Engenharia de Software

Prof. Marcelo Maia

Engenharia de Software na grade do BCC

1º Período	2º Período	3º Período	4º Período	5º Período	6º Período	7º Período	8º Período
360 – 30 – 390	300 – 90 – 390	330 – 60 – 390	330 – 60 – 390	360 – 30 – 390	330 – 30 – 360	330 – 45 – 375	225 – 90 – 315
GBC011 Empreend. em Informática 60 – 00 – 60	GBC021 Profissão em Comput. e Informática 30 – 00 – 30	GBC031 Estatística 60 – 00 – 60	GBC041 Estatística Computacional 60 – 00 – 60	GBC051 Comp. Científica e Otimização 90 – 00 – 90	GBC061 Gestão Empresarial 60 – 00 – 60	GBC071 Construção de Compiladores 60 – 00 – 60	GBC081 Direito e Legislação 45 – 00 – 45
GBC012 Cálculo Diferencial e Integral 1 60 – 00 – 60	GBC022 Cálculo Diferencial e Integral 2 60 – 00 – 60	GBC032 Cálculo Diferencial e Integral 3 90 – 00 – 90	GBC042 Teoria dos Grafos 60 – 00 – 60	GBC052 Análise de Algoritmos 60 – 00 – 60	GBC062 Teoria da Computação 60 – 00 – 60	GBC072 Projeto de Graduação 1 30 – 45 - 75	GBC082 Projeto de Graduação 2 30 – 60 - 90
GBC013 Geometria Analítica e Álgebra Linear 90 – 00 – 90	GBC023 Matemática p/ Cienc. da Computação 60 – 00 – 60	GBC033 Programação Funcional 30 – 30 – 60	GBC043 Sistemas de Banco de Dados 60 – 00 – 60	GBC053 Gerenciament. de Banco de Dados 60 – 00 – 60	GBC063 Inteligência Artificial 60 – 00 – 60	GBC073 Inteligência Computacional 60 – 00 – 60	GBC083 Segurança da Informação 60 – 00 – 60
GBC014 Programação Procedimental RF 60 – 30 – 90	GBC024 Algoritmos e Estrutura de Dados 1 60 – 30 – 90	GBC034 Algoritmos e Estrutura de Dados 2 60 – 00 – 60	GBC044 Linguagens Formais e Autômatos 60 – 00 – 60	GBC054 Modelagem de Software 60 – 00 – 60	GBC064 Engenharia de Software 60 – 00 – 60	GBC074 Sistemas Distribuídos 60 – 00 – 60	GBC084 Programação para Internet 30 – 30 – 60
GBC015 Introdução a Ciência da Computação 30 – 00 – 30	GBC025 Programação Lógica 30 – 30 – 60	GBC035 Programação Orientada a Objetos 1 30 – 30 – 60	GBC045 Sistemas Operacionais 60– 00 – 60	GBC055 Prog. Orientada a Objetos 2 30 – 30 – 60	GBC065 Modelagem e Simulação 60 – 00 – 60	T Optativa 1 60 – 00 – 60	T Optativa 3 60 – 00 – 60
GBC016 Lógica para Computação 60 – 00 – 60	GBC026 Sistemas Digitais 60 – 30 – 90	GBC036 Arquitetura e Org. de Comput. 1 60 – 00 – 60	GBC046 Arquitetura e Org. de Comput. 2 30 – 30 – 60	GBC056 Arquitetura de Redes de Comput. 60 – 00 – 60	GBC066 Arquitetura de Redes TCP/IP 30 – 30 – 60	T Optativa 2 60 – 00 – 60	Estágio Supervisionado 00 – 210 – 210

Sommerville

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Prof Ian Sommerville

Professor

Research profile

Email: ian.sommerville@st-andrews.ac.uk

Room: 1.27 - Jack Cole Building, North Haugh

Direct phone: +44 (0)1334 463279

Home page: http://ifs.host.cs.st-andrews.ac.uk

Recent Publications

What is software engineering?

- Software engineering is an engineering discipline that is concerned with all aspects of software production.
- Software engineers should adopt a systematic and organised approach to their work and use appropriate tools and techniques depending on the problem to be solved, the development constraints and the resources available.

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Recent Publications

What is a software process?

- A set of activities whose goal is the development or evolution of software.
- Generic activities in all software processes are:
  - Specification - what the system should do and its development constraints
  - Development - production of the software system
  - Validation - checking that the software is what the customer wants
  - Evolution - changing the software in response to changing demands.

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Recent Publications

What is a software process model?

- A simplified representation of a software process, presented from a specific perspective.
- Examples of process perspectives are
  - Workflow perspective - sequence of activities;
  - Data-flow perspective - information flow;
  - Role/action perspective - who does what.
- Generic process models
  - Waterfall;
  - Iterative development;
  - Component-based software engineering.

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Recent Publications

What are software engineering methods?

- Structured approaches to software development which include system models, notations, rules, design advice and process guidance.
- Model descriptions
  - Descriptions of graphical models which should be produced
- Rules
  - Constraints applied to system models;
- Recommendations
  - Advice on good design practice;
- Process guidance
  - What activities to follow.

MSW

ESOFT

Há duas semanas

SOs – Os primeiros grandes sistemas

Jay Forrester

real time computing (1951)

Bob Evans

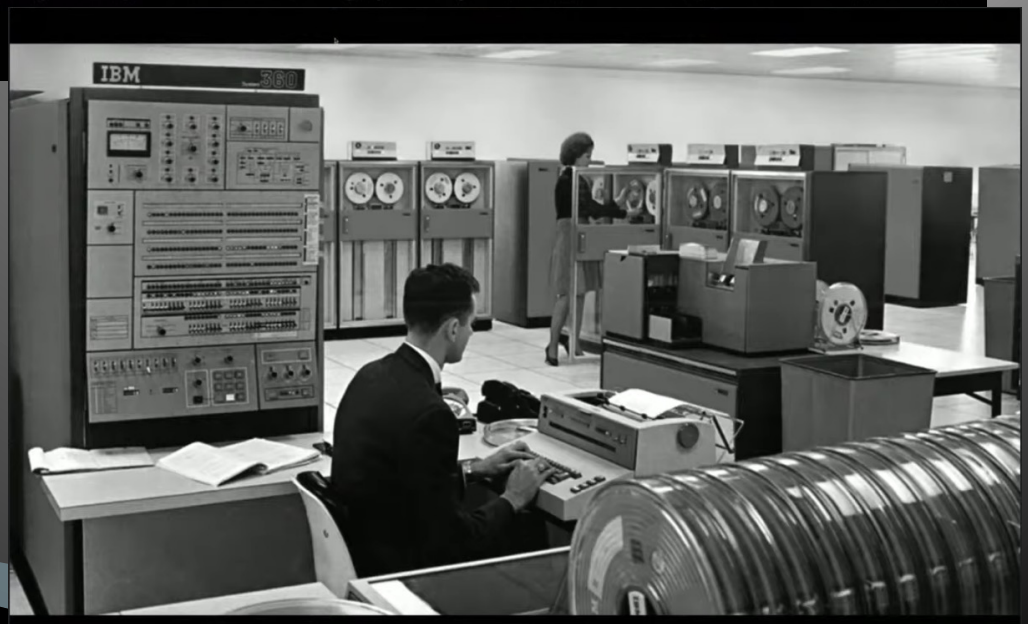
program management (1957)

Christopher Strachey

time sharing (1959)

Dina St Johnston

programming services (1959)



SOs - Primeiros grandes problemas


Fred Brooks

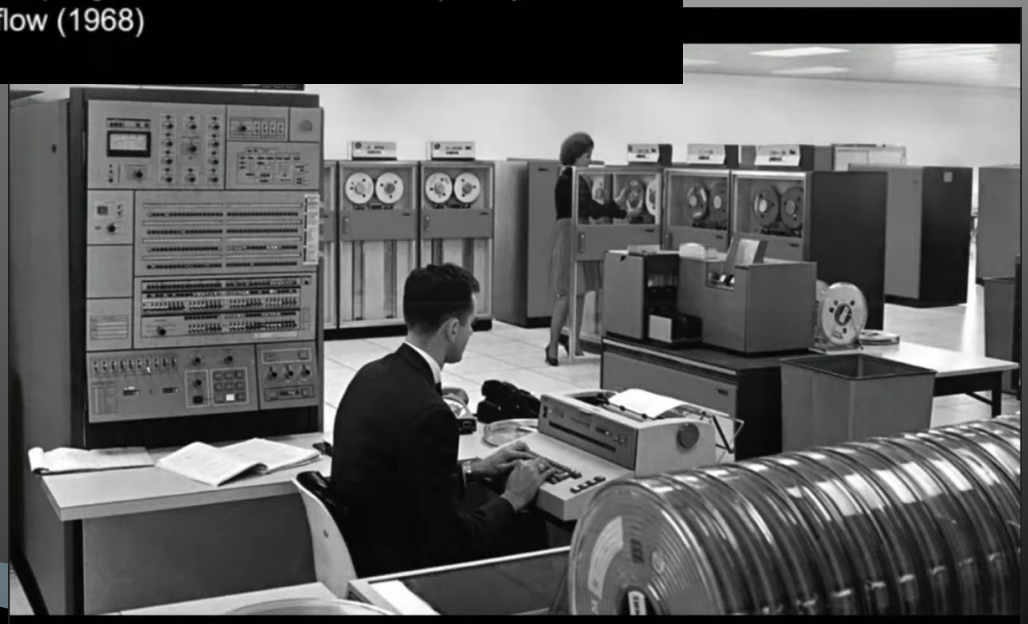
project management (1964)


Larry Constantine

modular programming/coupling & cohesion/data flow (1968)


Edsger Dijkstra

structured programming (1969)



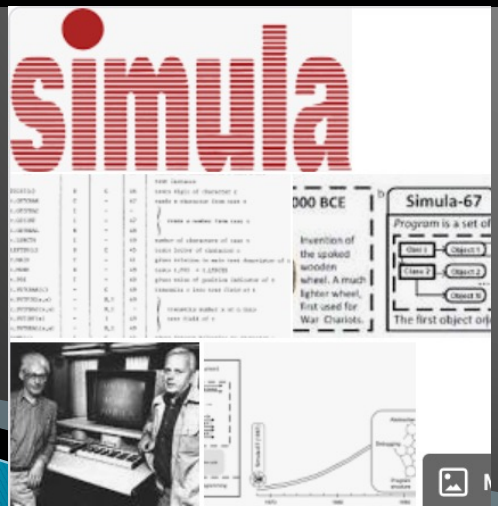
Métodos Formais? OO?

formal systems (1967)

object-oriented programming (1967)

object-oriented programming (1967)

formal systems (1969)



Hoare logic (aka Hoare-Floyd logic)

- Created by Sir C.A.R. "Tony" Hoare, based on Floyd
- Hoare triples: {P} C {Q}
  - P=precondition, C=Command/code, Q=postcondition
- Examples of rules:

$$\frac{\{P\}\ S\ \{Q\}\ ,\ \{Q\}\ T\ \{R\}}{\{P\}\ S;T\ \{R\}}$$

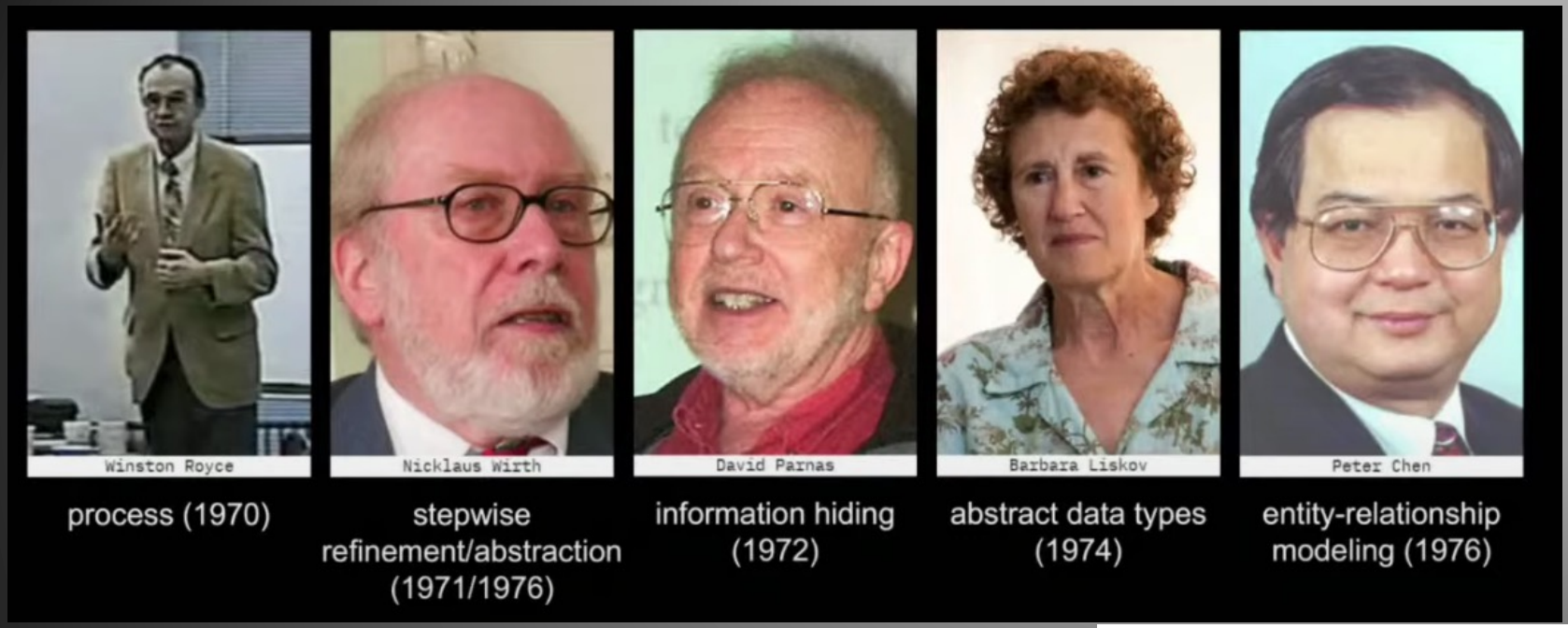
$$\frac{\{B \wedge P\}\ \ S\ \ \{Q\}\ ,\quad \{\neg B \wedge P\}\ \ T\ \ \{Q\}}{\{P\}\ \ \textbf{if}\ B\ \textbf{then}\ S\ \textbf{else}\ T\ \textbf{endif}\ \ \{Q\}}$$

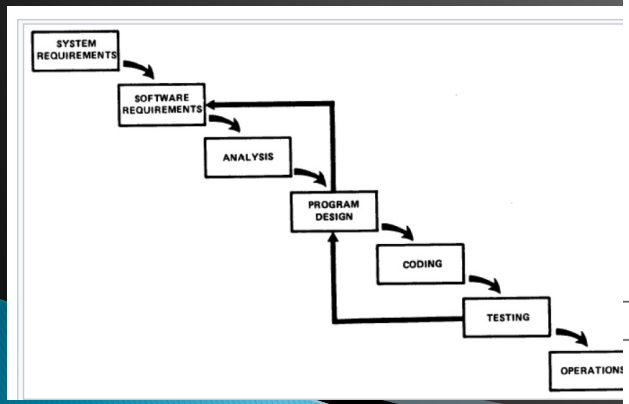
$$\frac{\{P \wedge B\}\ S\ \{P\}}{\{P\}\ \textbf{while}\ B\ \textbf{do}\ S\ \textbf{done}\ \{\neg B \wedge P\}}$$

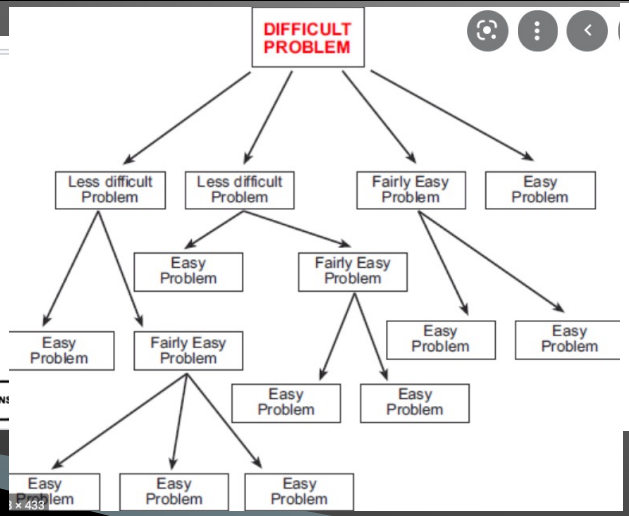
P is "loop invariant"

Key:
Premises
Conclusion

Processos? Modelagem? Black-box?







PROGRAMMING WITH ABSTRACT DATA TYPES

Barbara Liskov
Massachusetts Institute of Technology
Project MAC
Cambridge, Massachusetts

Stephen Zilles
Cambridge Systems Group
IBM Systems Development Division
Cambridge, Massachusetts

Modelagem!!!! 1969-1978


Douglas Ross

SADT (1969)


Larry Constantine

structured design (1972)


Ed Yourdon

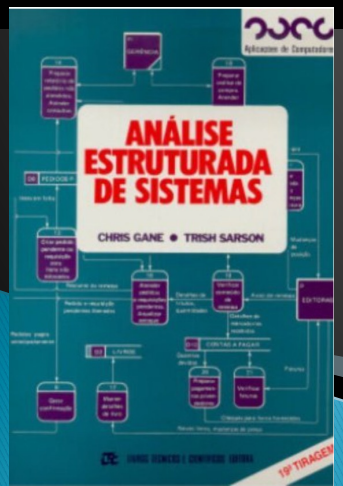
structured design (1972)

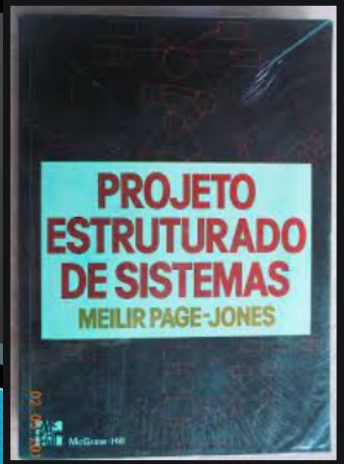

Michael Jackson

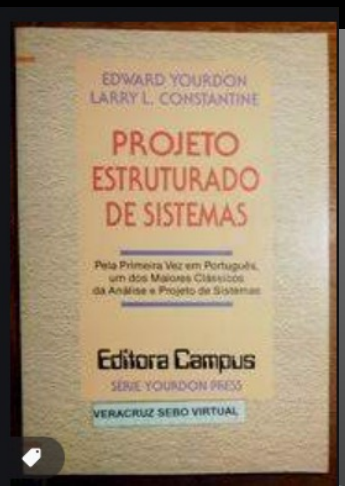
Jackson structured design (1975)

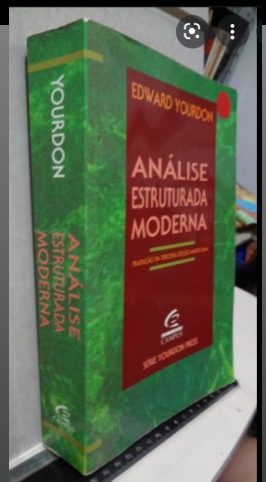

Tom Demarco

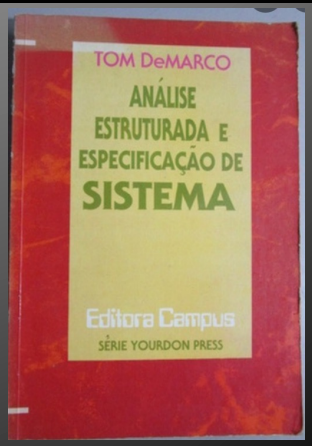
structured analysis and system specification (1978)











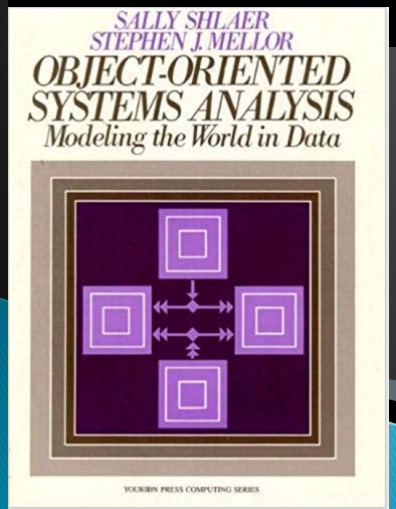
Modelagem!!!! 1985-1990's OO

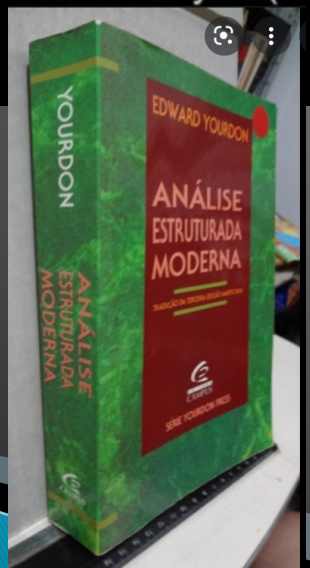
object-oriented analysis (1988)

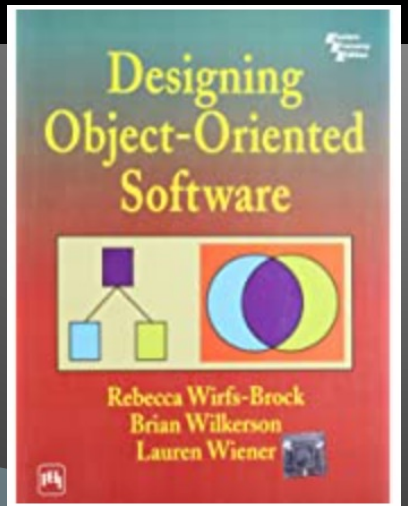
structured analysis (1989)

Responsibility driven design (1989)

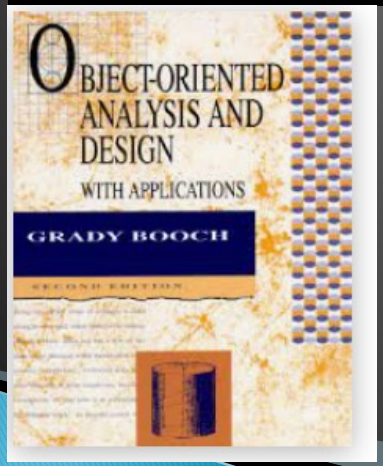
object-oriented analysis and design (1990)

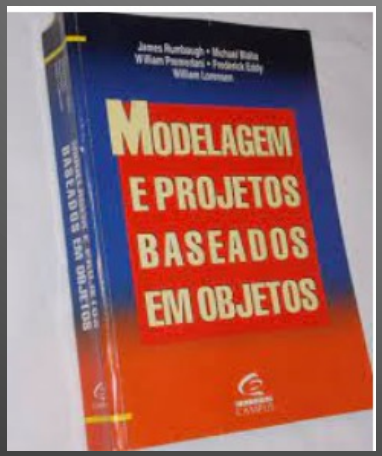


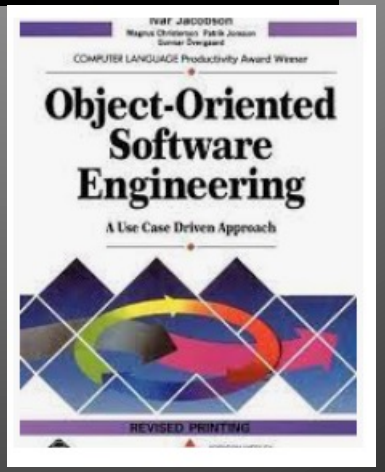




Modelagem!!!! 1985-1990's OO







Projeto!!!! Meados de 90's

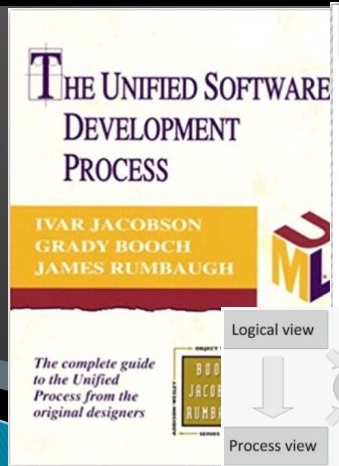
THE HILLSIDE GROUP

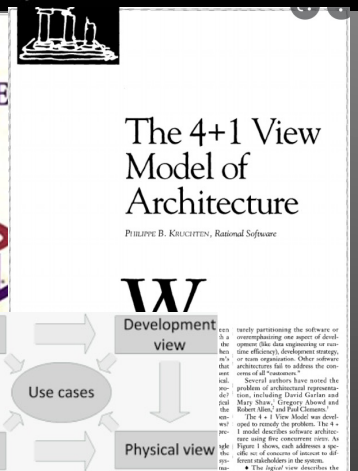
1993

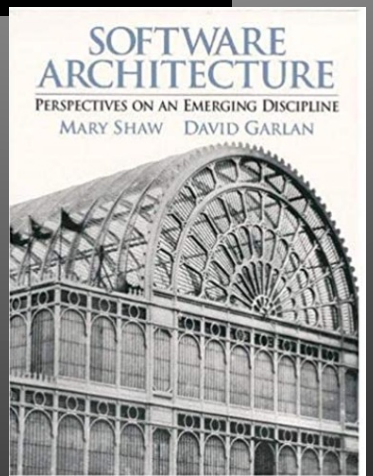
Design patterns (1994)

Rational Unified Process/software architecture (1995)

software architecture (1996)







Economia!!!! 1985-em diante


Barry Boehm

software engineering economics (1981) spiral model (1988)


Victor Basili

empirical software engineering (1986)


Brad Cox

component based software engineering (1986)


Harlan Mills

clean room software engineering (1987)


Watts Humphrey

capability maturity model (1988)

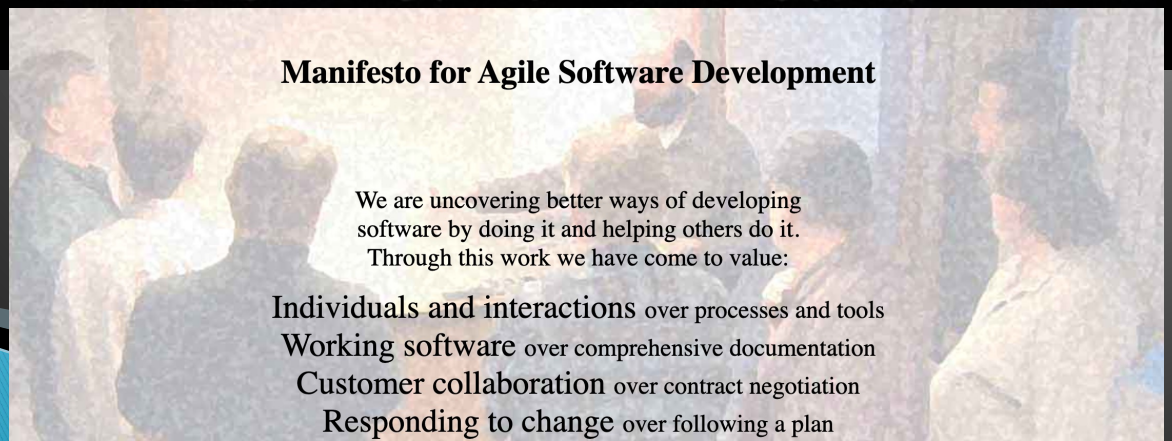
Peso-mosca x Peso-Pesado 1995-em diante

SCRUM (1995)

extreme programming (1996)

refactoring (1999)

Rational Unified Process (2000)



2000's…

Agile Alliance

2001

Linus Torvalds

git (2005)

Jim Coplien

organizational patterns (2005)

Jeannette Wing

computational thinking (2006)

Joel Spolsky

Stackoverflow (2007)

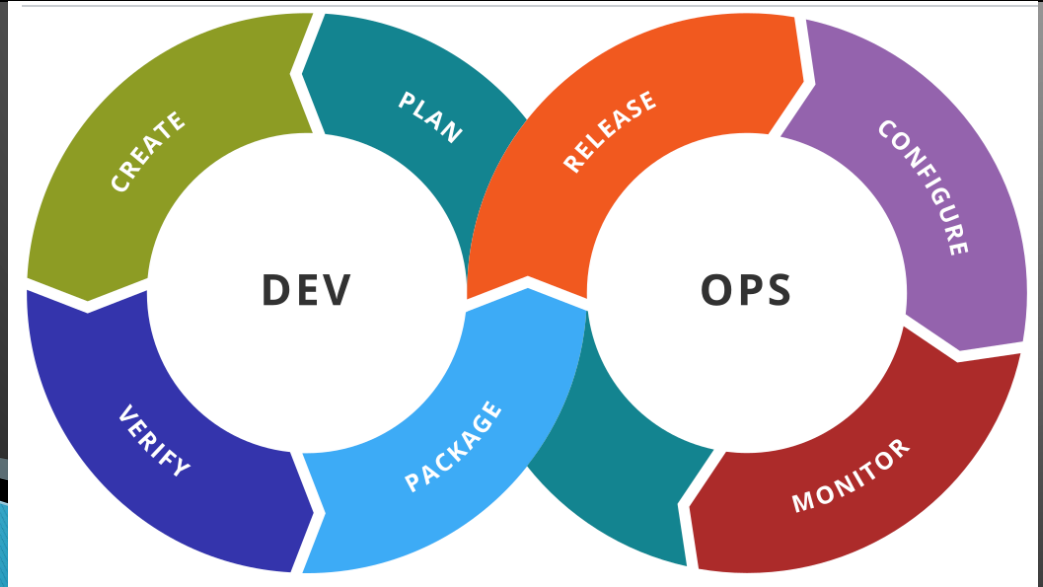
Robert Martin

clean code (2008)

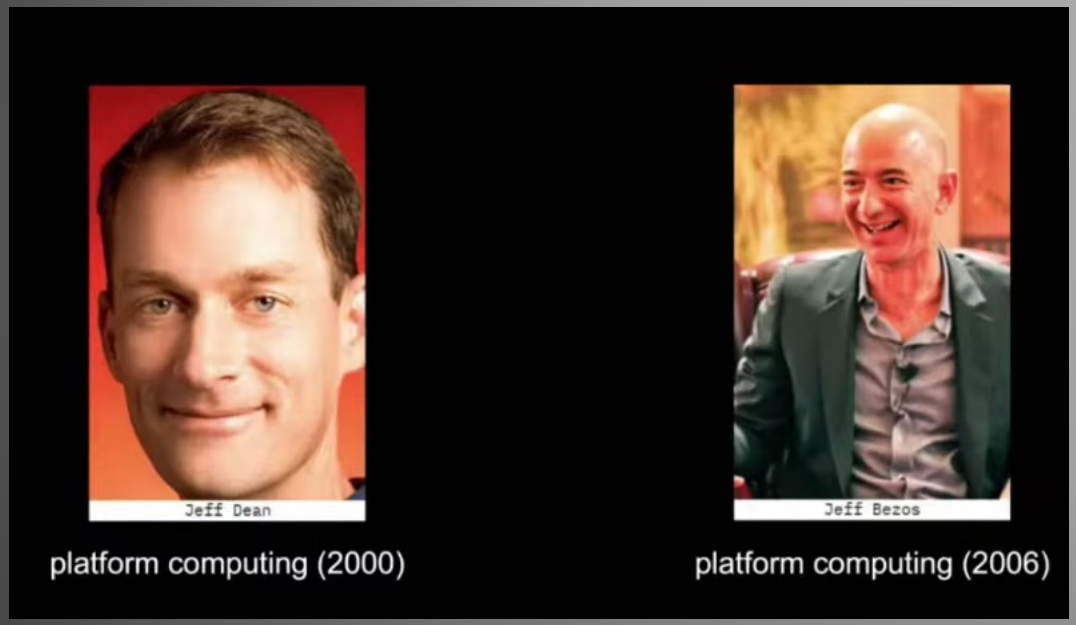
stackoverflow

2000's…


Andrew Shafer
Patrick Debois
devops (2008)
devops (2008)


CREATE
PLAN
RELEASE
CONFIGURE
DEV
OPS
VERIFY
PACKAGE
MONITOR

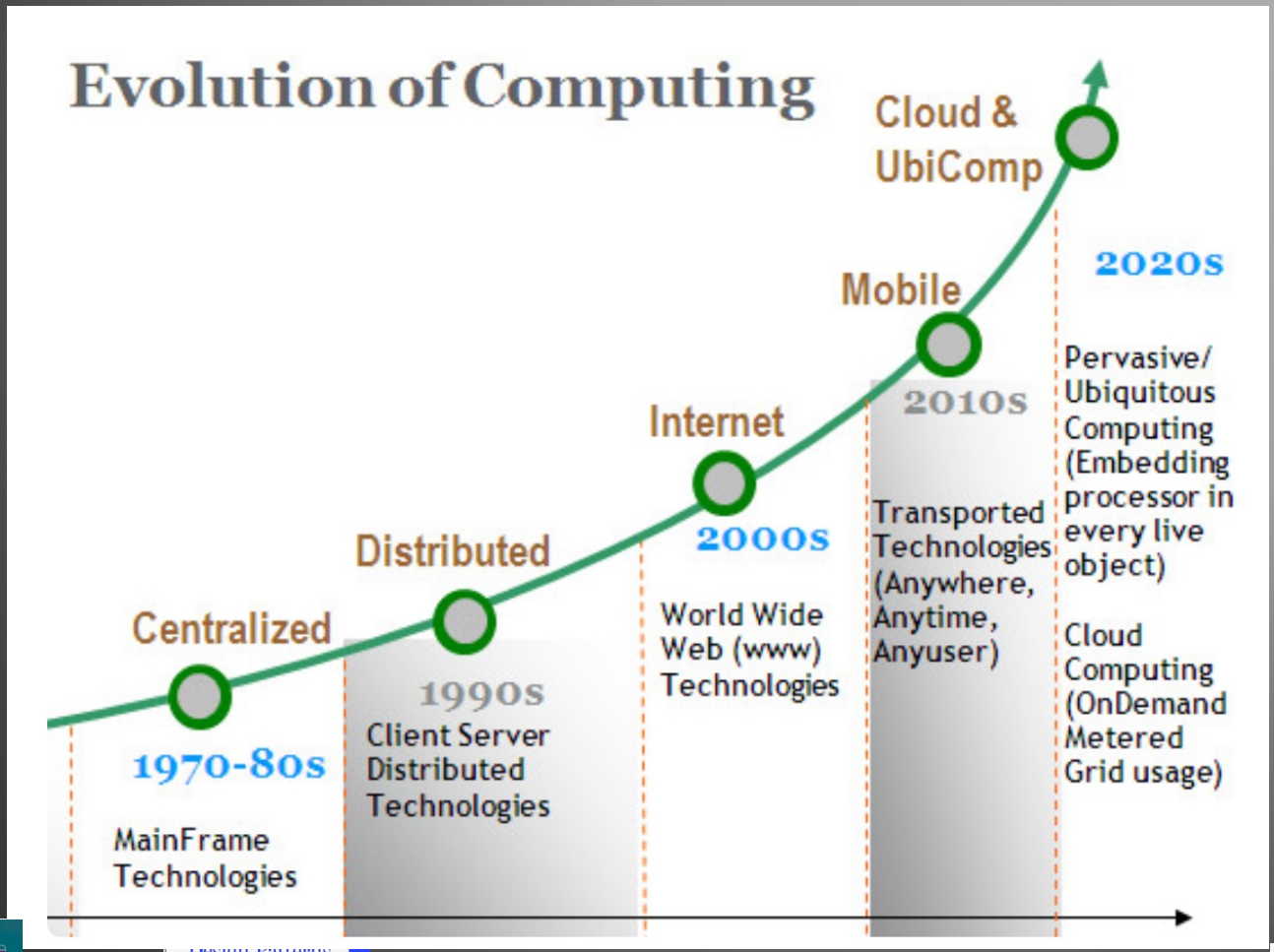
Nowadays…

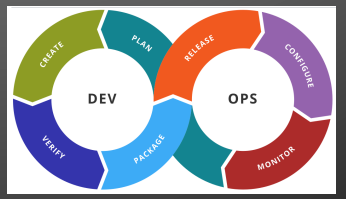


Google Cloud

aws

Por que estas coisas surgiram? Qual impacto na modelagem?





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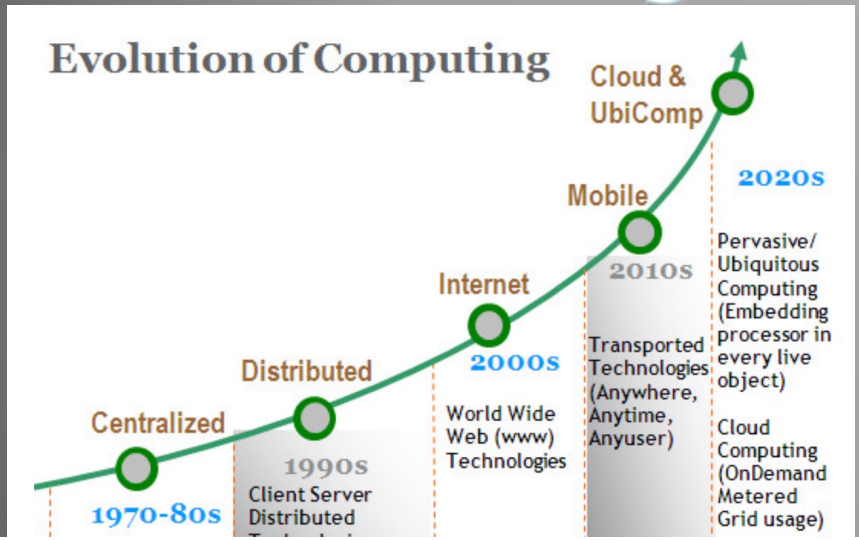
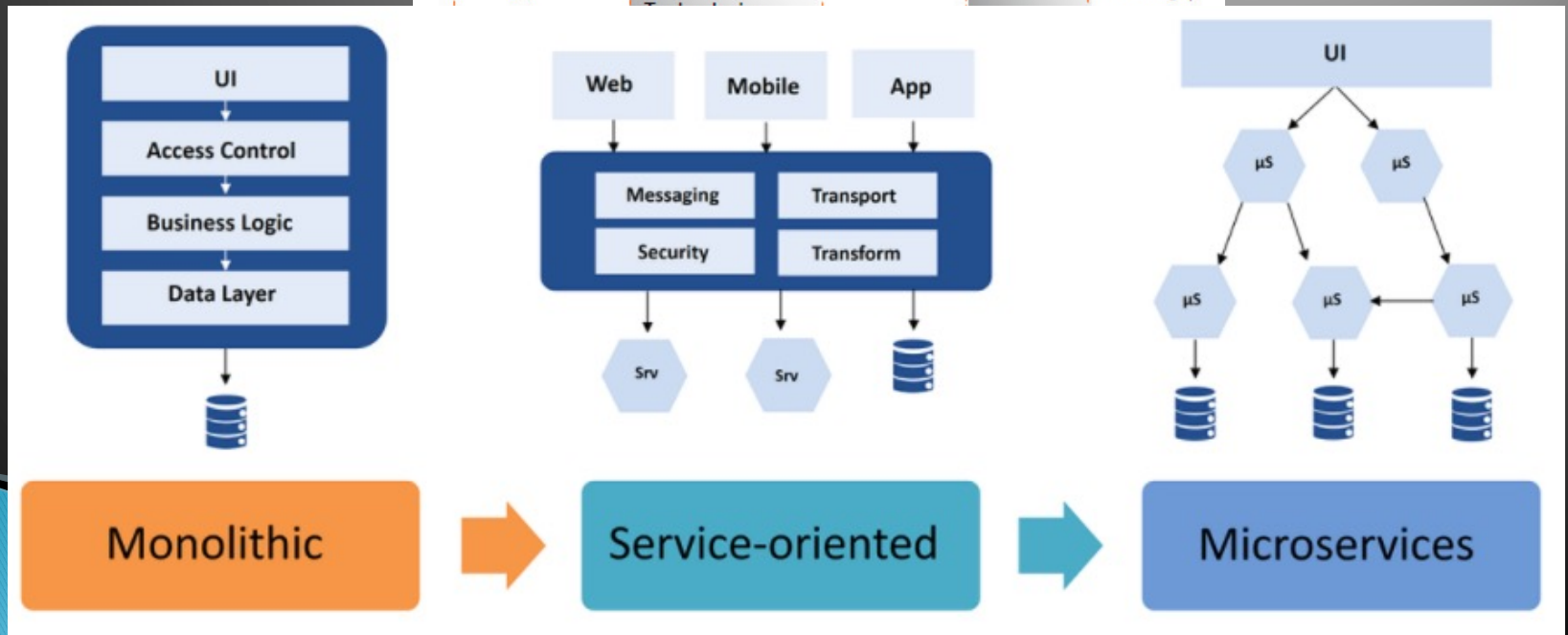
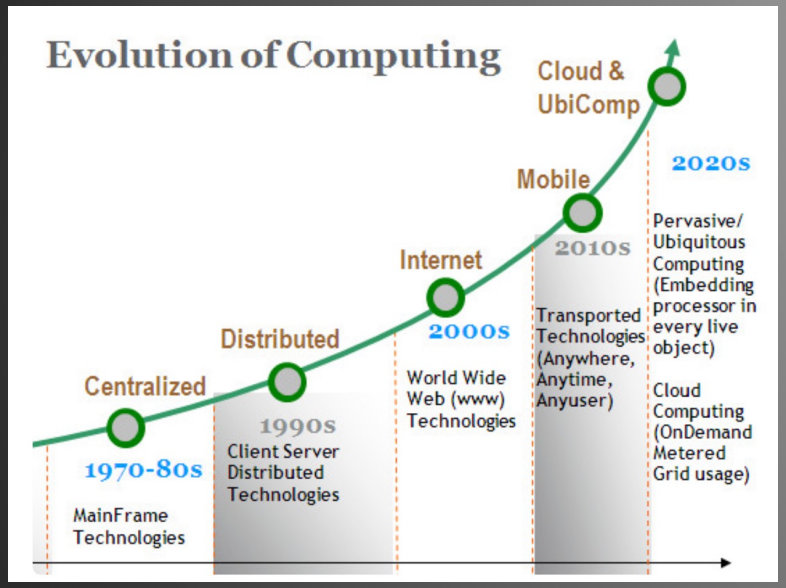
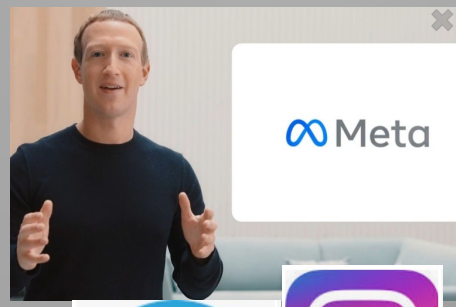
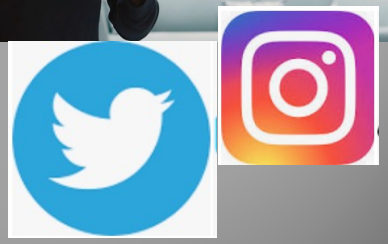


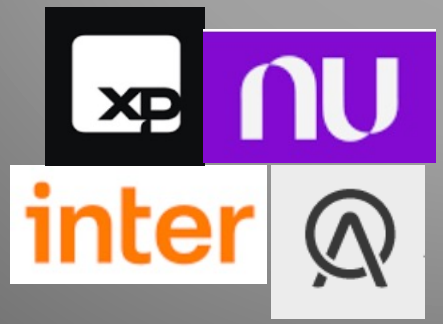


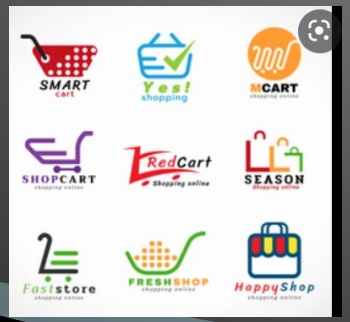
Voltando: Mas por que a computação evoluiu assim?

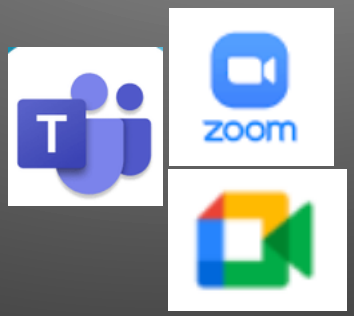












Engenharia de Software

- Passado
- Presente
- Futuro

Software requirements
Software design
Software construction
Software testing
Software maintenance
Software configuration management
Software engineering management
Software engineering process
Software engineering tools and methods
Software quality

Guide to the Software Engineering Body of Knowledge

2004 Version

SWEBOK®

IEEE COMPUTER SOCIETY
http://computer.org

Plano do curso

- Teams
- Aulas presenciais: Segundas e Quartas 14:50
- Avaliação:
  - Apresentação de trabalhos durante o curso (apresentação online).
    - 4 apresentações de 10, 20, 20, 20 pontos
  - Prova final de 30 pontos

- Trabalho
  - Organização, especificação e implementação parcial de um projeto de software a sua escolha
  - Em grupo
  - Tônica do Trabalho:
    - Cooperação / Colaboração
    - Coordenação
    - Responsabilidade
    - Gestão
    - Ferramentas:
      - Gerenciamento de Projeto
      - Gerenciamento de versões
      - Issue Tracker