

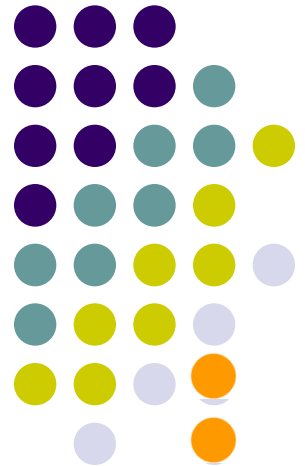
# Arquitetura de Software

## Evolução do Hardware

VLSI e LAN

José Motta Lopes

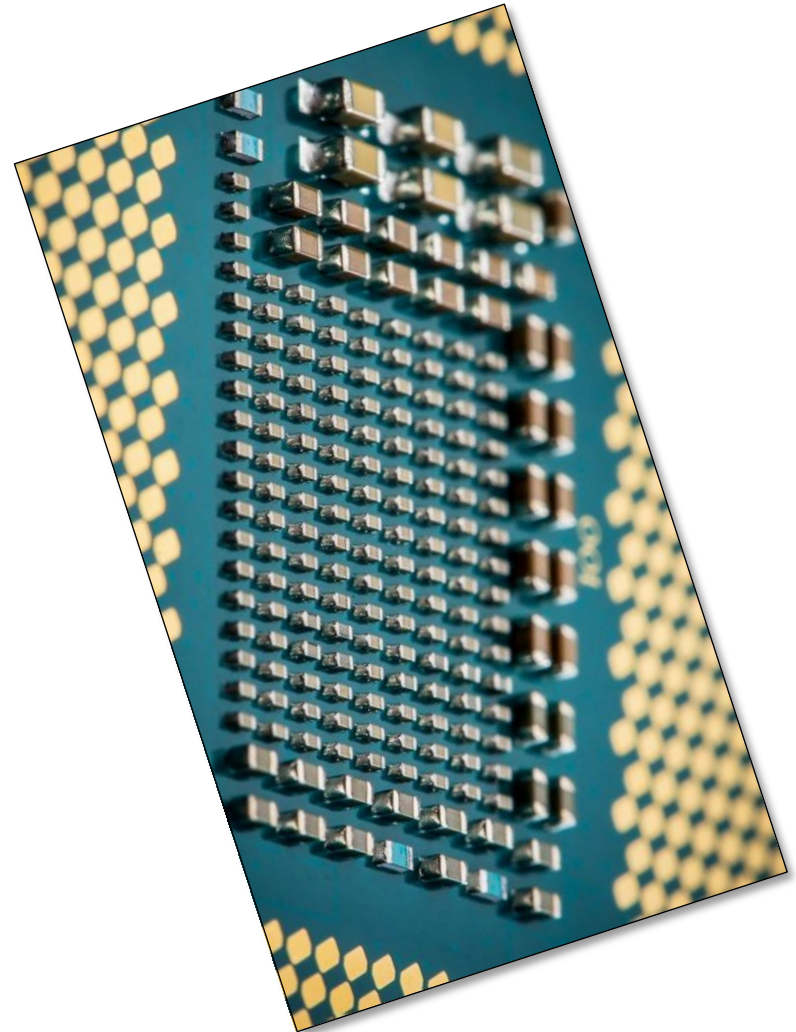
[josemotta@bamplicom](mailto:josemotta@bamplicom)



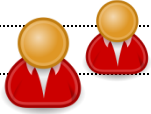
# Agenda



- **Últimos 50 anos de TI**
- **Aplicação Multi-Usuário**
- **Ethernet LAN & ISO/OSI**
- **Multiprocessamento**
- **Servidor Arquivos**
- **Cliente/Servidor**
- **Servidor SQL & NOSQL**
- **Microservices**
- **Virtualização**
- **Containerização**
- **Serviços na Nuvem**



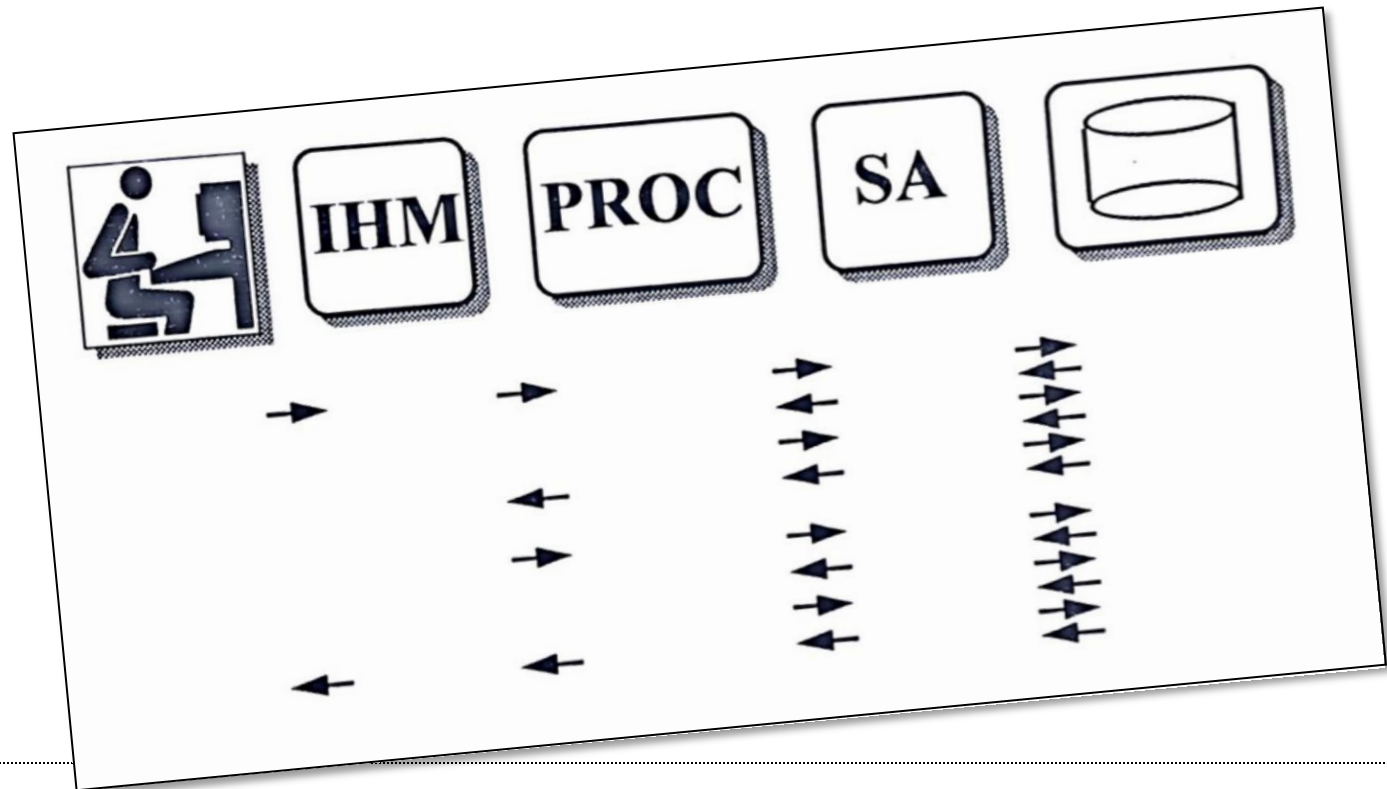
# Últimos 50 anos de TI



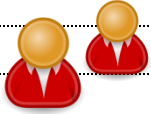
Interface HM

Processamento

Sistema Arquivos



# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos

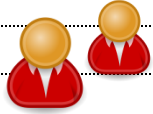


## Aplicação Multi-Usuário

- Usuários
- Interface Homem-Máquina
- Processamento
- Sistema de Arquivos
- Disco



# Últimos 50 anos de TI



Interface HM

1970

Terminal

Processamento

Mainframe

Sistema Arquivos

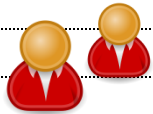


- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial

✓ Ethernet



# Últimos 50 anos de TI



Interface HM

1970

Terminal

Processamento

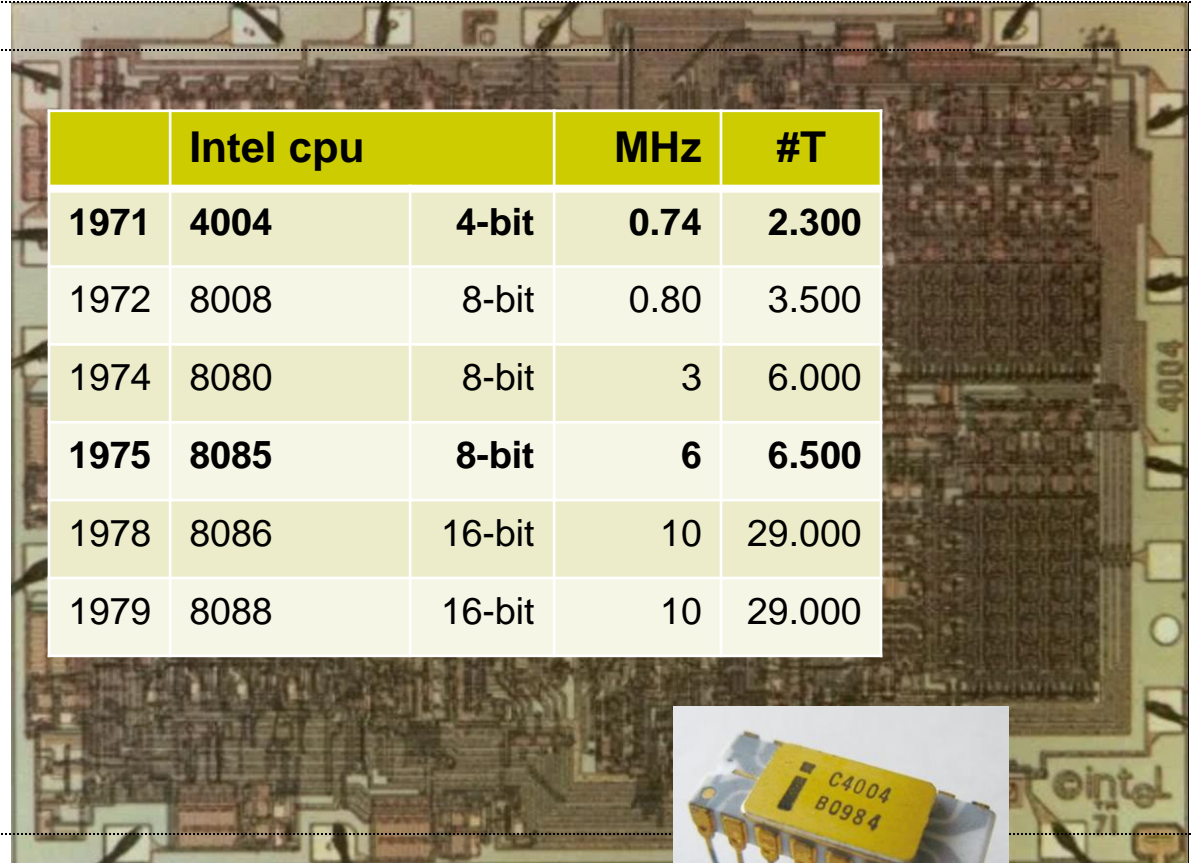
Mainframe

Sistema Arquivos

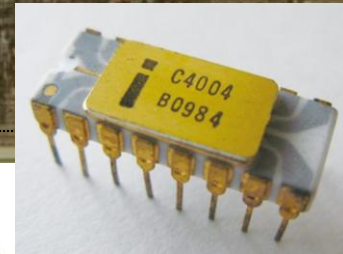


- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial

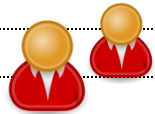
- ✓ Ethernet



	Intel cpu		MHz	#T
1971	4004	4-bit	0.74	2.300
1972	8008	8-bit	0.80	3.500
1974	8080	8-bit	3	6.000
1975	8085	8-bit	6	6.500
1978	8086	16-bit	10	29.000
1979	8088	16-bit	10	29.000



# Últimos 50 anos de TI



Interface HM

1970

Terminal

Processamento

Mainframe

Sistema Arquivos



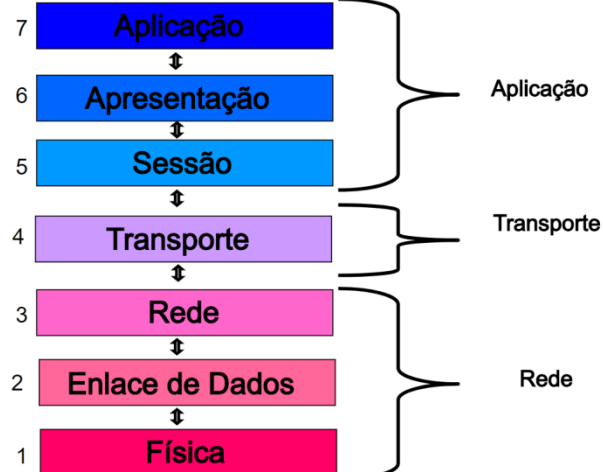
- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial

✓ Ethernet

## Modelo de Referência OSI

Camadas

grupos



The Ethernet, A Local Area Network.

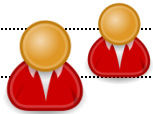
Data Link Layer and Physical Layer Specifications.

Setembro 1980





# Últimos 50 anos de TI

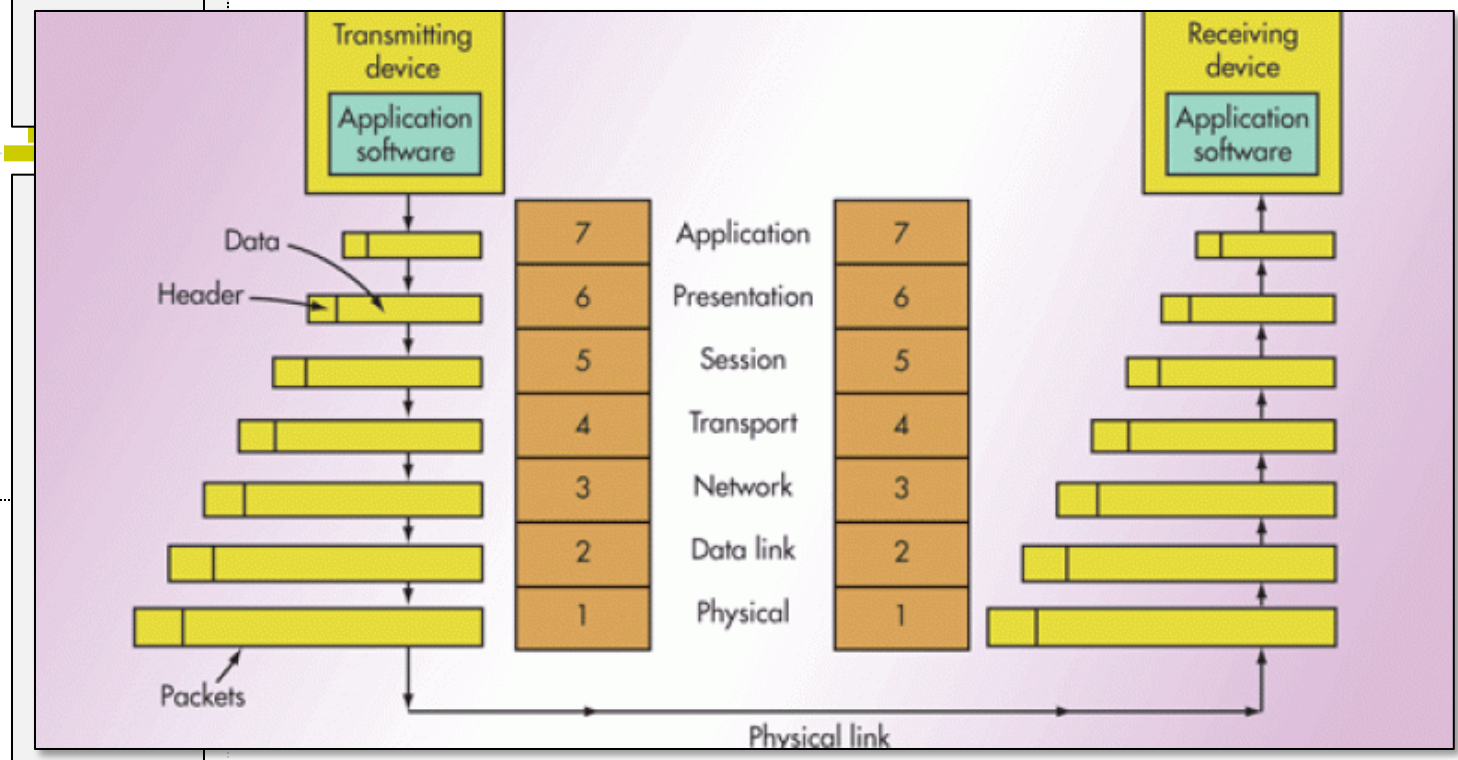


Interface HM

1970

Processamento

Sistema Arquivos

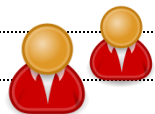


- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial
- ✓ Ethernet





# Últimos 50 anos de TI



Interface HM

1970

Terminal

1980

Micro

Disco

Mainframe

Processamento

Sistema Arquivos



- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial

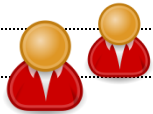
✓ Ethernet

- ✓ IBM PC
- ✓ MS DOS
- ✓ MS Windows

✓ LAN  
✓ ISO/OSI



# Últimos 50 anos de TI



Interface HM

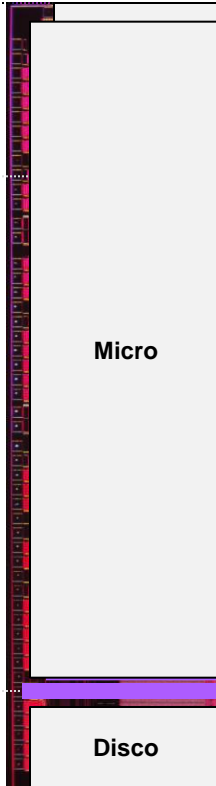
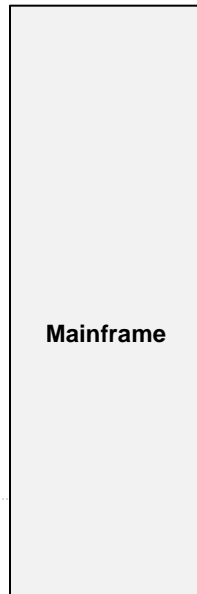
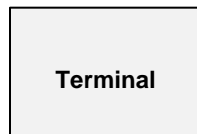
Processamento

Sistema Arquivos



1970

1980



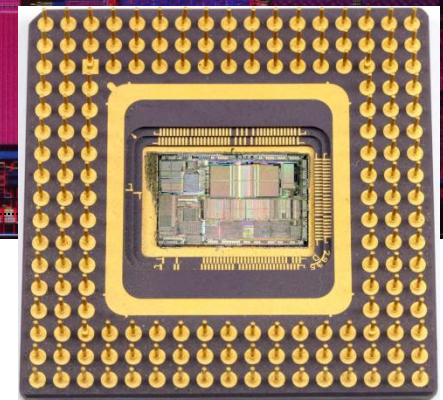
	Intel cpu		MHz	#T
1982	286	16-bit	25	134 K
1985	386	32-bit	40	275 K
1989	486	32-bit	100	1.180 K

- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial

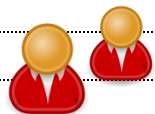
- ✓ Ethernet

- ✓ IBM PC
- ✓ MS DOS
- ✓ MS Windows

- ✓ LAN
- ✓ ISO/OSI



# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos



1970

1980

1990

Terminal

Mainframe

Micro

Micro

Arquivo

Disco

- ✓ Mainframes
  - ✓ Superminis
  - ✓ Porta Serial
- 
- ✓ Ethernet

- ✓ IBM PC
  - ✓ MS DOS
  - ✓ MS Windows
- 
- ✓ LAN
  - ✓ ISO/OSI

- ✓ dBase
  - ✓ Novell
  - ✓ Linux
  - ✓ Open Source
  - ✓ Apache
  - ✓ Netscape
- 
- ✓ IEEE 802.3

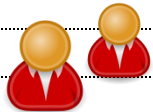
Windows for  
Workgroups  
Versão 3.11

MS SMB  
Linux Samba

Lock/Unlock



# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos



1970

1980

1990

Terminal

Mainframe

Micro

Disco

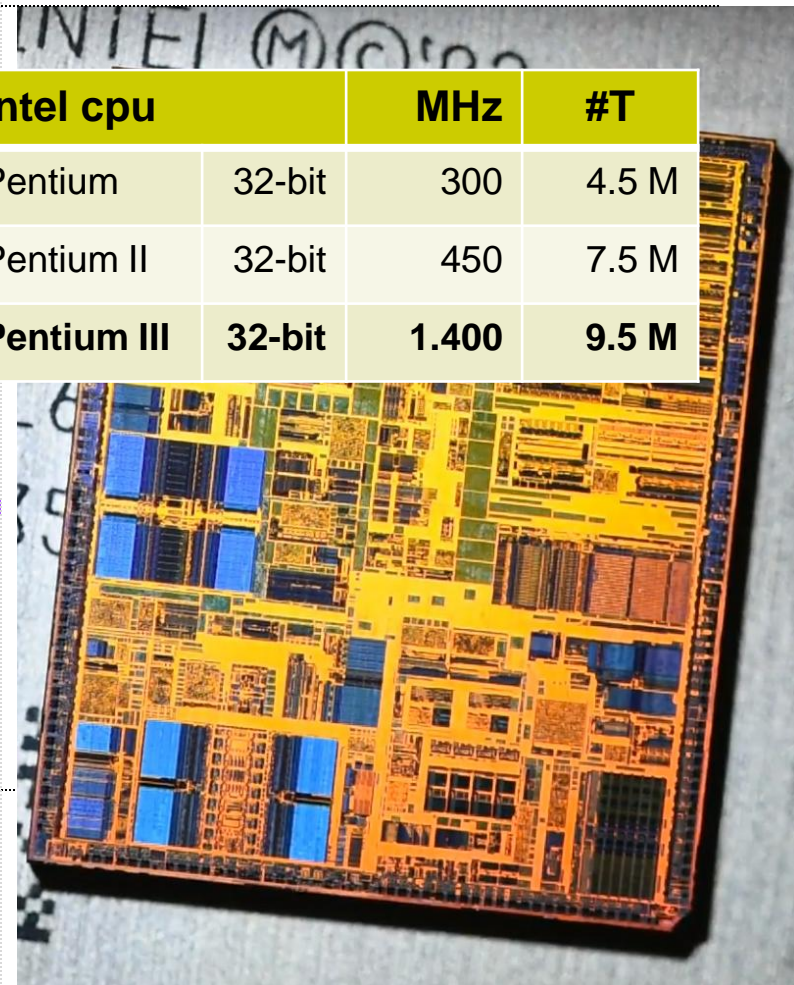
Arquivo

- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial
- ✓ Ethernet

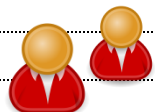
- ✓ IBM PC
- ✓ MS DOS
- ✓ MS Windows
- ✓ LAN
- ✓ ISO/OSI

- ✓ dBase
- ✓ Novell
- ✓ Linux
- ✓ Open Source
- ✓ Apache
- ✓ Netscape
- ✓ IEEE 802.3

	Intel cpu		MHz	#T
1993	Pentium	32-bit	300	4.5 M
1995	Pentium II	32-bit	450	7.5 M
1999	Pentium III	32-bit	1.400	9.5 M



# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos



1970

1980

1990

2000

Terminal

Cliente

Micro

Servidor

SQL

Mainframe

Micro

Arquivo

Arquivo

Disco

- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial
- ✓ Ethernet

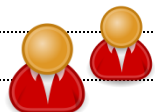
- ✓ IBM PC
- ✓ MS DOS
- ✓ MS Windows
- ✓ LAN
- ✓ ISO/OSI

- ✓ dBase
- ✓ Novell
- ✓ Linux
- ✓ Open Source
- ✓ Apache
- ✓ Netscape
- ✓ IEEE 802.3

- ✓ Docker
- ✓ Big Data
- ✓ NOSQL
- ✓ API
- ✓ Github
- ✓ Wireless



# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos

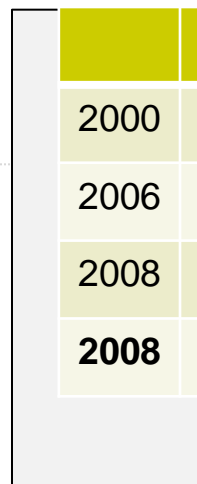
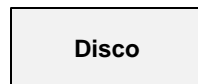
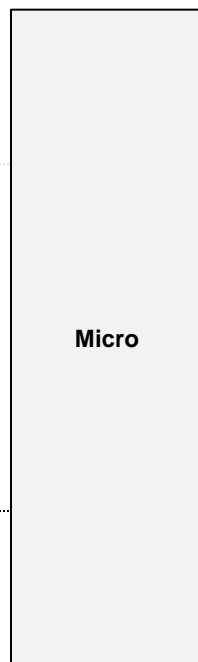
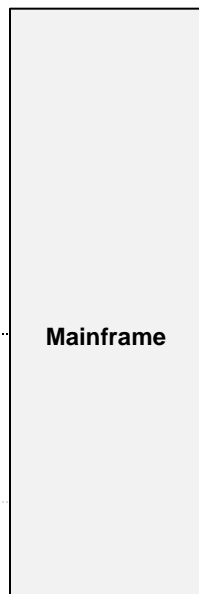
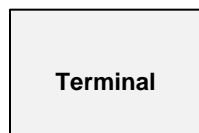


1970

1980

1990

2000



	Intel cpu		GHz	#T
2000	Pentium IV	64-bit	3.4	42 M
2006	Pentium IV	64-bit	3.7	184 M
2008	Core 2 Duo	64-bit	3.4	230 M
2008	Core i7	64-bit	3.3	731 M

- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial
- ✓ Ethernet

- ✓ IBM PC
- ✓ MS DOS
- ✓ MS Windows
- ✓ LAN
- ✓ ISO/OSI

- ✓ dBase
- ✓ Novell
- ✓ Linux
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- ✓ Docker
- ✓ Big Data
- ✓ NOSQL
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- ✓ Wireless

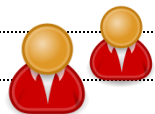


Socket H2:  
1.155 pinos





# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos



1970

Terminal

Mainframe

- ✓ Mainframes
- ✓ Superminis
- ✓ Porta Serial
- ✓ Ethernet

1980

Micro

Disco

- ✓ IBM PC
- ✓ MS DOS
- ✓ MS Windows
- ✓ LAN
- ✓ ISO/OSI

1990

Micro

Arquivo

- ✓ dBase
- ✓ Novell
- ✓ Linux
- ✓ Open Source
- ✓ Apache
- ✓ Netscape
- ✓ IEEE 802.3

2000

Cliente

Servidor

SQL

Arquivo

- ✓ Docker
- ✓ Big Data
- ✓ NOSQL
- ✓ API
- ✓ Github
- ✓ Wireless

2010

Cliente

Microservices

NOSQL

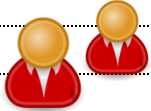
Arquivo

- ✓ Cloud
- ✓ Microservices
- ✓ Orchestration
- ✓ Compose/Swarm
- ✓ Kubernetes
- ✓ API First Design
- ✓ ELK Elastic Stack





# Últimos 50 anos de TI



1970

1980

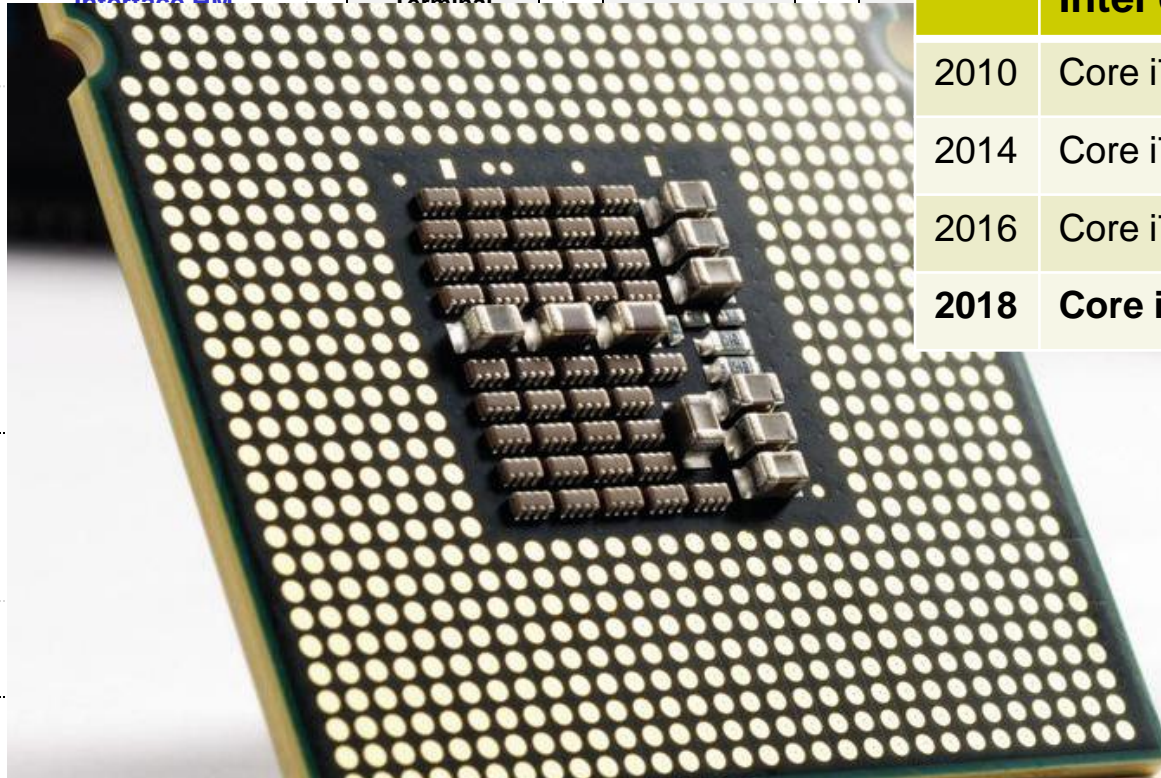
1990

2000

2010

Interface HM

Terminal



	Intel cpu		GHz	#T
2010	Core i7	64-bit	3.4	1.170 M
2014	Core i7	64-bit	3.5	2.600 M
2016	Core i7	64-bit	3.8	3.200 M
2018	Core i9	64-bit	4.2	7.000 M



✓ Porta Serial  
✓ Ethernet

✓ MS Windows  
✓ LAN  
✓ ISO/OSI

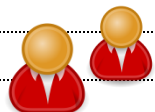
✓ Linux  
✓ Open Source  
✓ Apache  
✓ Netscape  
✓ IEEE 802.3

✓ NOSQL  
✓ API  
✓ Github  
✓ Wireless

✓ Orchestration  
✓ Compose/Swarm  
✓ Kubernetes  
✓ API First Design  
✓ ELK Elastic Stack



# Últimos 50 anos de TI



Interface HM

Processamento

Sistema Arquivos



1970

1980

1990

2000

2010

Terminal

Cliente

Cliente

- Microsoft
- Amazon
- Google
- Linux
- Apache
- Facebook
- Netflix

Micro

Servidor

Microservices

- Microsoft
- Oracle
- Apache Lucene

SQL

NOSQL

Mainframe

Arquivo

Arquivo

Arquivo

- Microsoft
- Google
- Linux
- Apple
- IBM

Disco

- ✓Mainframes
- ✓Superminis
- ✓Porta Serial
- ✓Ethernet

- ✓IBM PC
- ✓MS DOS
- ✓MS Windows
- ✓LAN
- ✓ISO/OSI

- ✓dBase
- ✓Novell
- ✓Linux
- ✓Open Source
- ✓Apache
- ✓Netscape
- ✓IEEE 802.3

- ✓Docker
- ✓Big Data
- ✓NOSQL
- ✓API
- ✓Github
- ✓Wireless

- ✓Cloud
- ✓Microservices
- ✓Orchestration
- ✓Compose/Swarm
- ✓Kubernetes
- ✓API First Design
- ✓ELK Elastic Stack



# Arquiteturas Multi-Usuário



**Servidor Arquivos**



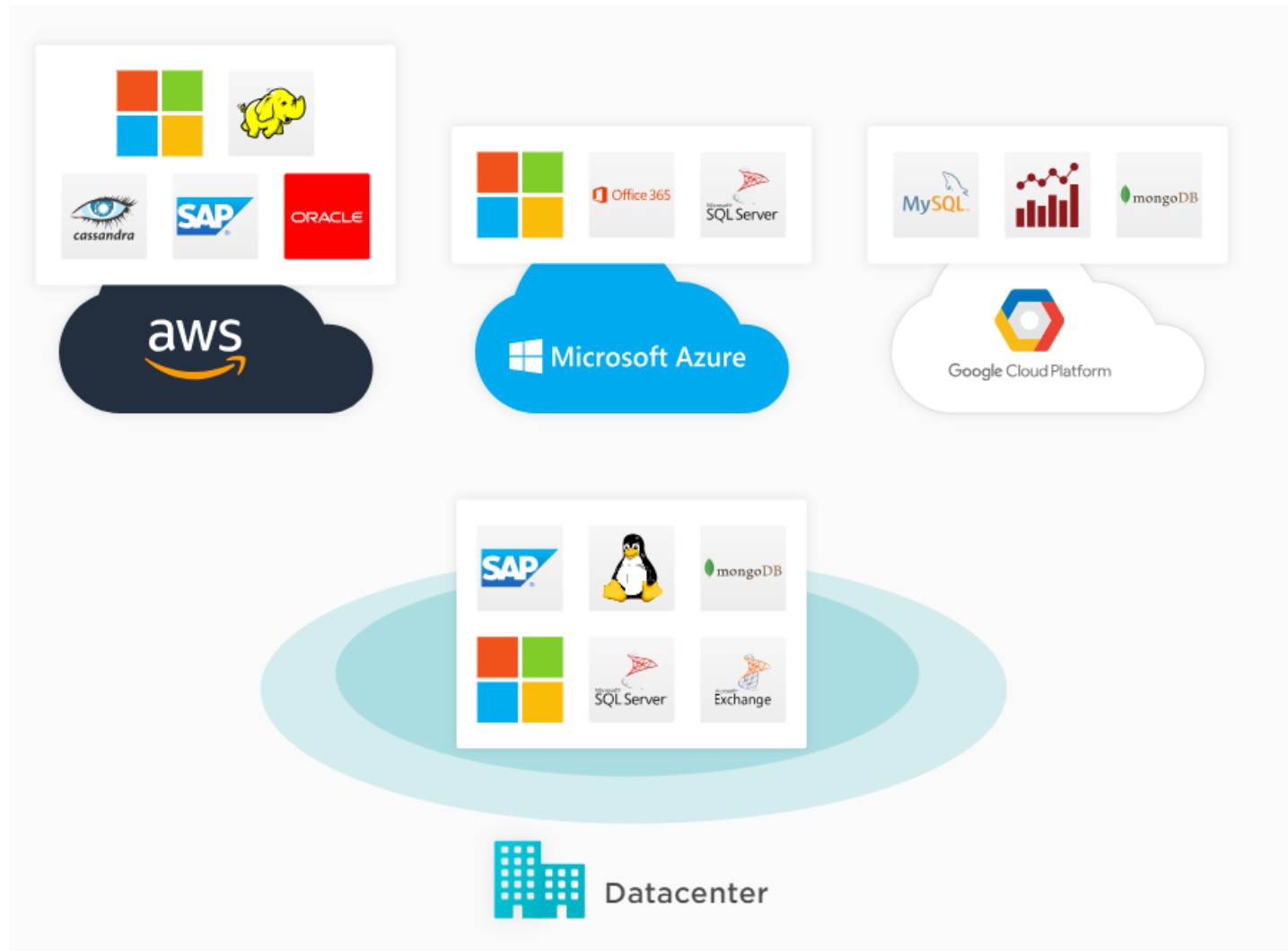
**Cliente-Servidor**



**Terminal**



# Cloud Services



# Serviços na nuvem



On-Premises

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

You Manage

Other Manages

# Serviços na nuvem



## Infrastructure as a Service

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

You Manage

Other Manages

## IaaS

- Microsoft Azure
- Amazon Web Services
- Google Compute Engine
- Digital Ocean
- Linode
- Rackspace
- Cisco Metapod

## Startups

Organizações grandes

Gastar o que consumir



# Serviços na nuvem

## PaaS

- Apache Stratos
- Heroku
- AWS Elastic Beanstalk
- Google App Engine
- Windows Azure
- Force.com
- OpenShift

Múltiplos desenvolvedores  
Aplicações customizadas  
Deploy rápido

### Platform as a Service

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

You Manage

Other Manages



# Serviços na nuvem



## SaaS

- Google Apps
- Dropbox
- Salesforce
- Cisco WebEx
- Concur
- GotoMeeting

## Startups

Empresas pequenas  
Projetos curta duração  
Acesso web / mobile

## Software as a Service

Applications

Data

Runtime

Middleware

O/S

Virtualization

Servers

Storage

Networking

You Manage

Other Manages

# Serviços na nuvem

