in the long term perspective”
- Question 1 (what to do?) is more strategic than question 2 (how to do?).
 - It is not wise to work on level 2 (how to do?), before being sure about the result of the analysis of level 1 (what to do?)
 - It is not wise to start to study a computer language (or any information technology) before discussing the consequences of the choice and comparing it to one’s long term perspective objectives
- Key concept: creation of value

What are *my* long term objectives?

- Whether or not you work with IT, it is useful to periodically ask yourself the question below.



- To produce some marvelous product, but being your work “to serve coffee to the board”, means your activity creates little value



Businesses forge technology

- The businesses and economic activities should be conceived paying respect to the human morale, philosophic principia and the law
- Typically, the information technology is developed (forged) to support and satisfy the business needs
 - The IT should satisfy mainly the business owner, not the operator or the manager

morale,
philosophic principia,
and the law

serves

business,
economic activities

final
activity

serves

information
technology

support
activity



Businesses forge technology (2)

- The software engineer serves the business needs; but the consulting activity or the technology provision is itself a business
- C / C++ is the main option for the technology development
 - Java, bluetooth, web, operating system kernel, device drivers are some examples of technology development
 - For information systems development, several computer languages and development tools are available. It is possible to use C / C++ for information systems as well.
- By knowing C / C++ and the IT environment, one can imagine innovative businesses



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Businesses forge technology (3)

- Traditional goal of a software engineering course is “learn what computers can do (computers created by someone else)”
- Our software engineering course will work with the incremented goal “learn also how you can create new things by using our current wonderful technology of computers and other electronics”
- *old computing is what about what computers can do; new computing is about what people can do.*
 - Ben Shneiderman

Economic environment and business model

- Changes in the economic environment might turn a business to become inconsistent
 - Example: gas lights became obsolete after the electrical lights. Other: wagon / horse became obsolete after the gasoline engine & car
- IT, Internet, Web, mobile devices (smartPhones & tablets), cloud computing, lowering cost of hardware and other items produce a strong impact on the economic environment
- What new businesses and opportunities exist in the new environment?
 - Just as important: what businesses don't make sense anymore?
 - If the information travels fast enough, the meaning of business (enterprise mission) should be redefined

Guru, President, Director, Manager



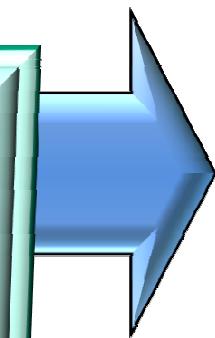
- Guru (consultant on management): Defines the economic activity
 - Conceives the mission, strategy and analysis of the global environment.
 - Conceptual discussion about methods.
- President (CEO): Plans the action,
 - Analyzes the specific environment where his forces are acting.
 - Propose strategy and action plan.
 - Establish relationship with other actors of the environment.
 - Discussion on the efficacy of methods
- Director: Communicates the plan to a smaller team, focusing on results
 - Sub-president. Handles part of the president responsibility
- Manager: Act and show results
 - Proposes and executes tactics, consistent with the strategy. Allocates resources. Define performance indexes, ask for results and makes results happen.
 - A manager is result-oriented
 - Commands an operational team



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Globalization

global
competition





Competing in the Global Economy

- Economy is already global in many fields; and that includes software for sure.
- Think about software with the global perspective.
- How is the best way to do something considering the world's big picture? Why should someone choose my work instead of someone else's from any place in the world?
- Don't try to be the champion of 2nd division. Compete in the 1st division!

One effect of the economy being Global is that there's little room for the second best. We as customers have access and choose the best. When we sell something, we should compete to be the best, as well.

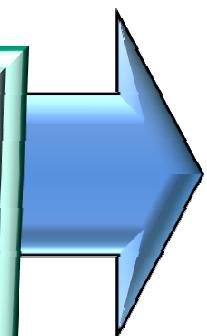




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packed knowledge

packed
knowledge

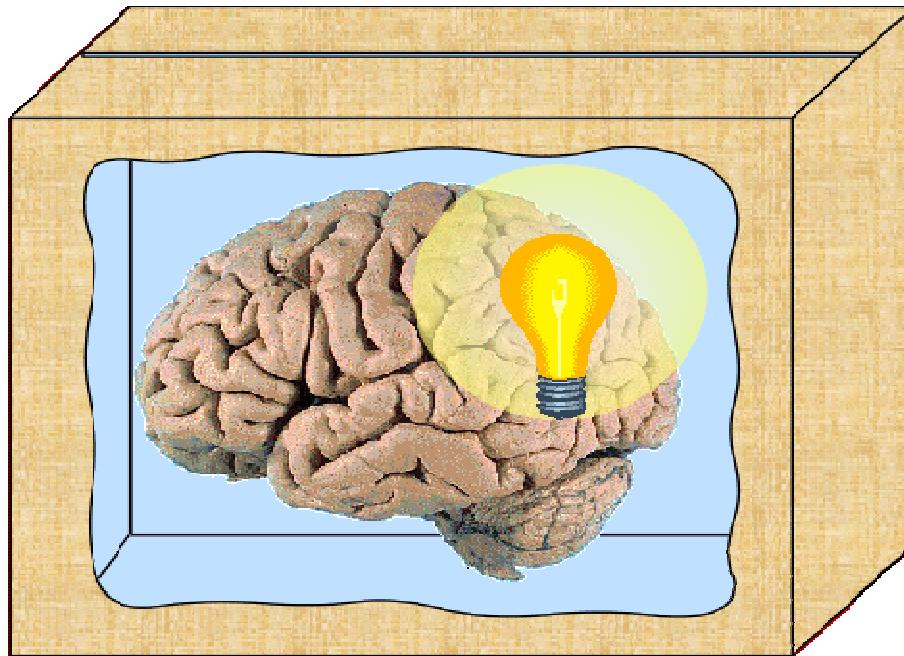




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packed knowledge™

- A product is said to be a *packed knowledge*™ if it has some characteristics



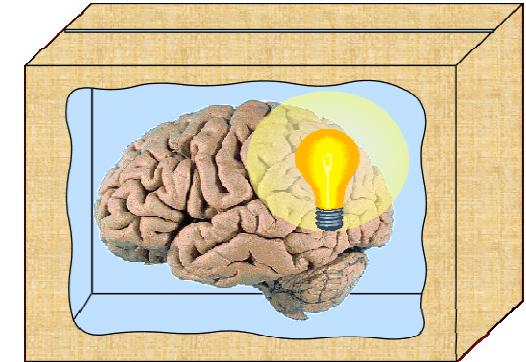
logo of
package knowledge

a brain with a
brilliant idea
inside a package

Characteristics of packed knowledge products

- The product is knowledge intensive.
- The product cost is almost all related to development cost. The production and distribution costs are far less related.
- The price is formed mostly from the perception of value by the customer, and has little relation to the cost.
- The customer needs to invest time to learn how to use the product. The quality of support is crucial to add value to the product. The support can be provided by some firm, or it can exist some community of users that share information and provide support.
- The standardization of the market is beneficial to the customer.

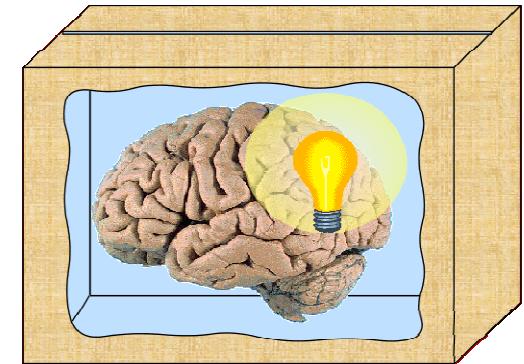
- Among the products that your firm develops and sells, which ones can be considered PK? Who in the firm knows the most valuable part of the knowledge of these PK products?





Examples of packed knowledge products

- Software
 - operating system
 - database
 - Office & tools (text editor, spreadsheet, photo editor, etc.)
- Electronic gadgets
 - Digital photo & video camera
 - audio & video players
 - mobile devices (smartphones & tablets)
- Specialized hardware
 - router, switch, VPN, IDS, firewall, etc.
 - CPU, GPU
 - Disk array (storage)
- Seeds and embryos for agribusiness
- Industrial goods
 - Robot for building cars
 - Weaving machines
 - Machine to produce memory for computer



Paradigm of an enterprises and individuals that develop PK

- What strategies are recommended for enterprises and individuals that develop PK-products?
- What are the computer languages used by successful enterprises in software business?
 - Google, Intel, nVidia, Adobe, ARM, Facebook, Apple, Microsoft, Oracle, IBM, Samsung, Sony, and others





Paradigm of an enterprises and individuals that develop PK (2)

- PK products and non-PK products tend to have different evolution paths. While non-PK products can live with competition of several brands, PK products tend to follow an evolution path that leads to the extinction or merge (big firms purchase small ones) of many of the options
- After enough time, only one or a few PK options survive
- The knowledge level of the PK products increases geometrically; one consequence of this is to have a barrier to start competing
- Usually it makes no sense to offer free non-PK products. But it might make sense to offer some PK products for free. For example:
 - offer Microsoft's power point viewer or Adobe's acrobat reader for free, to push sales of the complete power point or complete acrobat.
 - offer mobile OS for free (Android), and collect from the advertisement and commission of app sales.
- Some software firms choose to turn their products to open source, give up the possibility to sell licenses, and focus on selling services



Characteristics of software products

- From the customer point of view, the 2 situations below are different
 - Situation A: to choose software (e.g. operating system or photograph retouch tool) among several options
 - Situation B: to choose a commodity (e.g. a TV set) among several options
- Software is a PK product. By choosing one in particular, the customer is to study about the software, and in some sense to partner with the software supplier. After choosing for a particular software, it is not very easy for the customer to switch to some other option, because the customer will loose the time invested to learn how to use the software.
- A commodity is a non-PK product (however it can contain PK components). The customer doesn't partner with the supplier because of the choice. For instance: I can purchase a second TV set of a brand different from the one of my first TV set
- The more software is used, the more value it has (just like movies: the more it is seen, the more value it has)



Characteristics of software products (2)

- Software is not a tangible product
 - 100% development cost, 0% production cost
 - Fierce competition (much increased by the FOSS phenomenon)
 - Get obsolete quickly
- Usually it doesn't make sense to offer a tangible product freely. However, there is plenty of free software, even from license selling firms
 - offer Microsoft's power point viewer or Adobe's acrobat reader for free, to push sales of the complete power point or complete acrobat.
 - offer mobile OS for free (Android), and collect from the advertisement and commission of app sales.

Characteristics of software products (3)

- Human behavior tends to be inertial with respect of technology usage. That is, it is hard to convince an user to change whatever software he knows well how to use.
 - To learn how to use a software is an investment (of time, money, concentration, etc.)
 - The user's instinct is to preserve his/her investment on learning, thus resisting to change the software in use (specially if he/she is satisfied with he/she is using)
- The Internet/web bubble (1995~2000) can be interpreted and explained from the human inertial behavior on technology usage.
 - Since the web opened an enormous set of possibilities, the firm that managed to grow over the “virgin land” would make users get used to their product; the users would associate the product to the product category and be inertial to change it; this firm would then be able to make money for a long time



Characteristics of software products (4)

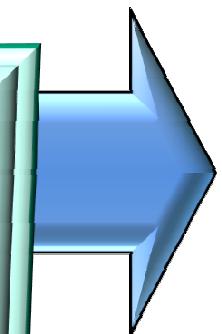
- It is advantageous for the customer that some software become standard (that is, most users choose that software)
 - For non-software products, it is irrelevant whether most user choose or not that same product. Products like bike, TV set, car, watch, and many others. If you buy one of these products of brand A, your next purchase is not necessarily of the same brand A
 - For software products, if there's a standard product in some category (niche) [category examples: operating system, office, photograph retouch tools], the user is compelled to buy this same product, because he will get very useful support from other users.



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**commodity ×
differentiated product**

**commodity ×
differentiated
product**



Economics theory

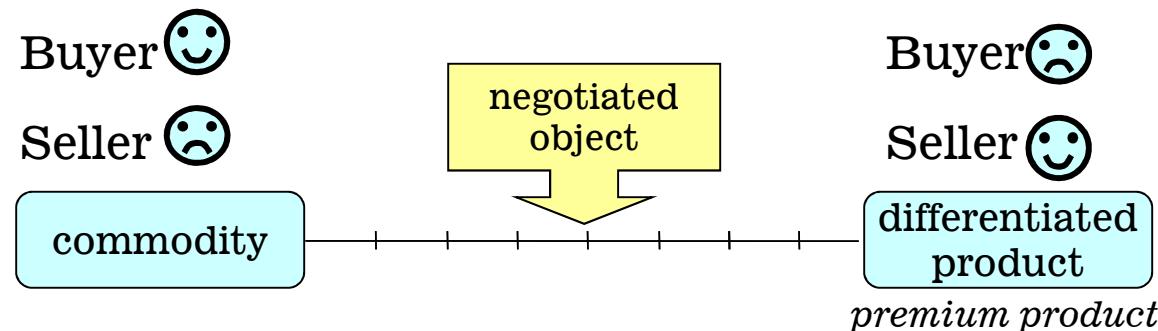
- In an economic transaction, where someone buys something, there are 2 actors:
 - Seller
 - Buyer



- Keywords:
 - *negotiated object*: a product or a service
 - *cost*: a measure of the value of resources needed to produce the negotiated object
 - *price*: the value paid for the negotiated object
 - *perceived value*: the value the market is paying for the negotiated object

Economics theory (2)

- The negotiated object lays on some point on the ruler below



- When the negotiated object is a commodity, it is the buyer who is in the good negotiating position. If there exist enough supply, the buyer can choose the cheapest product. The seller can't differentiate the object, and end up forced to negotiate with low profit margin.
- When the negotiated object is a differentiated product (also known as premium product), it is the seller who is in the good negotiating position. The buyer has no option and the seller recognizes this and defines a high price.



Commodity in short supply

- If a commodity is in short supply, even though it is a commodity, the market price tend to go high (good for who has it to sell, bad for who has to buy it)
- But the price tends to be controlled in the long term, because the good profit attracts new suppliers
 - Study cases: market value of html authoring; production of consumer goods

Commodity in short supply (2)

- In the long term, only the premium products can sustain premium prices
 - Premium products usually allow higher profits.
 - Many successful companies own and sell premium products, at premium prices.
 - C/C++ is a convenient computer language for COTS, that can become premium software products.
 - Examples: Microsoft Windows, Microsoft office, Adobe's Photoshop, Adobe's InDesign, Netscape's Navigator (now converted to Firefox), Emule P2P, PostgreSQL, MySQL



Observing best practices



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The developer's ability is an object negotiated in the labor market

- The developer should sell his ability in the market, much like the same way the firms should sell theirs products to theirs clients.
 - Both the developer and the firm endlessly seek for ways to improve their earnings.
- If a developer uses a computer language (or development tool) that is “easy”, his/her ability tends to become a commodity in the labor market, thus reducing his/her earning.



The developer's ability is an object negotiated in the labor market (2)

- There are countless innovations in the IT environment. The language C/C++ evolves slowly (to absorb the news), but does not require the developer to abandon old concepts. So, it is always possible to use C/C++ in the new environments that come to interest.
 - Want to develop for palm-sized devices? for cell-phones? for bluetooth? secure network? 16/32/64-bit processors? latest features of 3d games? device driver? cross-platform GUI? database? real-time control? Use C/C++!
 - New features (e.g. bluetooth) come first to C/C++. When such development becomes available to other-than-C/C++ technologies, the wave is already over.



Profitable strategy

**Buy commodities and
sell differentiated products**

- Example of application of the profitable strategy: buy undifferentiated hardware, add software that you develop or own, and sell it as a differentiated system.
- Analyze the set of exported goods of several countries, and state who is applying the profitable strategy in the correct way, and who is applying it in the wrong way.
- The adoption of the profitable strategy leads to the development of products knowledge intensive. Thus, it becomes necessary to protect the intellectual property of these products (patents, copyright, etc.)

Competitive advantage

- Competitive advantage, as described by Michael Porter, exists when a firm is able to deliver the same benefits as competitors but at a lower cost (cost advantage), or deliver benefits that exceed those of competing products (differentiation advantage). Thus, a competitive advantage enables the firm to create superior value for its customers and superior profits for itself.
- Examples: an asset such as a brand (e.g. Coca Cola) or a patent, such as Viagra. It can also simply be a result of the industry's cost structure – for example, the large fixed costs that tend to create natural monopolies in utility industries.



Competitive advantage (2)

- Actors should pursue strategies that create or strengthen sustainable competitive advantage.
 - How to choose a technology to apply to an information system in such a way that I can satisfy the immediate needs of the client, and at the same time help to create or strengthen sustainable competitive advantage to my career or to the firm I'm working for?
- With C/C++ and OO, you can efficiently use Windows, gnu/Linux, Workstations, palm devices, cell-phones, mainframes and virtually any digital processor in existence.
Innovations happen very frequently, and since C/C++ is the almost the only language for technology development, the innovations are available first for C/C++.

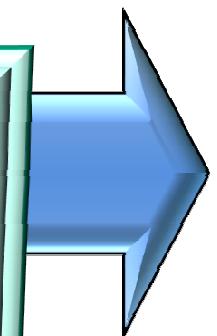




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Economy and Information Technology

Economy and
Information
Technology



Strategic thinking:

your (true) objective is to satisfy the customer?

- The ideal situation is when the professional activity satisfies the customer and at the same time reinforces your strategic position: you being a value creator or enhancing your competitive advantage.
- If the customer's request from you is a product or service that doesn't reinforce your strategic position, if possible you should dismiss this customer.
 - You should satisfy your client by providing a negotiated object that is has value out of its knowledge intensive features; this object should either be developed or owned by yourself.
 - Decide whether you will take the customer or not focusing on your strategic objectives (long term perspective objectives).
 - If by taking the customer you will put yourself in a situation of low value due to low knowledge creation, perhaps you should dismiss this customer.
- If the true purpose of a firm was always to satisfy the customer, Microsoft would accept an offer to sell the Windows source code.





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Entrepreneurship

The attitude and art of starting / running an enterprise

- Business plan
 - Document required for new businesses or business planning a major change in operations. This plan should contain management goals and forecast the firm's cash flow (earnings and expenses, bank loan, money from investors, etc) over a period in the future (usually 3~5 years).
- Venture capital
 - Also called risk capital. Is the money provided from investors for investment in innovative enterprises or research, especially in high technology. The investors and researchers/workers become partners of the newly created firm, and share its profits.
- Enterprise owned by multiple investors
 - Club of investors
 - Firm's stocks on sale in the stock market.
- IPO (Initial Public Offering)
 - The first time a company offers shares of stock to the public.



C/C++ and entrepreneurship

- Since C/C++ is the major technology development computer language, the innovative enterprises very often use C/C++ in their projects.
- Examples: ultra-efficient automatic web catalog (Google), web (Netscape), pdf (Adobe), database (PostgreSQL / MySQL), P2P (Napster, Kazaa, torrent), media (ffmpeg), palm (palm), web tools (Macromedia). Read business news and find more examples!
- Anyone willing to take advantage of license-free gnu/Linux benefits a lot for having knowledge of C/C++.
 - Whenever you use gnu/Linux or any FOSS, claim the cost of the licenses of proprietary software (including Windows) that didn't have to be purchased as a value created by you!



Technology tribes

- Developers and software engineers tend to have “tribe behavior”. That is, to have strong instinct to defend the tribe; here this means the use of the technology he/she knows and likes.
 - Example of technologies and its tribes: C/C++, java, .Net, some libraries or environments like wxWidgets, jboss, xerces, etc.
 - The “tribe behavior” is a human feature also found in cheering for sport teams, and for religions.



Technology tribes (2)

- Why should developers, that have “tribe behavior”, choose for C/C++?
 - Because while C/C++ allows easy access to low-level technology conceiving level of software, the usage of Object Orientation create tiers of complexity isolation that eases complexity of development of large applications.
 - So, by choosing the C/C++ tribe, the developer gets flexibility, agility and efficiency.
 - C/C++ is a comprehensively applicable computer language, that allows usage with many platforms and processors. Whatever the future of IT be, the knowledge of C/C++ will always have room in the market. It is not thinkable that other computer language will take the place of C/C++ as the mainstream of technology development.

The choice of a technology tribe is a strategic decision

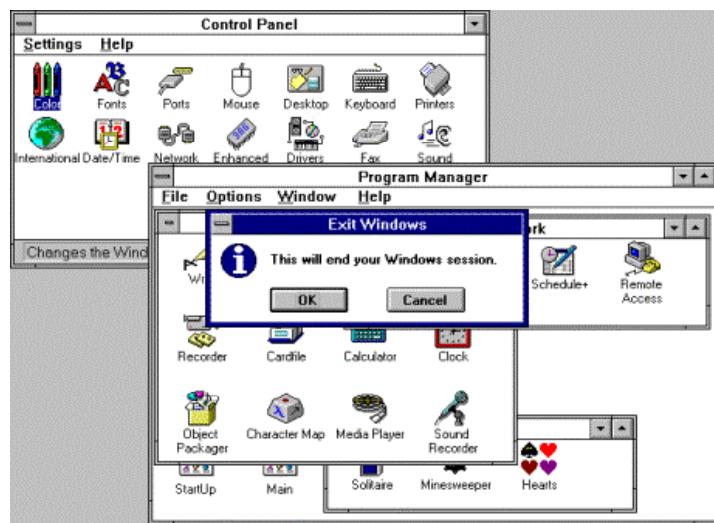
- Learning requires time and money. To decide to learn a specific technology among many others is a strategic decision, because it produces long lasting impact.
- When making the decision to choose a particular information-technology to study, keep in mind your personal strategy.
 - Which long-term objectives do you have?
 - How do you intend to make a difference and be able to create value in the environment that is being produced as time goes on?



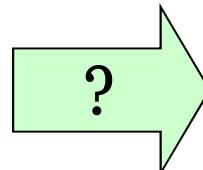
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Technology choice case studies

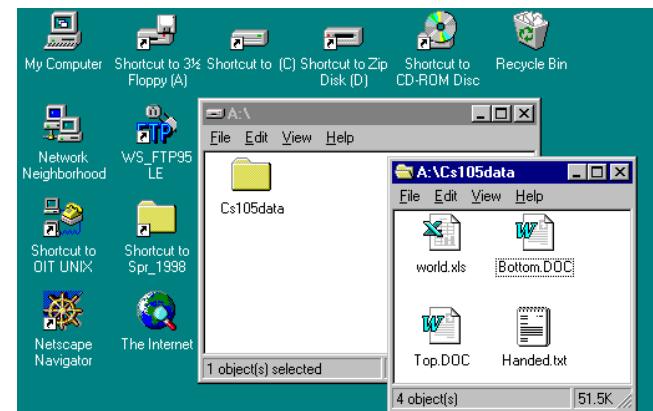
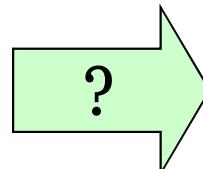
- The choice of moving from Microsoft's win3.1 to IBM's OS/2 or to Microsoft's Windows 95.



Windows 3.1
(16 bits)



OS/2 (32 bits)



Windows 95 (32 bits)



Technology choice case studies (2)

- The choice of keeping Mainframe or switch to Workstation.
 - In 1980's some "gurus" were saying that the mainframe was an obsolete philosophy doomed to be extinct, to be substituted by Workstations and PCs.
 - Now it is clear that some kinds of businesses (e.g. bank) can't work well without mainframes. The ones who worked for bank's IT structure in the 1980's and chose to switch from mainframe to workstation made a terrible mistake.



Mainframe



Workstation

Technology choice case studies (3)

- Which technology choose to use for a web/cgi based system?
 - scripts such as perl, php, cold fusion, asp.
 - “Java package” (java, tomcat, jsp, servlet, optionally j2ee such as jboss)
 - development tools non-100%-compatible-with-web like Microsoft’s .Net.
 - C++ & VBMcgi, in an elegant 3-tier architecture.
 - Reinforce your strategy of learning C++ and OO, while being able to develop also for web.
 - Deliver web software in binary format; prevent reverse engineering and protect your intellectual property.



Conquering the neutrality with respect to Windows

- The dominance of Microsoft's Windows as operating system choice for PC is an obvious fact.
 - To choose some information technology to study that is not applicable to Windows would be a professional suicide.
 - Choosing to study cross-platform C/C++, the developer can develop for Windows as well as for the alternatives.
- If you're interested in GUI software, I recommend you the free, open-source, cross-platform library wxWidgets (www.wxwidgets.org). With wxWidgets, you it is possible use C++ to develop GUI software for Windows, Macintosh, gnu/Linux (actually any unix), palm and other devices.
 - By using wxWidgets, you can develop software being neutral with respect to Windows. Your customer wants GUI software for Windows? use wxWidgets. Your customer now wants a version of that software you developed for Windows in a different platform (say: gnu/Linux), just recompile it!



The wxWidgets tier

Components and systems are developed for a generic GUI platform

The cross-platform GUI development tier

The wxWidgets tier



Palm



Microsoft Windows



Any unix
(Linux, Solaris,
Free-BSD, ...)



Macintosh



Other



The supported GUI platforms
(all the important platforms are here)



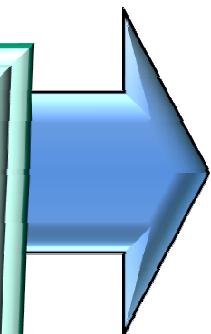
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Comparing some OO computer languages

C/C++ ×

Java ×

.Net and C#



Java × C/C++

Advantages of C/C++

- C/C++ is indisputably the most powerful computer language available, and this is the main option of technology development.
- C/C++ is a language where the compiler is relatively easy to develop. It is to be remarked that since long gnu.org has been offering its C/C++ compiler as open source.
 - There is a C/C++ compiler available for every processor of interest.

Java × C++ (2)

Advantages of C/C++

- C/C++ is both high and low level. That is: it has all the power of the low level and all the advantages of the high level.
- There exists a huge number of libraries and components developed in C/C++, for countless types of applications.
- C/C++ has solid tradition. It is to be remarked that the unix kernel is developed with C. That's a language that can be used for projects of high responsibility.



Java × C++ (3) Advantages of C/C++

- C/C++ has broad applicability. Most IT segments allow usage of it.
 - There are some operating systems developed using it. The most visible example is gnu/Linux.
- By using C/C++, and several components, since you're working in the technology development level, eventually you will invent something new and exciting.
 - Innovation is a very effective competitive tool.

Java × C++ (4)

Advantages of C/C++

- If you consider changing professional sub-area within the whole IT field, there's substantial advantage to use C/C++. Due to its broad application and the usage of OO and purpose-specific components, the experience and knowledge of C/C++ can be applied to other sub-areas.
 - This enhances the employability of those who work with C/C++.
- Those who like gnu/Linux or any unix have greater chance of gaining experience with C/C++.
 - All versions of unix come with a C/C++ compiler. By studying cross-platform C/C++, it is possible to efficiently develop native code once for Windows and gnu/Linux just by recompiling it.
 - Whenever you use gnu/Linux, claim the cost of the licenses of Windows or paid unix that didn't have to be purchased as a value created by you!



The flexibility of C/C++ at a glance

unix
programming

GUI & windows
programming

chip
programming
(embedded
electronics)

audio
video
stream

web (cgi)
programming

C/C++

control
applications

device
driver

high-performance
programming
(super computer)

real-time
programming

database
programming

client-
server

game
programming

network
programming

parallel
processing

Java × C++ (5)

Disadvantages of C/C++

- C/C++ is an extensive and long language; it takes longer and greater effort to learn it all, when compared to other languages.
- Because C/C++ is powerful, it allows for the development of malicious code.
 - But this problem can be minimized with proper management techniques. For instance, software can be developed in tiers, and certain tiers can be managed to have only “defensive code” (no low level access, usage only of classes from highly trustable libraries).
- Those who don't have interest in free software or other powerful features of C/C++ have little to benefit from it.

Java × C++ (6)

Disadvantages of C/C++

- Those who have little entrepreneurial spirit don't benefit much by choosing C/C++ (when choosing another language is an option).
 - It might be more efficient for the software development process to use a simpler language, that has more availability of developers in the labor market. This technologic decision will produce long term effects in the development culture, and eventually produce lack of differentiation.
- Those who aren't interested in changing sub-area within the IT field might perform efficiently as a software developer using a language/development-environment designed specifically for a class of applications.
 - For low complexity GUI applications for Windows, Visual Basic or Delphi can be a more cost-effective choice than C/C++. For low or medium complexity web applications, asp or php can be a more cost-effective choice than C/C++. For scientific and math intensive applications, Matlab can be a more cost-effective choice than C/C++.
 - By using non-C/C++ focus-specific languages, the expertise of one area can not be directly used to other area.
 - The price of the development tool must be taken into account. Those who use C/C++ instead of the alternative can (should) claim the saving of the development tool as a value created by the developer.

Java × C++ (7)

Advantages of Java

- Java implements OO very well, and is a very good option for cross-platform server-side system development.
- Java is compiled cross-platform at bytecode level, that is, “write once run anywhere”.
- Java is easier to learn when compared to C++; that is: developers are more numerous and less expensive.
- Java is safer than C++; by having less power, it is harder to develop malicious code in Java.
- There is a massive consortium of enterprises and individuals supporting Java.

Java × C++ (8)

Advantages of Java

- There's "evolution protection" for those who choose Java. Since the compiled bytecodes are executed over a "virtual machine" tier, it is always possible to develop a virtual machine for the next generation of hardware and execute your code there.
 - Some 64-bit cpu's and mobile phones became available after java was invented. Java code compiled before existence of these cpu's can run there without adaptation.
- There's research going on to find ways to improve performance of java programs.
- By using java it is possible to write applets to web browsers. Web software reach a new and powerful level by using java applets.
- Since 2006 Java is 100% open source, for the source code of the official (Sun's) JVM, written in C, is now open.

Java × C++ (9)

Disadvantages of Java

- Java is simple only when compared to C++, but it is complex when compared to simple area-specific languages such as ASP, PHP or Visual Basic.
 - For those who need very simple web software for a home page, PHP can be less expensive and simpler than Java.
 - For a simple GUI application, Visual Basic can be less expensive and simpler than Java, and yet deliver a better final product.
- Java is quite powerful, but not enough powerful and its performance is too low for the deepest cutting-edge requisites of technology development.
 - The highest level of technology development is done using C/C++. Here are some examples: kernel of operating systems, device driver development, signal processing, video and audio codec, high-profile COTS such as Adobe's Photoshop and InDesign (and its plugins), Macromedia's Dreamweaver, audio and video editors such as the open source Audacity.
 - If you want to be elite in IT, accept nothing less than the top: choose C/C++. With Java, you will learn a complex and powerful language and yet won't be able to do some of the high-profile jobs in IT.

- Java is not recommended for COTS development. It is a structural characteristic of Java that it is easy to decompile it (get source code out of the compiled program).
 - This problem has a solution: to obfuscate the code. But this solution is not always applicable and safe; for example; obfuscated code produces obfuscated logs, thus making it hard to debug the applications.

Java × C++ (11)

Disadvantages of Java

- Java's structure has non-solvable limitations on execution performance.
 - That limits usage of Java to some applications that require high execution performance. Examples: 3d-games, high-speed real time control of motors and robotics, voice recognition, scientific and math computing, and many others.
 - The best Java users can do to enhance execution performance is to compile Java to native code. This can not always be done (because some Java features won't work in compiled mode). Even in compiled-to-native mode Java still has performance hindrances due to the garbage collector thread (a Java feature that simplifies software development but slows running speed).
 - Some claim that the “poor performance problem” of Java programs tends to be solved as time goes by, because technology is always improving, and faster CPU's are being available.
 - But as CPU's get faster, users expectations about computers enhance. The fact is that Java programs always run slower than native code.

Java × C++ (12)

Disadvantages of Java

- Java didn't conquer friendship from all important IT players. There's an open war between Microsoft and its proprietary approach that promotes .Net, and Java, with mixed approach (both open source and proprietary).
 - The lack of Java support from Microsoft sometimes become a practical problem for the developer. For instance: Windows doesn't come anymore with Java Virtual Machine pre-installed. Installing the JVM is not a problem for the expert user, but it is a problem for the non-expert user. Commercial web pages that use Java applets require the user to install the JVM before using it.



Java × C#

- C# has little to do with C++!
 - C/C++ is a community-defined technology, and anyone is welcome to examine the compiler's source code and suggest new features. The compiler and the compiled code is cross-platform.
 - C# is a Microsoft owned proprietary language; The compiler and the compiled code is Windows-only.
- C# is one of the languages of the .Net platform. C# and .Net compete directly with Java, not with C++.
- C#, much like Java, is OO and runs over a virtual machine (that is not open source and runs well only in Windows).



Disadvantages of C# and .Net

- The main issue about choosing C# and .Net is that the code is insolvably Windows-only.
 - There are open-source efforts to reverse-engineer the .Net virtual machine to be cross-platform. But these efforts face trustworthiness problems.
 - Those who choose C# and .Net may suffer from scalability problems, that is, after a certain software is developed, if there's interest to install it to several other computers, the price of Windows may turn it to be prohibitive.
- Caution: very often “web” software develop with .Net turns up to be a Internet Explorer only compliant. Such software can't claim to be “web software”; instead it is a networked Windows software.
 - It is strongly recommended that web software is tested using firefox as web browser. This guarantees that the software will work well with a non-Windows version of firefox.
- .Net and C# are not languages to develop technology; these are languages to develop software systems, much like Java.



Advantages of C# and .Net

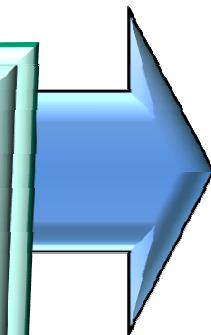
- .Net is a nice self-contained development environment, that has built in software management features.
 - It can be a good option for enterprises and individuals that choose to stick to Microsoft and forget everything else.
- .Net developers tend to be less expensive than the alternative
 - This is advantage for who hires, not for who is hired.
- .Net allows for integrated management of software from several different computer languages, not only C#.
 - Many traditional languages such as COBOL were adapted to .Net.



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Conclusion

conclusion





Conclusion

- To develop using C/C++ is the elite's choice. It has unmatched power and tradition.
- C/C++ is the main choice of technology development.
- C/C++ can be used (instead of the many alternatives) to integrate solutions and for commercial software.
 - By choosing C/C++ for easier projects, you can get experience for more complex ones.
- C/C++ has broad applicability. So you don't get caught on the overspecialization trap.



Conclusion (2)

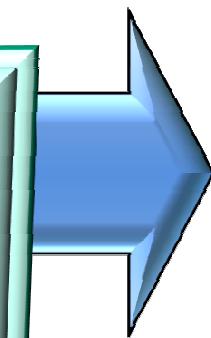
- The usage of **OO** with **C++** helps accumulate experience with components in libraries. Given enough time, there will be components to do anything of interest.
- It is not hard to migrate the **OO** concepts of **C++** and apply to other famous languages such as **Java** or **C#**.
 - The opposite is much harder.
- **Cross-platform C/C++ and OO** allows efficient native-code development.
 - This is particularly interesting to help making gnu/Linux a viable option, without opposing usage of Windows.



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Some open source projects

open source
projects





Some open-source projects using C/C++

- gnu/Linux kernel
 - <http://www.gnu.org/gnu/linux-and-gnu.html>
- gnu c and c++ compiler gcc/g++
 - <http://gcc.gnu.org/>
 - The best C/C++ compiler is open-source
- Firefox & Thunderbird
 - <http://www.mozilla.com/>
 - Cross-platform web browser and email client.
- PostgreSQL
 - <http://www.postgresql.org/>
 - Cross-platform database. The integrated pgAdmin tool uses C++ and the wxWidgets library.
- Filezilla
 - <https://sourceforge.net/projects/filezilla>
 - FileZilla is a fast FTP and SFTP client for Windows with a lot of features. FileZilla Server is a reliable FTP server.



Some open-source projects using C/C++ (2)

- **VBLib**
 - <http://www.sbvb.com.br/cgi-bin/index.cgi?p=14>
 - The general purpose Villas-Boas (sbVB) library in C++ cross-platform (Windows and Unix)
- **VBMcgi**
 - <http://www.vbmcgi.org>
 - <http://www.sbvb.com.br/cgi-bin/index.cgi?p=5>
 - The Villas-Boas (sbVB) and Martins library for web/cgi
- **7-Zip**
 - <https://sourceforge.net/projects/sevenzip>
 - 7-Zip is a file archiver with the high compression ratio. The program supports 7z, ZIP, CAB, RAR, ARJ, LZH, CHM, GZIP, BZIP2, Z, TAR, CPIO, RPM and DEB formats.
- **Notepad++**
 - <https://sourceforge.net/projects/notepad-plus>
 - Notepad++ is a generic source code editor (it tries to be anyway) and Notepad replacement written in C++ with the win32 API. The aim of Notepad++ is to offer a slim and efficient binary with a totally customizable GUI.



Some open-source projects using C/C++ (3)

- AbiWord
 - <http://www.abisource.com/>
 - AbiWord is a free word processing program similar to Microsoft® Word. It is suitable for a wide variety of word processing tasks.
- wxWidgets Dialog Designer
 - <http://sourceforge.net/projects/wxdsgn/>
 - Opensource wxWidgets Dialog designer that mimics the Delphi/Borland C++ Builder designer.
- Java Virtual Machine
 - <http://developers.sun.com/downloads/>
 - C source code of Java is available
- Xerces & Xalan
 - <http://xml.apache.org/>
 - Parsing & validating XML and XSLT transformation; open-source cross-platform C++ library.



Some open-source projects using C/C++ (4)

- eMule
 - http://www.afterdawn.com/software/source_codes/emule.cfm
- Torrent
 - http://www.afterdawn.com/software/source_codes/g3_torrent.cfm
- ImageMagik
 - <http://www.imagemagick.org/>
 - A cross platform C/C++ library to process bitmap images
- wxWidgets
 - <http://www.wxwidgets.org/>
 - Open-source cross-platform C++ GUI library
- Boost
 - <http://www.boost.org/>
 - Boost provides free peer-reviewed portable C++ source libraries.
- cURL
 - <http://curl.haxx.se/>
 - curl is a command line tool for transferring files with URL syntax, supporting FTP, FTPS, HTTP, HTTPS, SCP, SFTP, TFTP, TELNET, DICT, FILE and LDAP.



Some open-source projects using C/C++ (5)

- OpenSSL
 - <http://www.openssl.org/>
 - The OpenSSL Project is a collaborative effort to develop a robust, commercial-grade, full-featured, and Open Source toolkit implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols as well as a full-strength general purpose cryptography library.
- gSOAP
 - <http://gsoap2.sourceforge.net/>
 - The gSOAP Web services development toolkit offers an XML to C/C++ language binding to ease the development of SOAP/XML Web services in C and C++.
- PortAudio
 - <http://www.portaudio.com/>
 - PortAudio is a free, cross platform, open-source, audio I/O library. It lets you write simple audio programs in 'C' that will compile and run on many platforms including Windows, Macintosh (8,9,X), Unix (OSS), SGI, and BeOS.
- fmod
 - <http://www.fmod.org/>
 - FMOD is a cross platform audio library and toolset to let you easily implement the latest audio technologies into your title.
 - FMOD now supports 13 platforms! Win32, Win64, WinCE, Linux, Linux64, Macintosh (os8/9/10/x86) PS2, PSP, PS3, Xbox, Xbox 360, GameCube, Wii



Some open-source projects using C/C++ (6)

- **IT++**
 - <http://itpp.sourceforge.net/>
 - IT++ is a C++ library of mathematical, signal processing, speech processing, and communications classes and functions
- **GSL – GNU Scientific Library**
 - <http://www.gnu.org/software/gsl/>
 - The GNU Scientific Library (GSL) is a numerical library for C and C++ programmers. It is free software under the GNU General Public License.
 - The library provides a wide range of mathematical routines such as random number generators, special functions and least-squares fitting. There are over 1000 functions in total with an extensive test suite.
- **PTypes**
 - <http://www.melikyan.com/ptypes/>
 - PTypes (C++ Portable Types Library) is a simple alternative to the STL that includes multithreading and networking. It defines dynamic strings, variants, character sets, lists and other basic data types along with portable thread and synchronization objects, IP sockets and named pipes. Its main “target audience” is developers of complex network daemons, robots or non-visual client/server applications of any kind.



Some open-source projects using C/C++ (7)

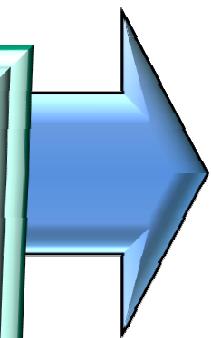
- ACE
 - <http://www.cs.wustl.edu/~schmidt/ACE.html>
 - The ADAPTIVE Communication Environment; an OO Network Programming Toolkit in C++.
- Bullet Physics Library
 - <http://sourceforge.net/projects/bullet/>
 - Bullet is a state-of-the-art 3D Collision Detection and Rigid Body Dynamics Library for games. ZLib license, free for commercial use, including Playstation 3. Supports COLLADA Physics. Visit forum at <http://bulletphysics.com> for support and feedback
- SecureICQ
 - <http://sourceforge.net/projects/secureicq>
 - SecureICQ is a chat program similar to ICQ. It uses a higher encryption than ICQ and is easier to handle with. SecureICQ is a stand-alone system: It does not rely on the ICQ servers nor on the ICQ protocol.



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Humor

humor

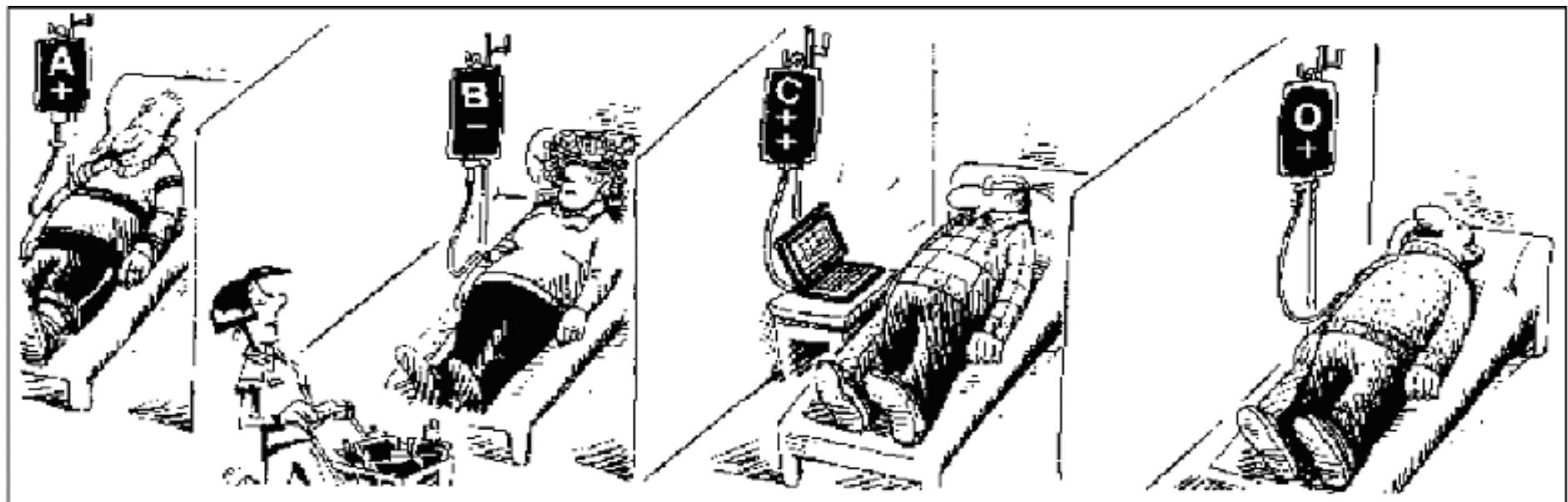




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Humor

- C++ flows in your blood



by Thach Bui, <http://www.pcandpixel.com/>