

Introdução à Banco de dados

Trilha de Banco de Dados Relacional

Juliana Mascarenhas

Tech Education Specialist DIO / Owner @Simplificandoredes
e @SimplificandoProgramação

Mestre em modelagem computacional | Cientista de dados

@in/juliana-mascarenhas-ds/



[https://github.com/
julianazanelatto](https://github.com/julianazanelatto)

Juliana Mascarenhas

Tech Education Specialist

@SimplificandoRedes

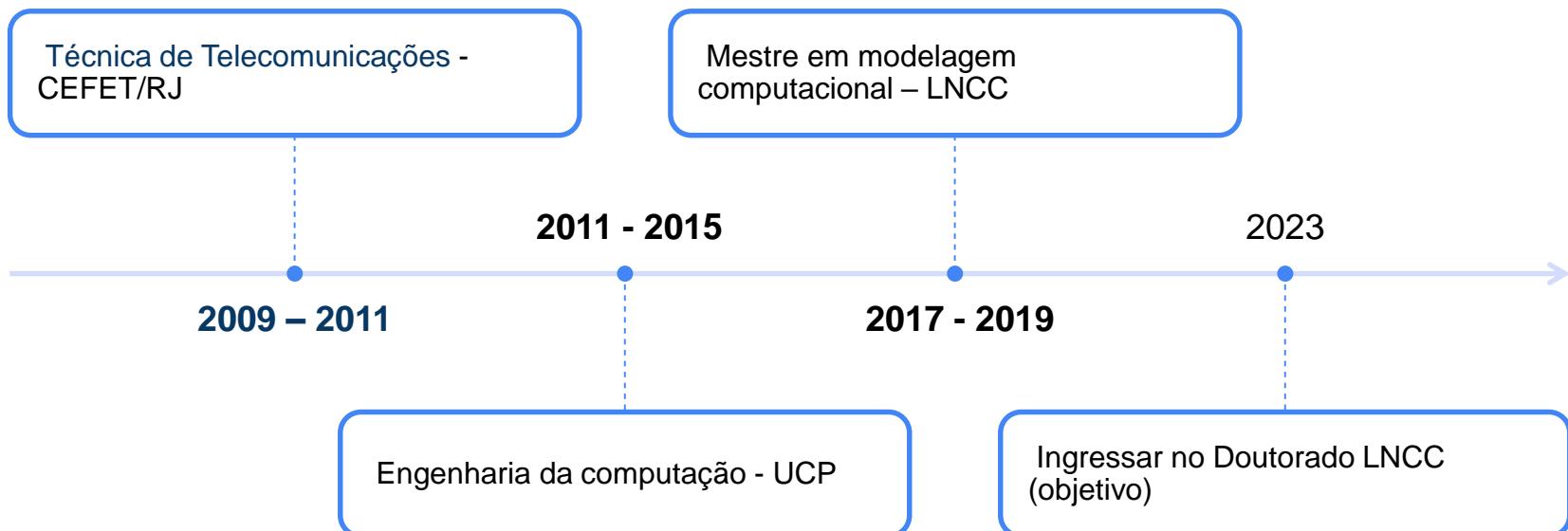
@SimplificandoProgramação

Cientista de dados

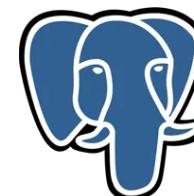
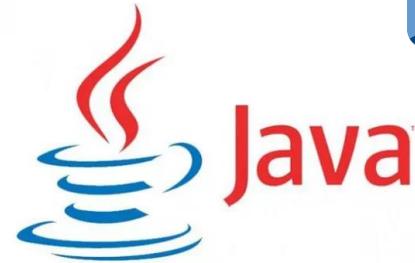
Desenvolvedora Java/Python

Me Modelagem Computacional - LNCC

Sobre Mim



Sobre Mim



PostgreSQL



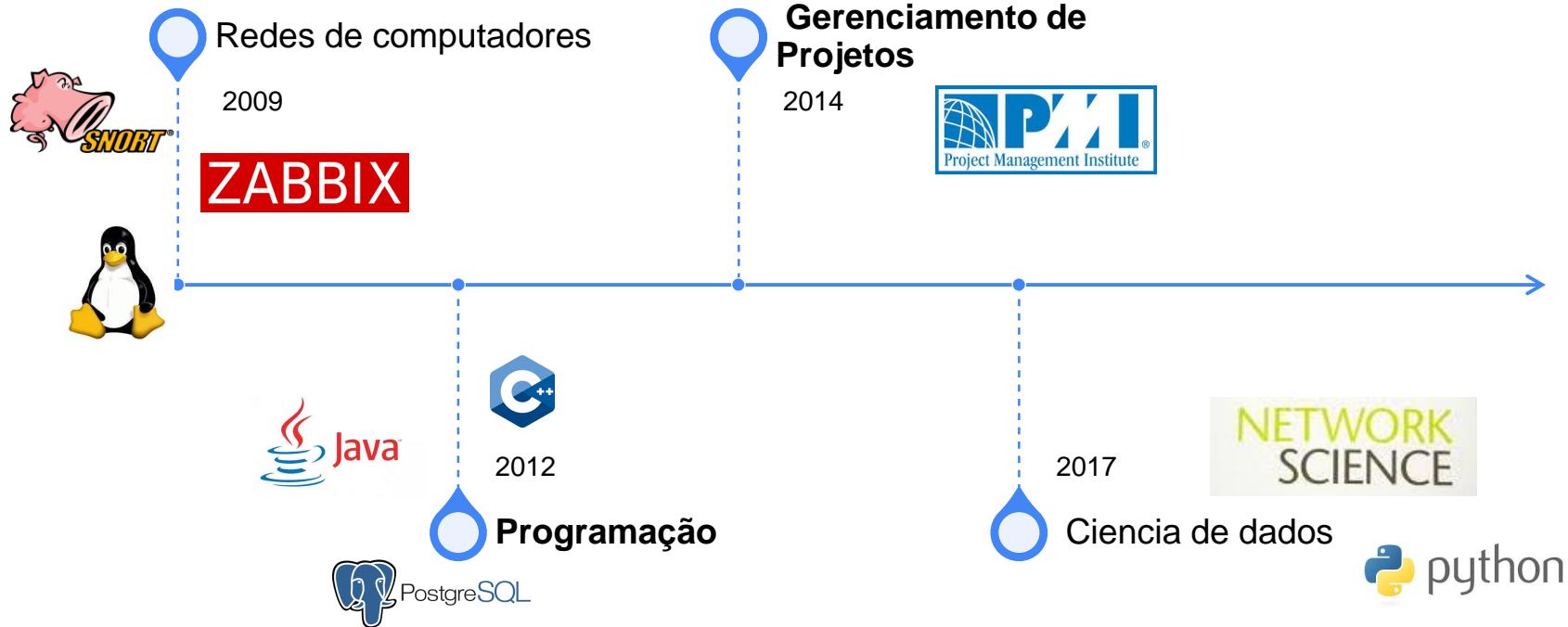
APACHE



ZABBIX



Sobre Mim



Cursos

Introdução à Programação e Pensamento Computacional

Curso base para iniciante

Juliana Mascarenhas

Tech Education Specialist / Sócia - criadora de conteúdo no @Simplificandoredes e @SimplificandoProgramação

Me Modelagem Computacional
[@in/juliana-mascarenhas-ds/](https://www.linkedin.com/in/juliana-mascarenhas-ds/)

[1]

Conhecendo os principais protocolos de comunicação da internet

HTTP | Web socket

Juliana Mascarenhas

Tech Education Specialist / Sócia - criadora de conteúdo no @Simplificandoredes e @SimplificandoProgramação

Mestre em modelagem computacional

[@in/juliana-mascarenhas-ds/](https://www.linkedin.com/in/juliana-mascarenhas-ds/)

[1]



Criando uma API REST conectada a Amazon RDS com Java

Juliana Mascarenhas
Me. Modelagem Computacional



Java Spring com RabbitMQ

Juliana Mascarenhas
Mestre em modelagem computacional



Criando um Microserviço de Upload de Imagens com o Amazon S3

Juliana Mascarenhas
Me. Modelagem Computacional

Objetivo Geral

Objetivo deste módulo é apresentar o mundo da modelagem de dados voltado para um sistema de banco de dados. Dessa forma, o dev irá dar seu primeiro mergulho no mundo de Banco de dados obtendo uma visão geral sobre o assunto.

Objetivo Geral



Contextualização

Histórico
O que são BDs ?
Era dos dados



Introdução à Modelagem de Dados

Modelagem e SQL
Instalando e Configurando seu SGBD



Características principais
StakeHolders
Vantagens e quando não usar?



Explorando SGBDs



Arquitetura de SGBDs

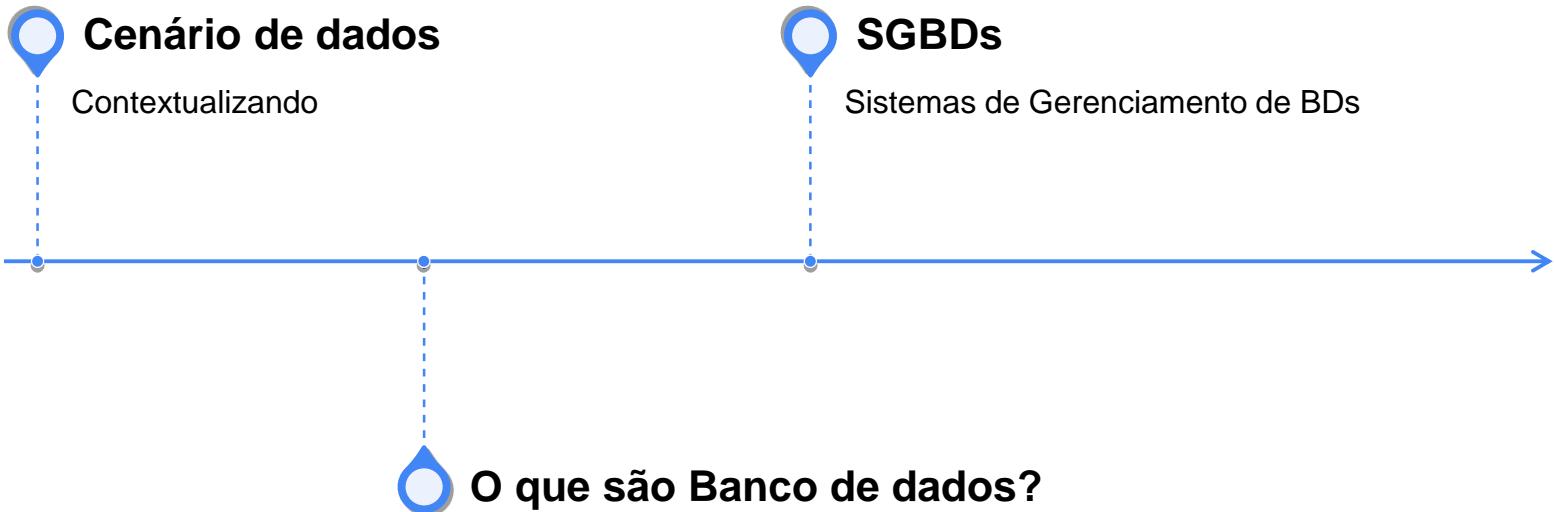
Modelos, Esquemas, linguagens, ambientes

Etapa 1

Contextualizando – O que são banco de dados?

// Introdução à Banco de dados

Conversa



Contextualizando



Contextualizando

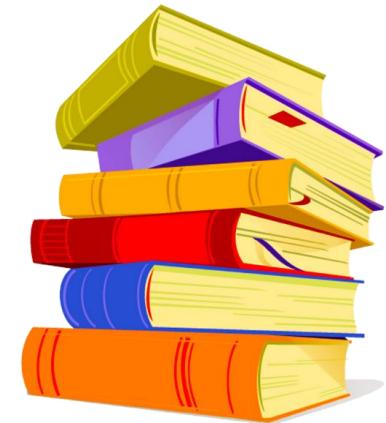


Contextualizando



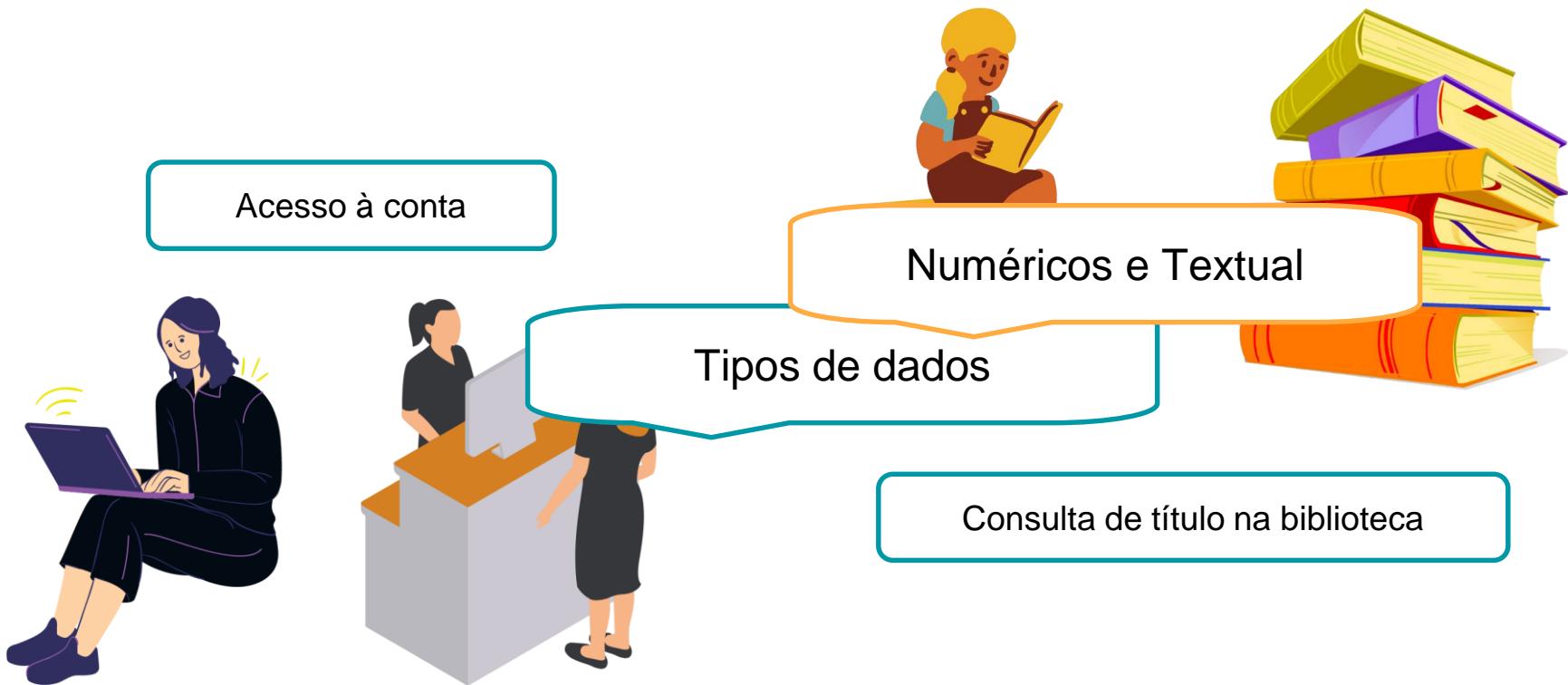
Contextualizando

Acesso à conta

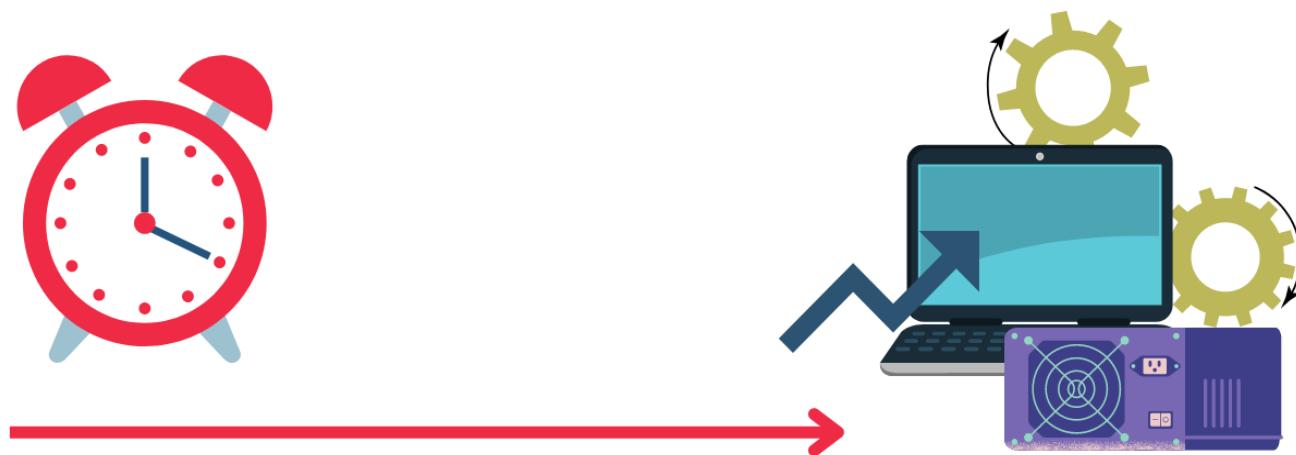


Consulta de título na biblioteca

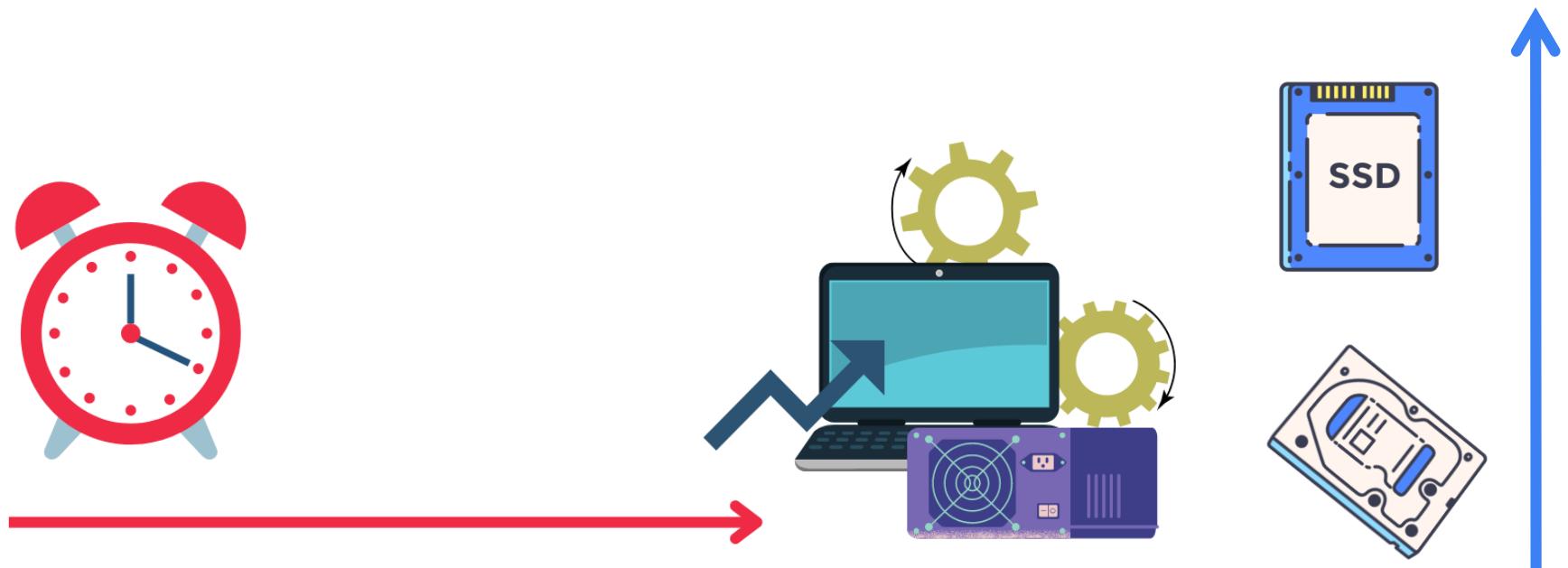
Contextualizando



Contextualizando



Contextualizando



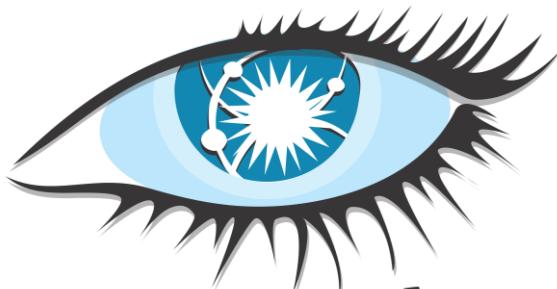
Contextualizando



Contextualizando



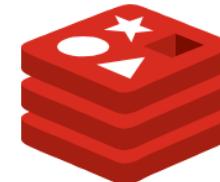
Contextualizando



cassandra

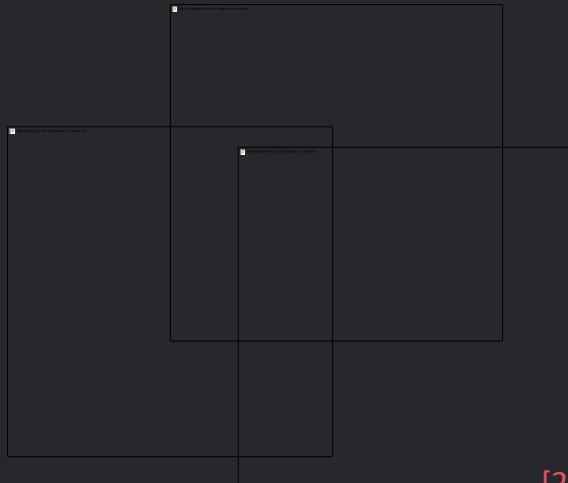


mongoDB®



redis

O que são banco de dados?



O que são Banco de Dados?

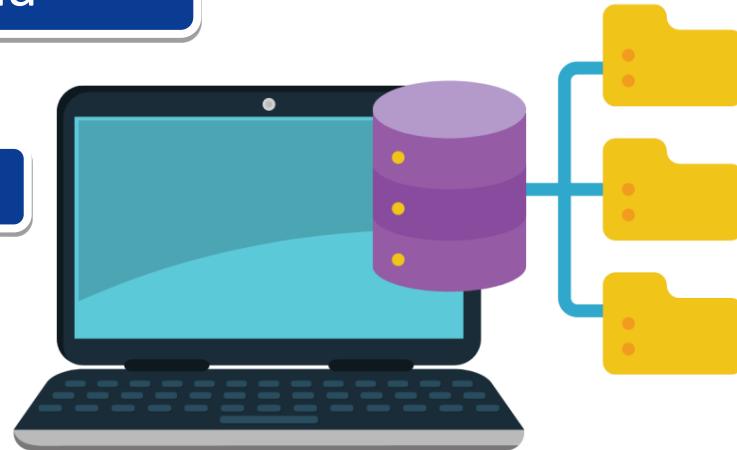
Negócios

E-commerce

Engenharia

Medicina

Social Media



O que são Banco de Dados?

Formalmente:



O que são Banco de Dados?

CADASTRO

Nome
Telefone
Email
Whats app



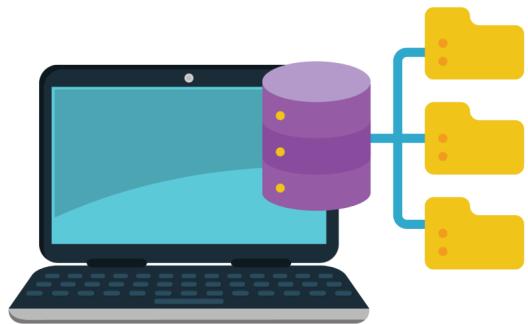
Significado

O que são Banco de Dados?

Podemos considerar uma coleção de palavras, que dentre elas há relacionamentos entre dados, constituindo então um banco de dados.

Definição geral

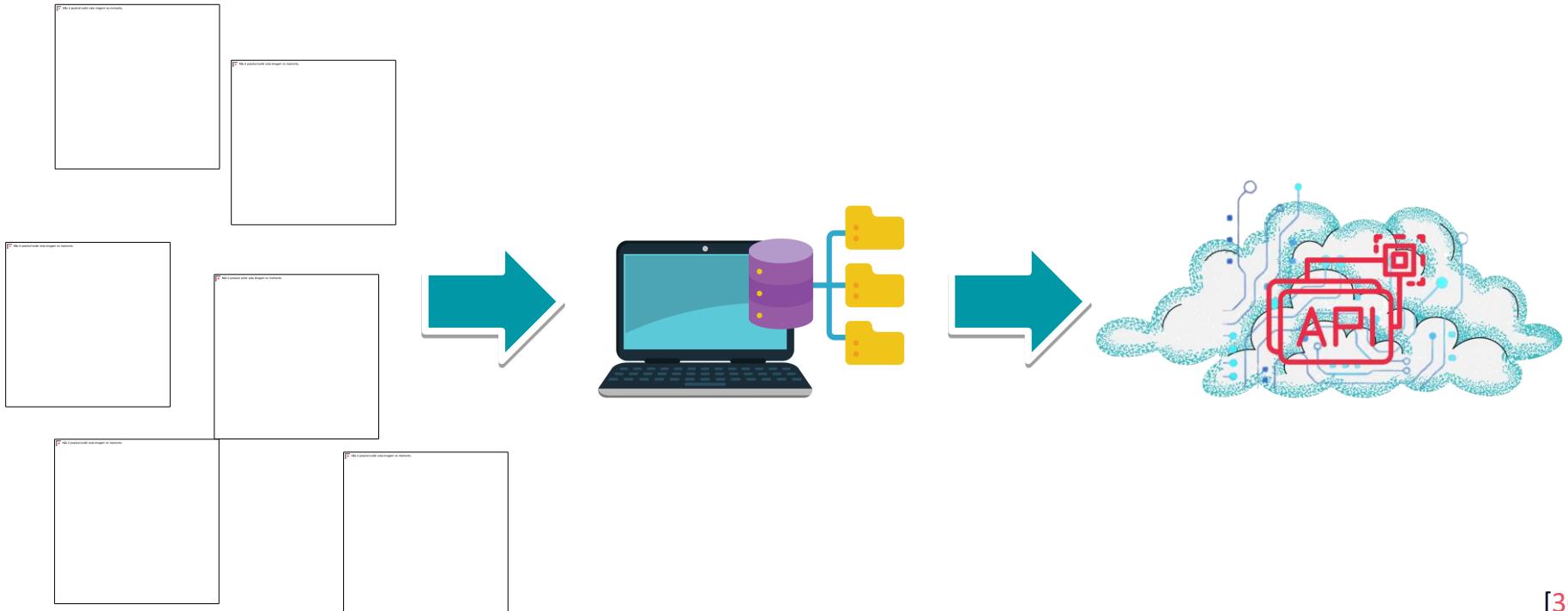
O que são Banco de Dados?



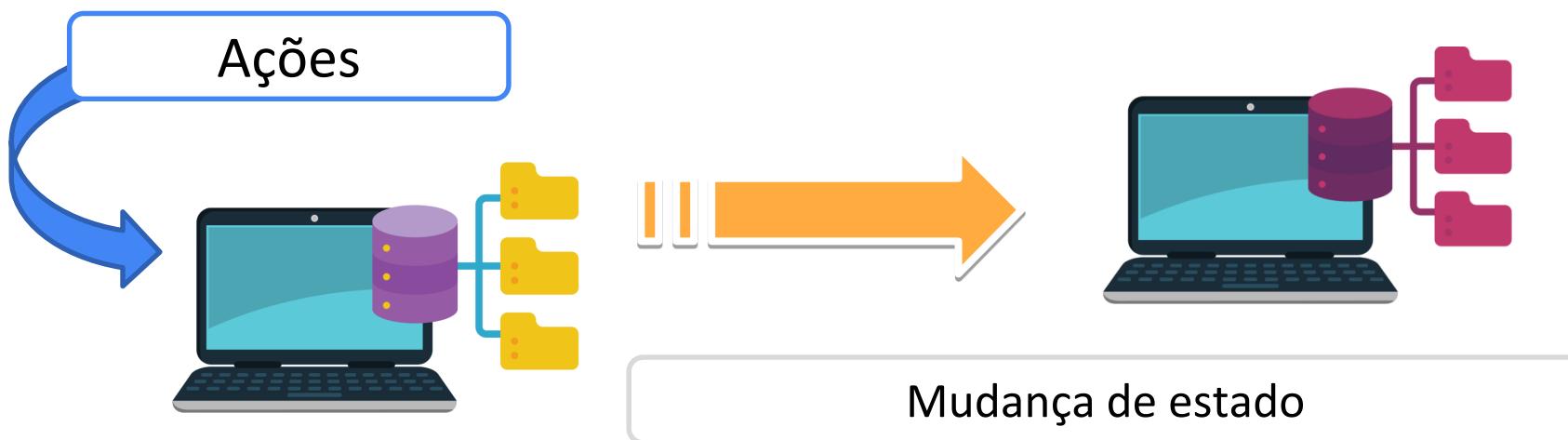
- Contexto - representação do mundo real;
- Coerência;
- Propósito

Uso + restrito

O que são Banco de Dados?



O que são Banco de Dados?

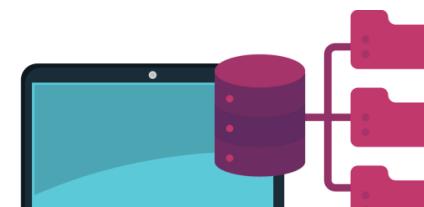


O que são Banco de Dados?

Confiável

Acurado

Ações



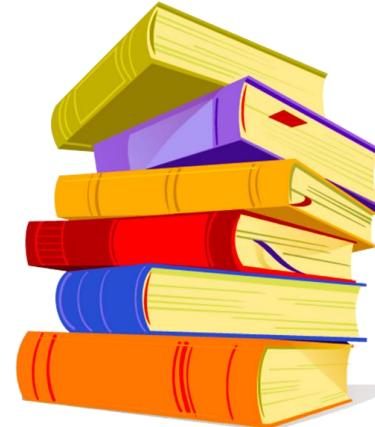
Mudança de estado

O que são Banco de Dados?

Tamanho?



Centenas



Bilhões



O que são Banco de Dados?



Complexidade

friends



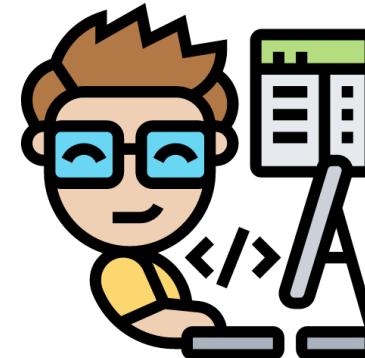
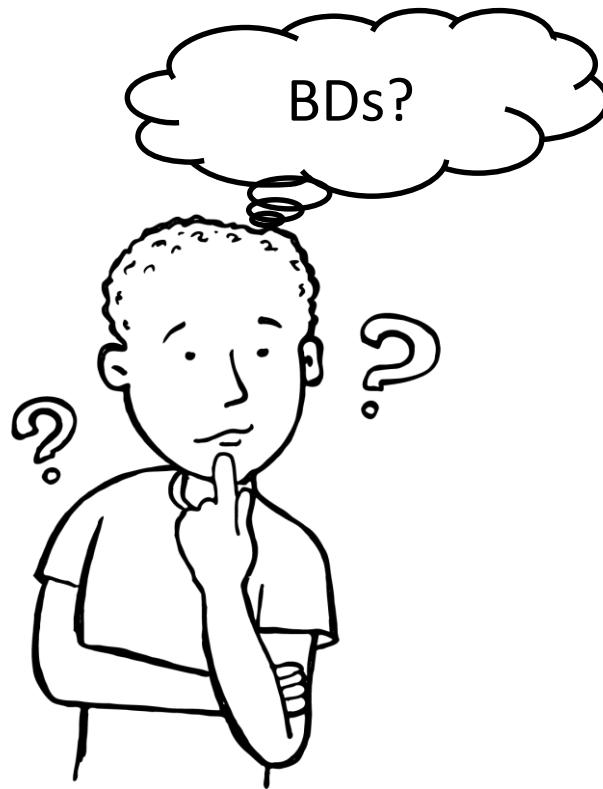
Manutenção do modelo e estado do bd

O que são Banco de Dados?

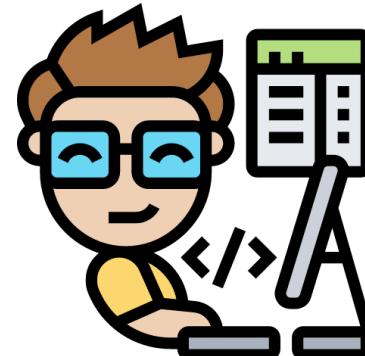
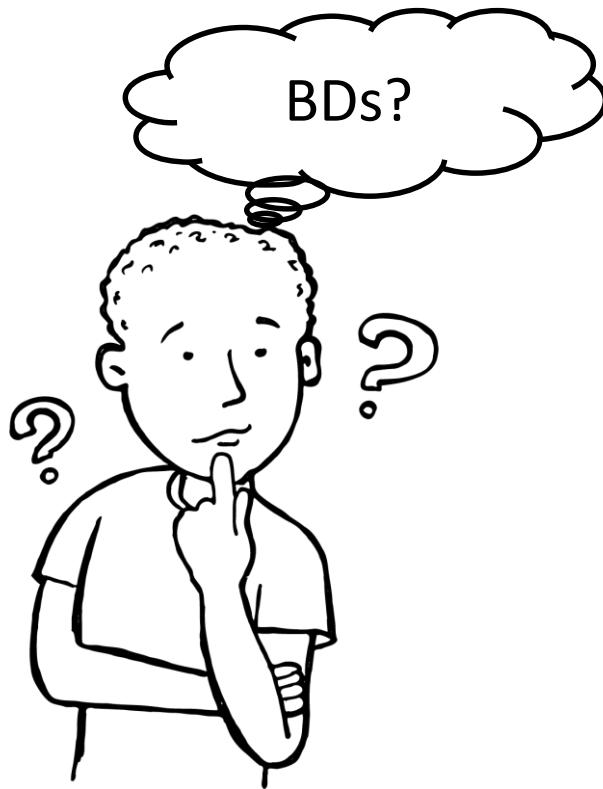


- 60 milhões de users
- 42 Terabytes
- SGBD distribuído

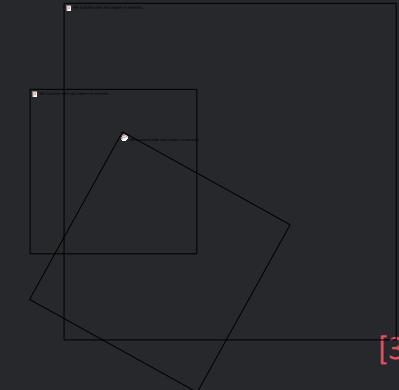
O que são Banco de Dados?



O que são Banco de Dados?



SGBDs - Sistemas de Gerenciamento de Banco de Dados



SGBDs

- Definição
- Construção
- Manipulação
- Compartilhamento



Tipo de dados

Estrutura

Constrains

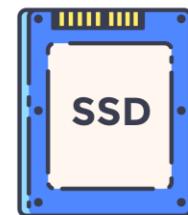
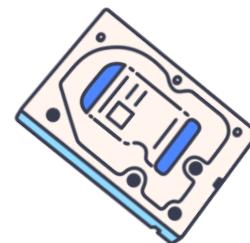
Software de propósito geral

SGBDs

- Definição
- Construção
- Manipulação
- Compartilhamento



Inserção de dados



Software de propósito geral

SGBDs

- Definição
- Construção
- Manipulação
- Compartilhamento



Recuperação

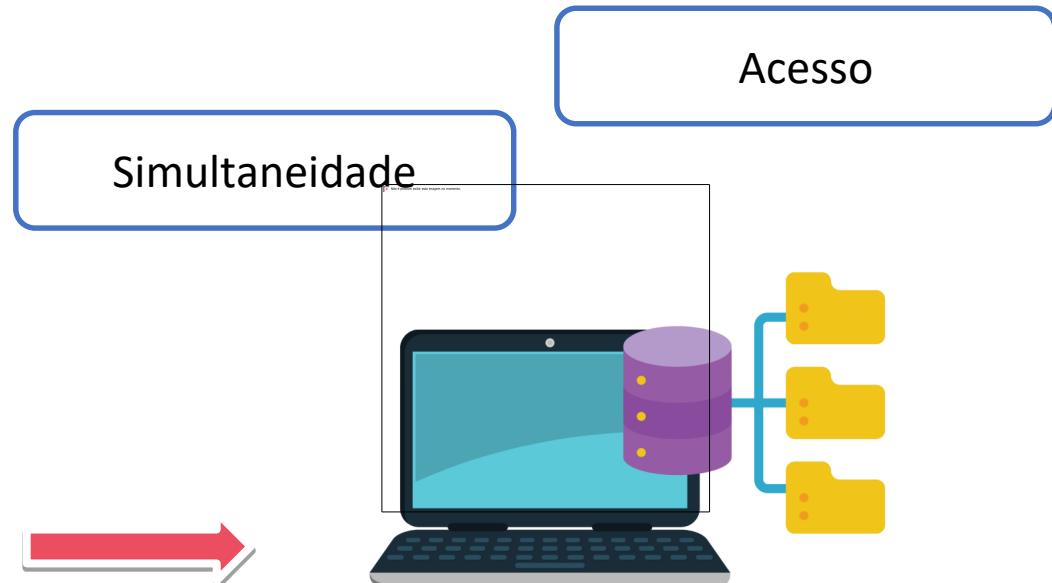
Relatórios



Software de propósito geral

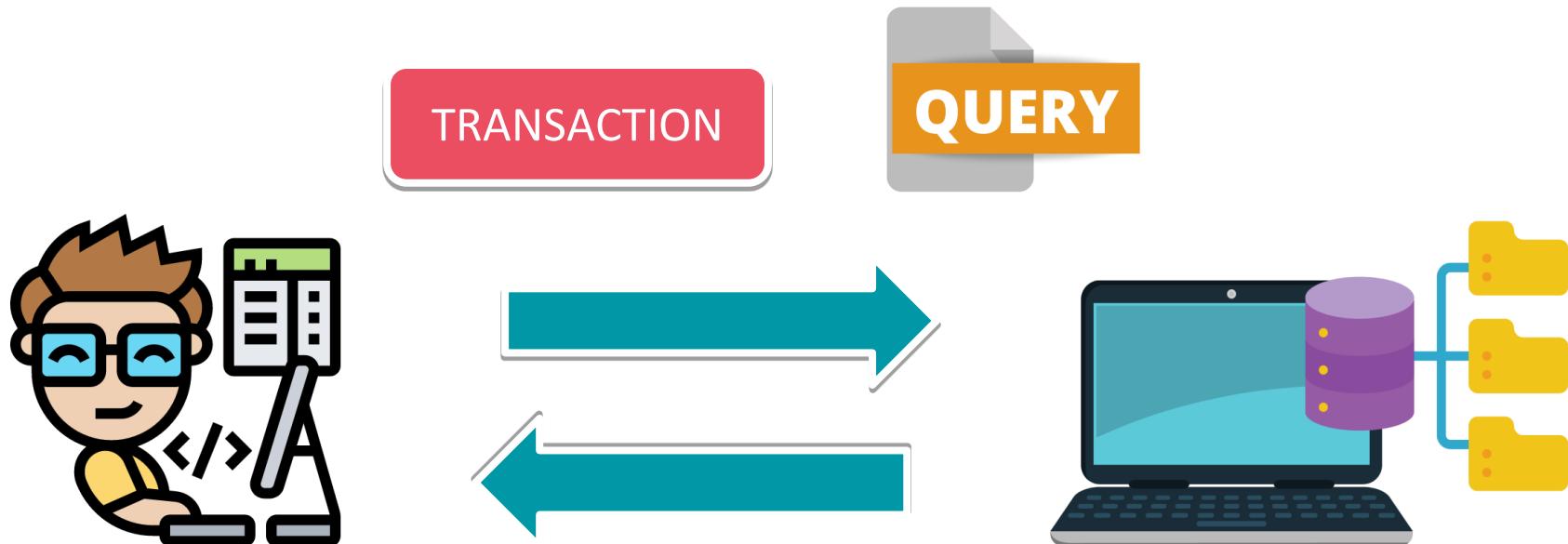
SGBDs

- Definição
- Construção
- Manipulação
- Compartilhamento

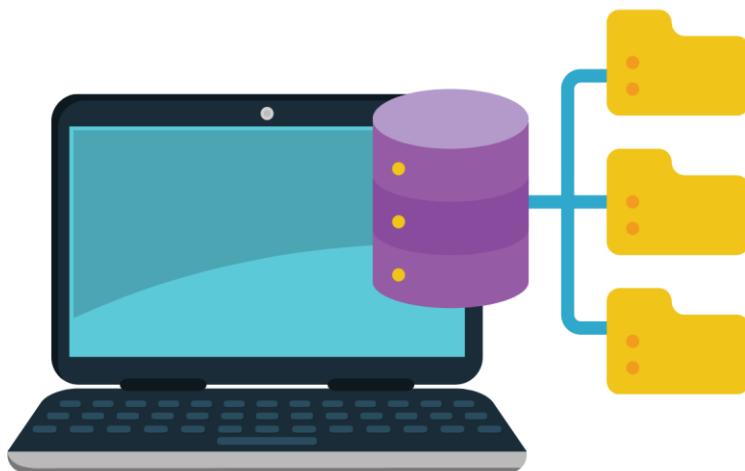


Software de propósito geral

SGBDs



SGBDs



Além disso ...

Acesso

Mal funcionamento

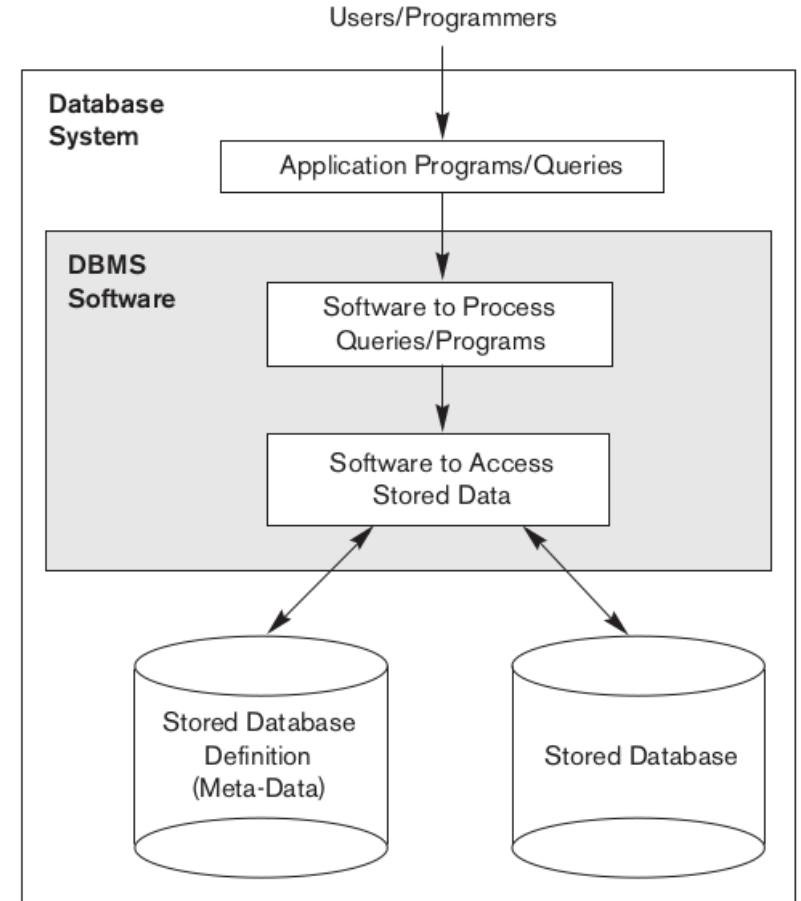
Proteção

Ciclo de vida de longo prazo

SGBDs - Exemplo

Contexto: Universidade

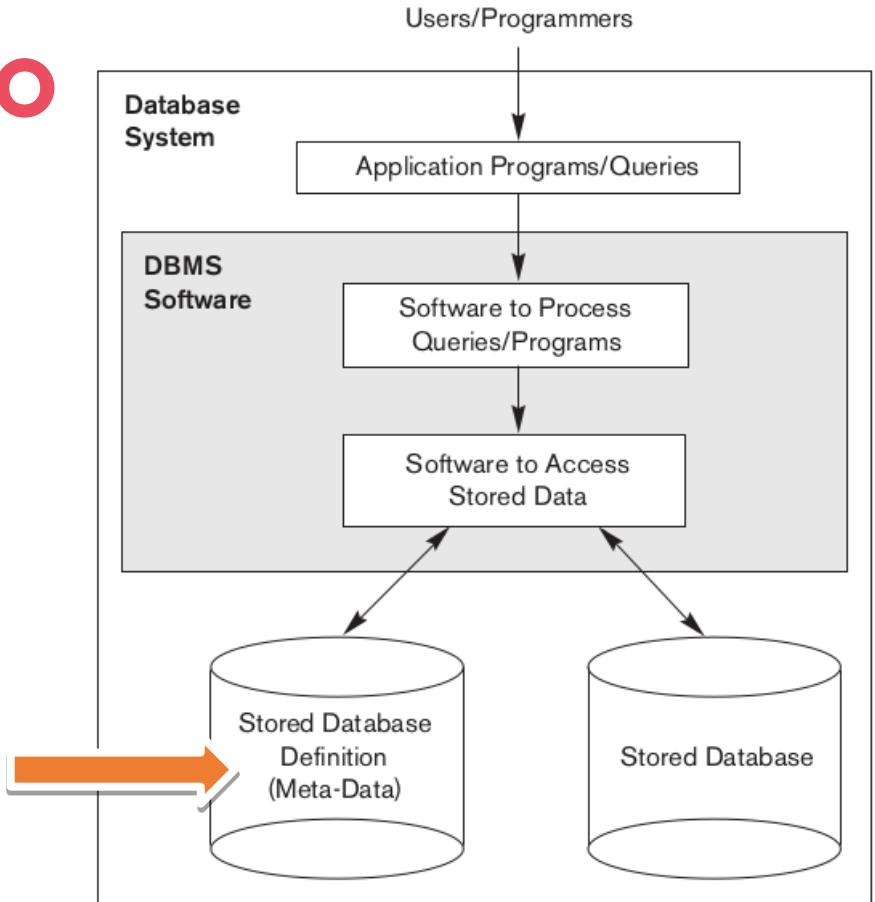
- Nome completo
- Matrícula
- Endereço
- Campus
- Curso
- Telefone
- Email
- ...



SGBDs - Exemplo

Definição

- Estudantes
- Cursos
- Seção
- Pré-requisitos
- Report da grade



SGBDs - Exemplo

Definição

- Estudantes
- Cursos
- Seção
- Pré-requisitos
- Report da grade

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone

GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

SGBDs - Exemplo

Definição

- Estudantes
- Cursos
- Seção
- Pré-requisitos
- Report da grade

Tipos de dado

COURSE

Course_name	Course_number	Credit_hours	Department
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17	112	B
17	119	C
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8	135	A

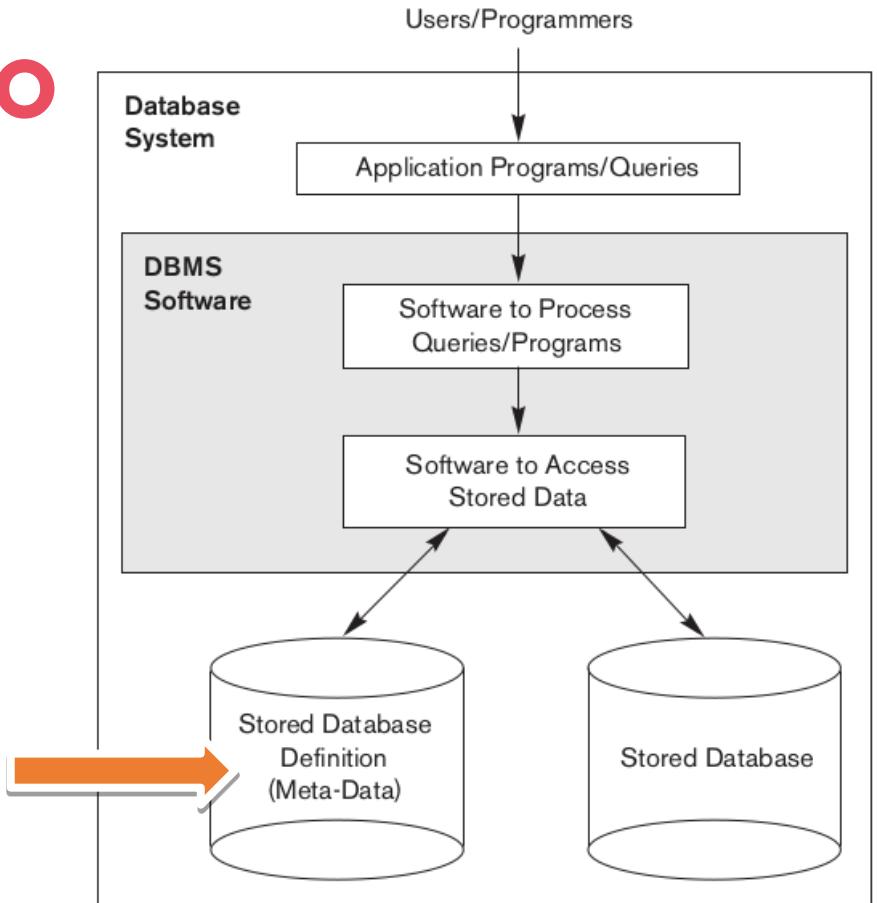
PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

SGBDs - Exemplo

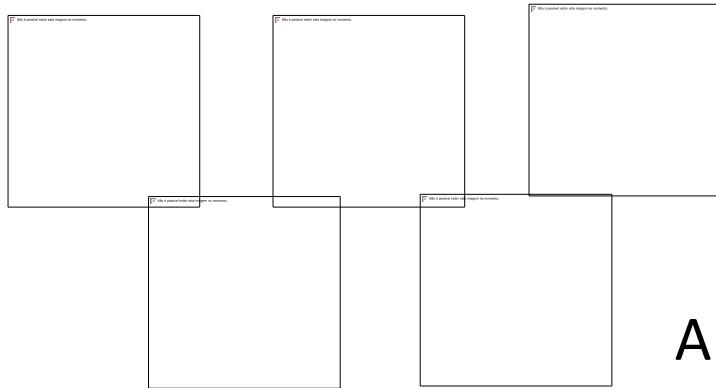
Metadados

Informações que fornecem uma descrição concisa dos dados contidos no BD

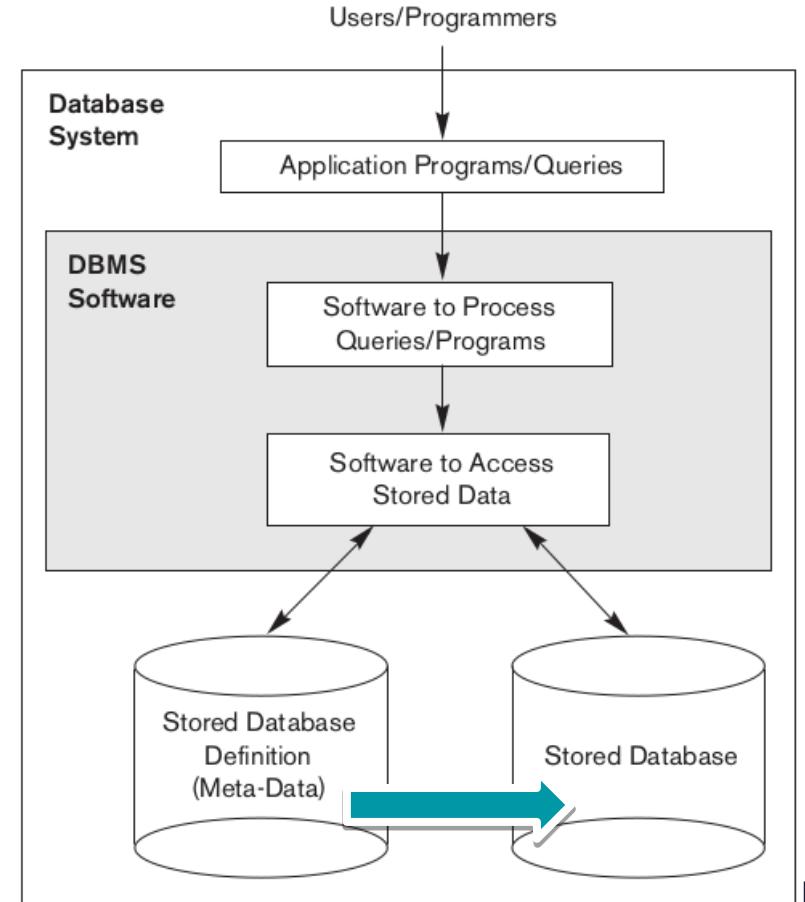


SGBDs - Exemplo

Construção



Arquivos

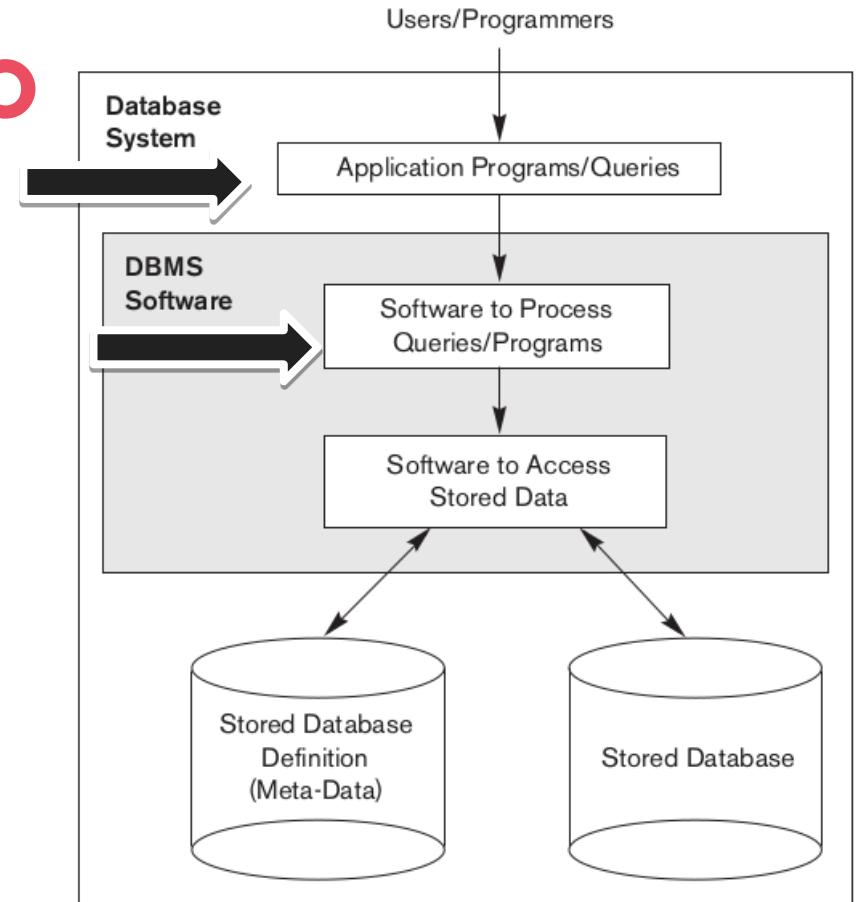


SGBDs - Exemplo

Manipulação

QUERY

Updates

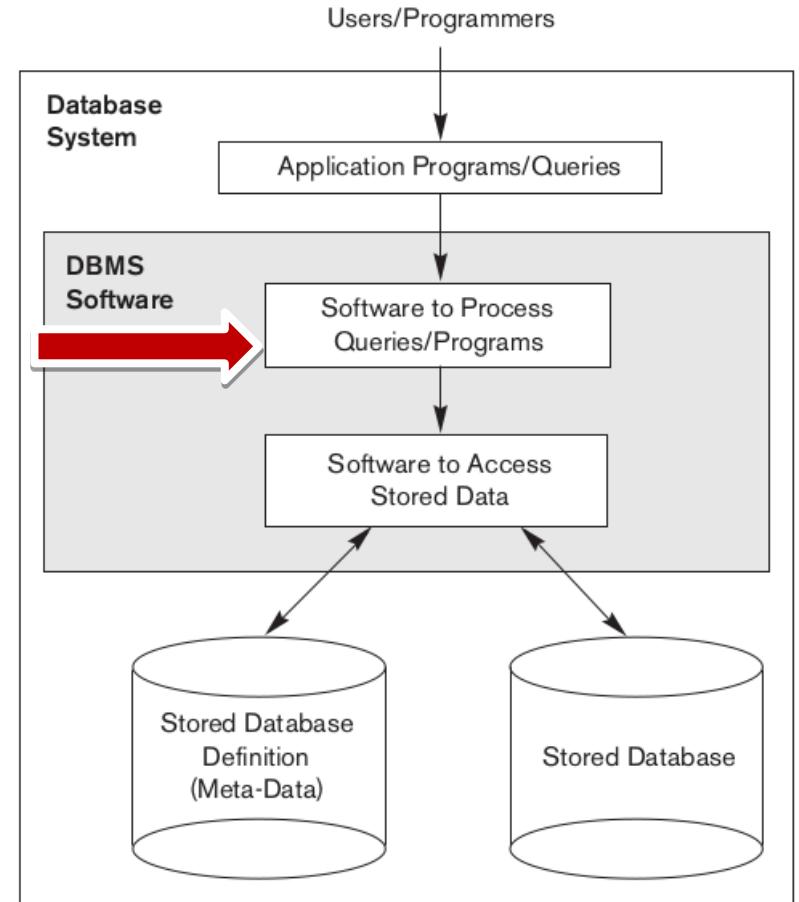


SGBDs - Exemplo

Compartilhamento

Por padrão o BD realiza o bloqueio e a liberação das tabelas

Transações



Etapa 2

Contextualizando – breve histórico e conceitos

// Introdução à Banco e dados

Conversa



Breve histórico

Como surgiu?



Mercado

Sistemas de Gerenciamento de BDs mais utilizados

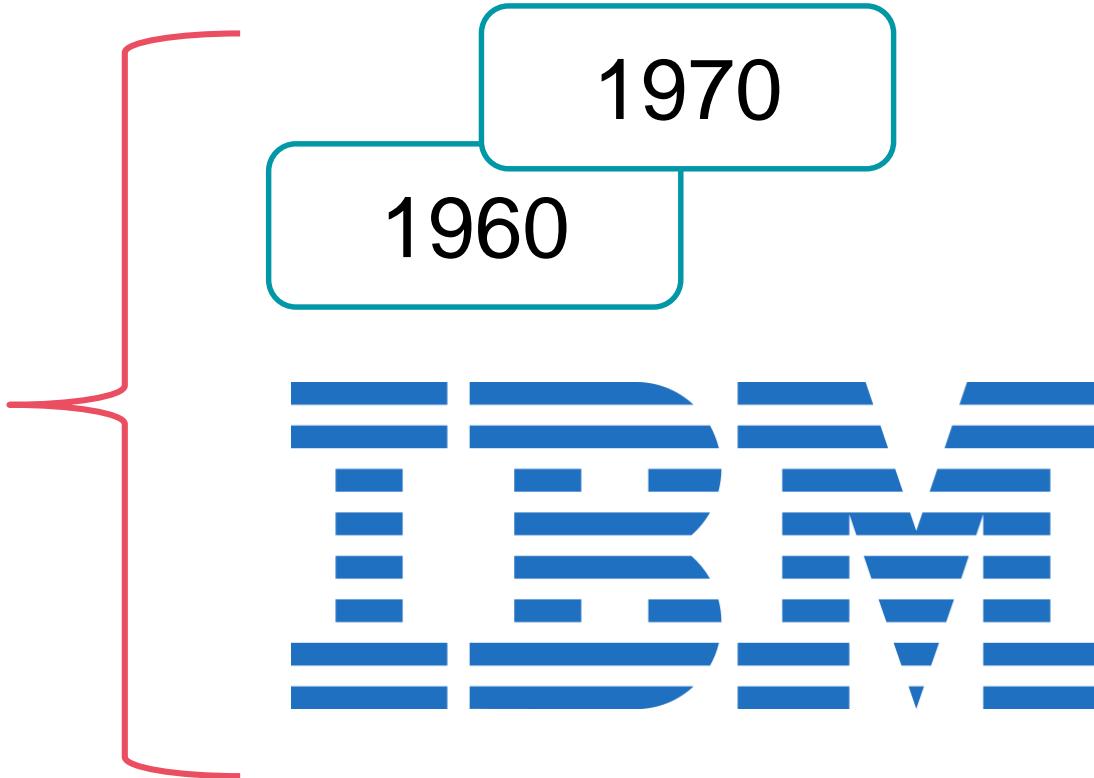


Modelo de BD Relacional

Visão geral de características e propriedades

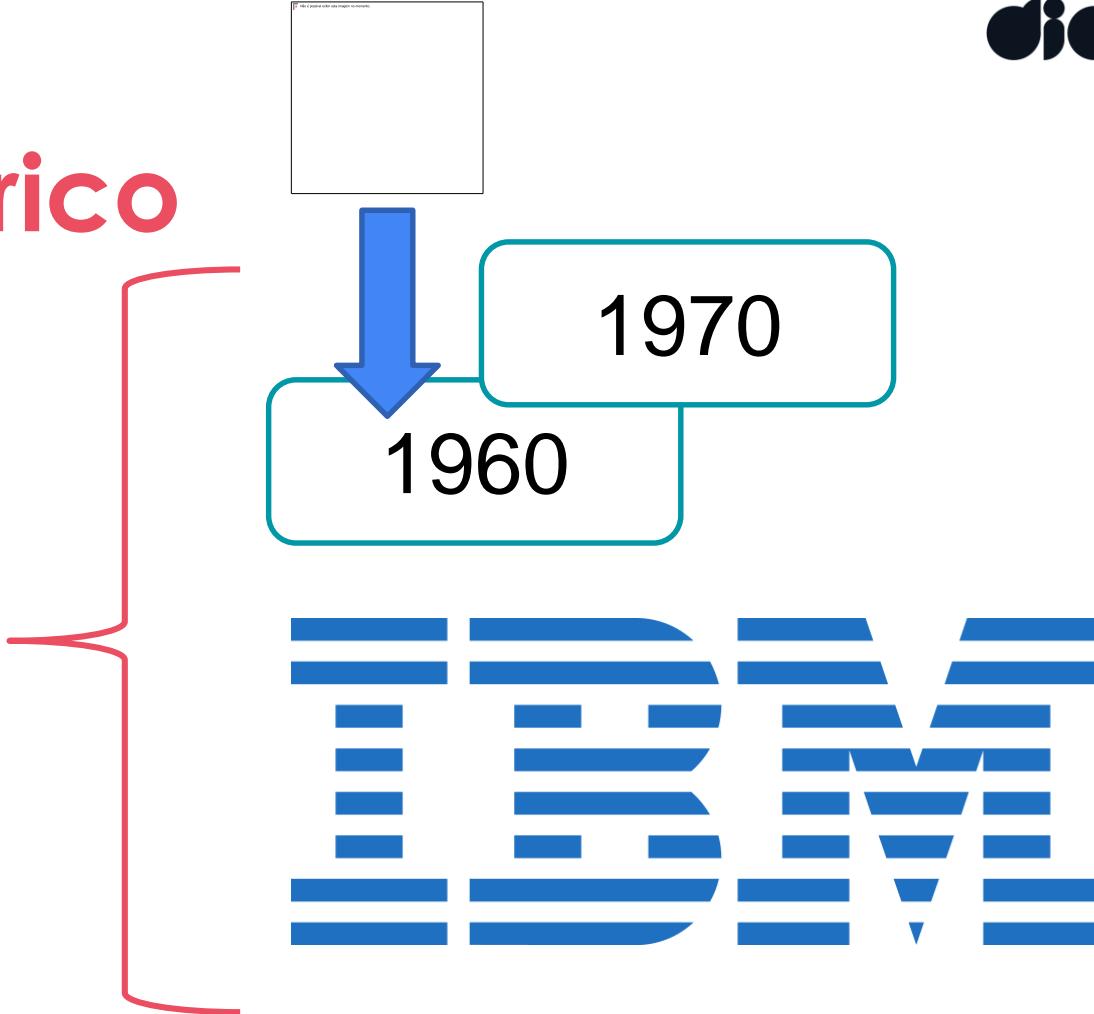
Breve Histórico

Modelo Relacional
de BDs

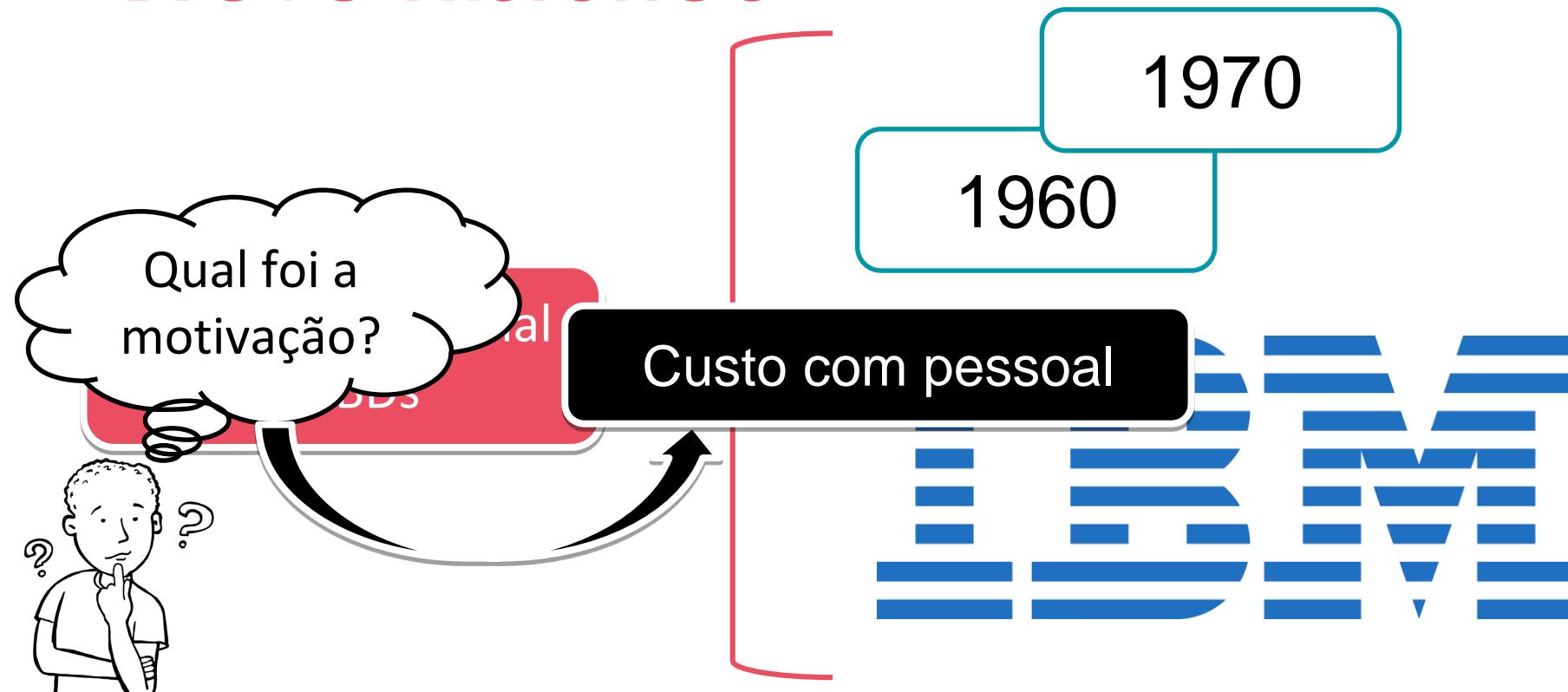


Breve Histórico

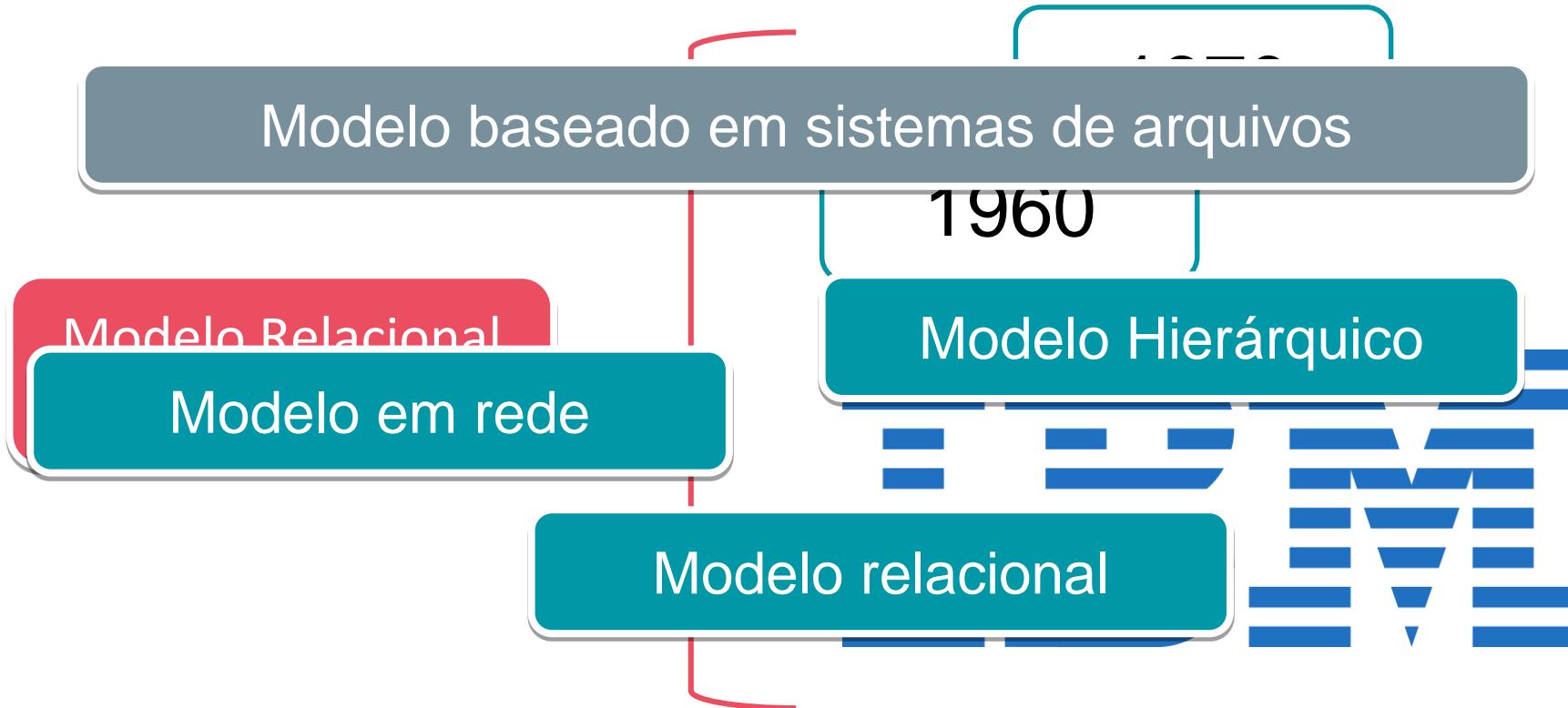
Modelo Relacional
de BDs



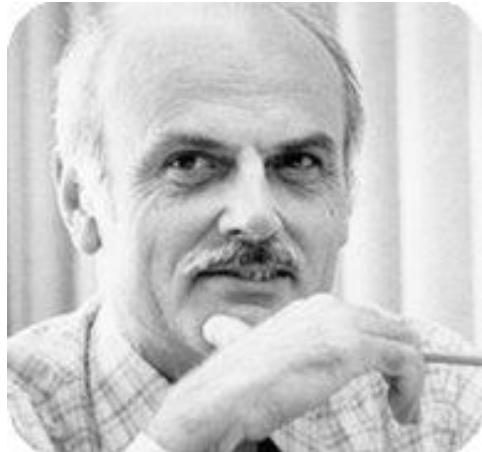
Breve Histórico



Breve Histórico



Breve Histórico



Criador: Ted Codd

Cálculo e Álgebra Relacional

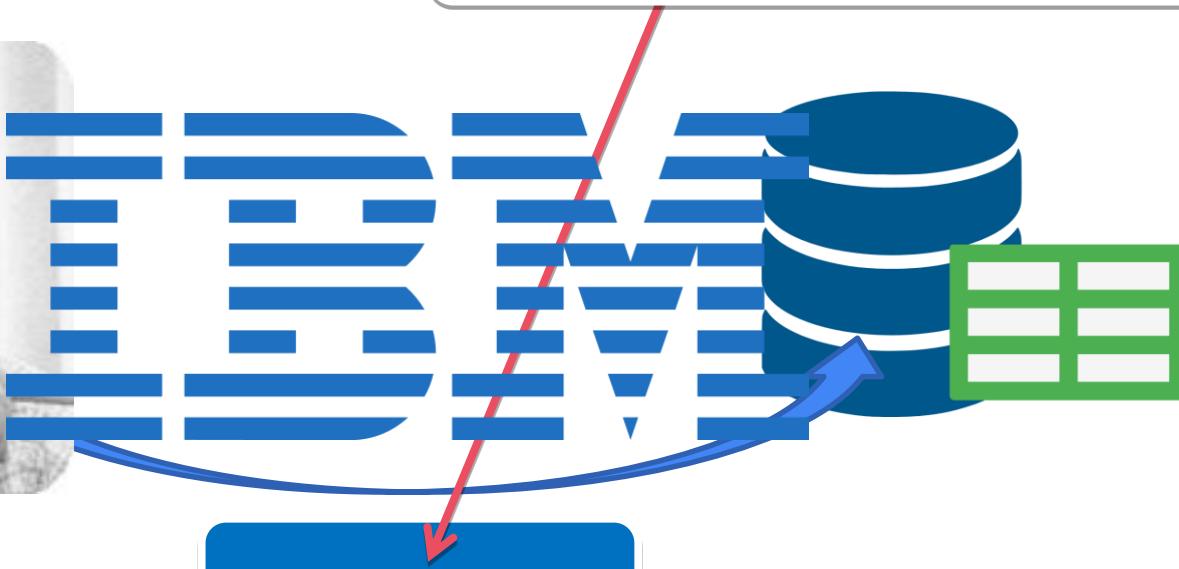
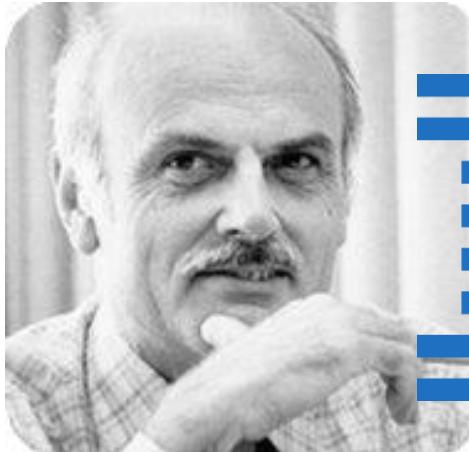
Artigo



1970

Breve Histórico

Cálculo e Álgebra Relacional

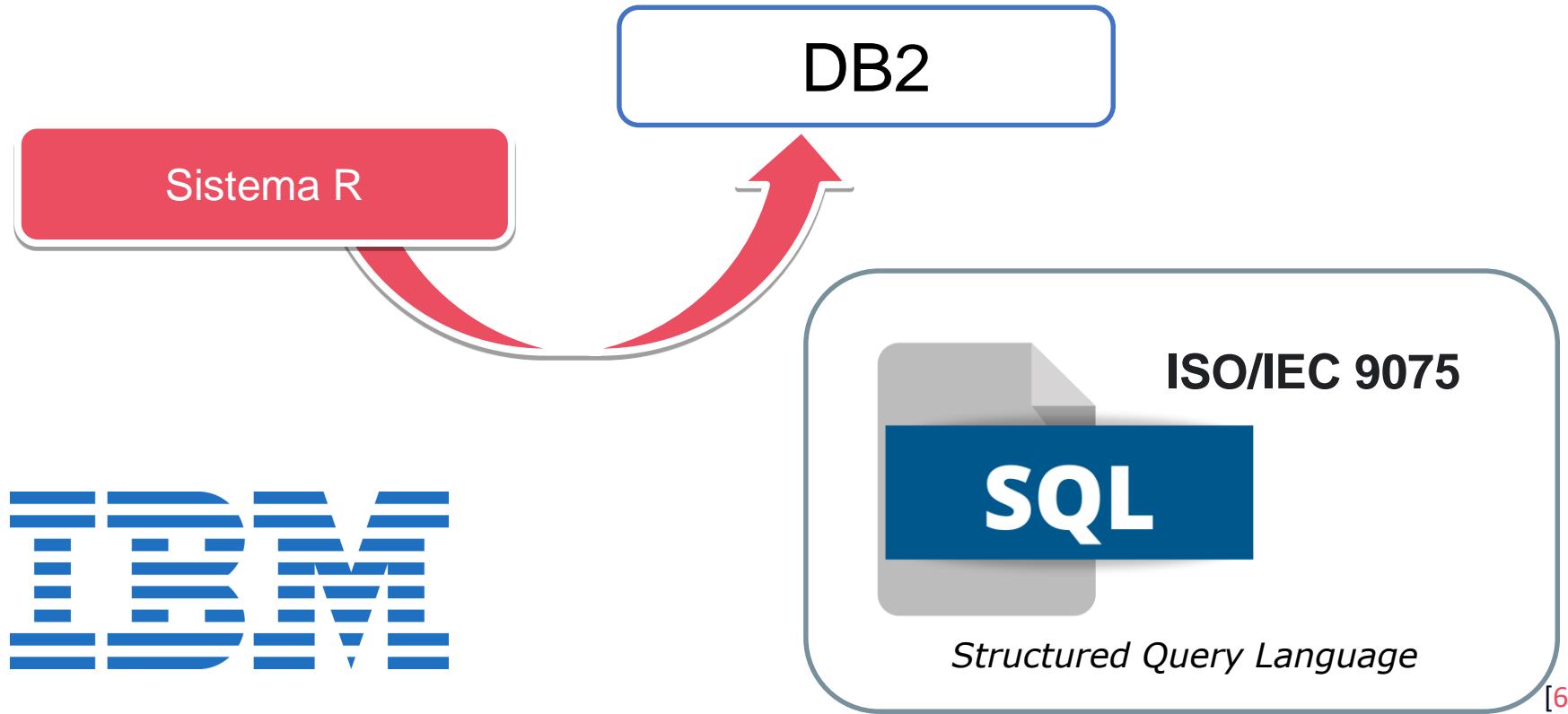


Criador: Ted Codd

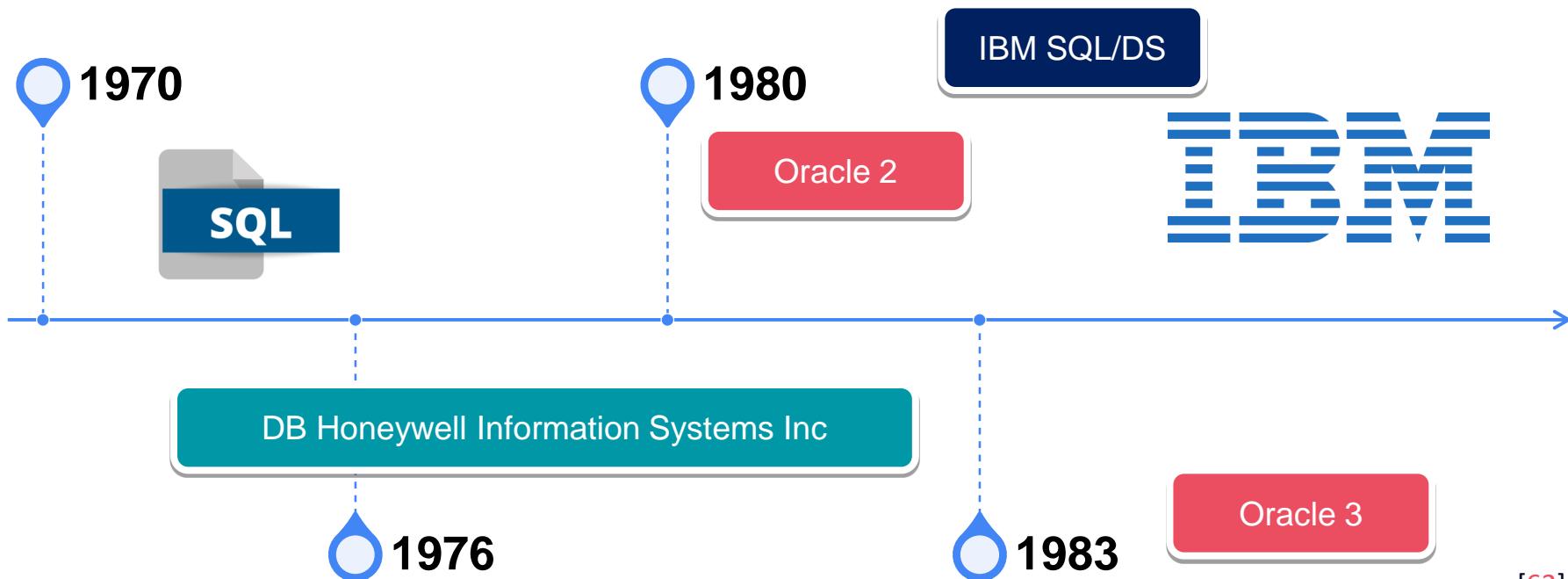
Artigo

1970

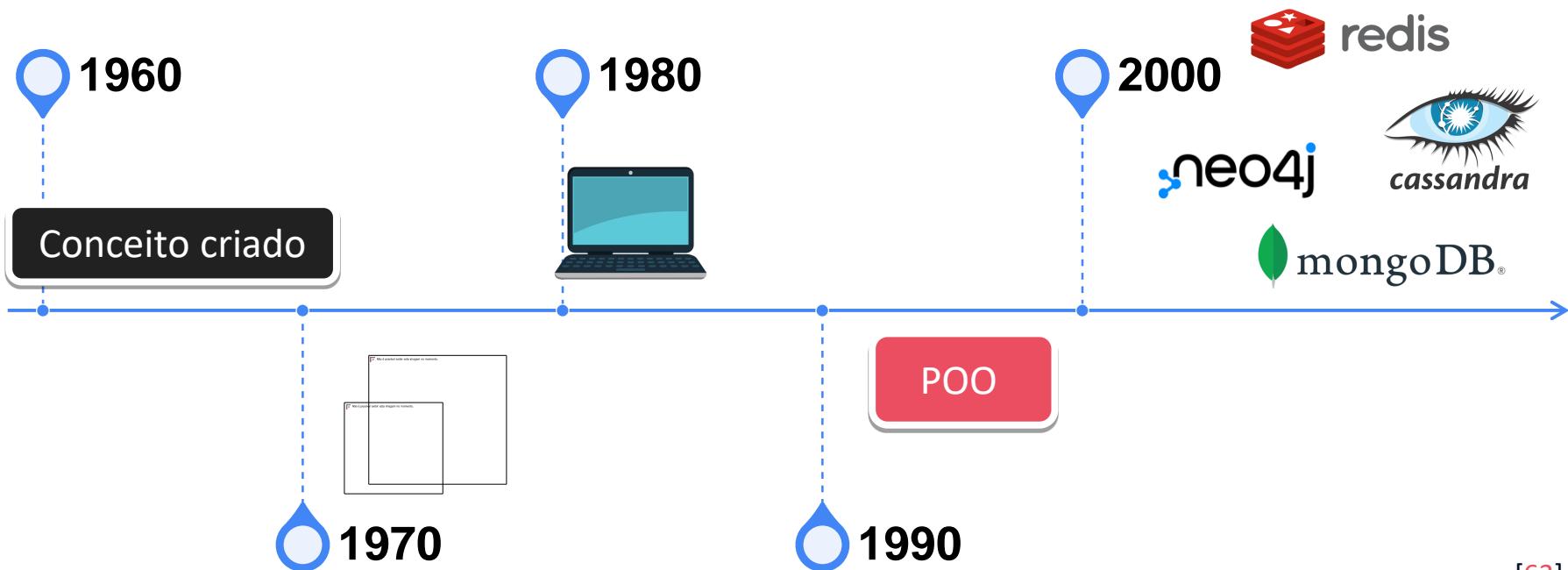
Breve Histórico



Sequência de Eventos



Linha do Tempo



Primeiros do Mercado

Uso dos pcs



Evolução do modelo relacional - 80's

Feedback

Sistemas distribuídos

Desenvolvimento dos sistemas

8 MB

TeraBytes



1980

Modelo Hierárquico

BDDBase

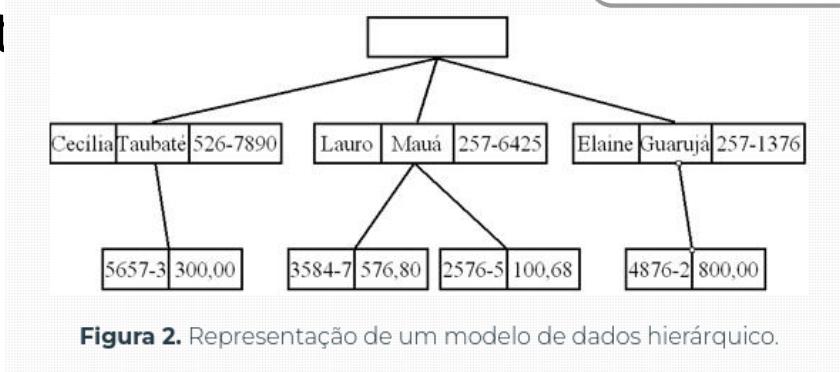
COBOL

Clipper

Fox Pro

IMS – Information Management

- Registros: links e dados
- TAD tree – com raiz



Modelo Hierárquico

Modelo em Rede

Relacionamento  N:M

CODASYL

- Links - Ponteiros entre nós
- 1964

Conhecimento da estrutura física do BD

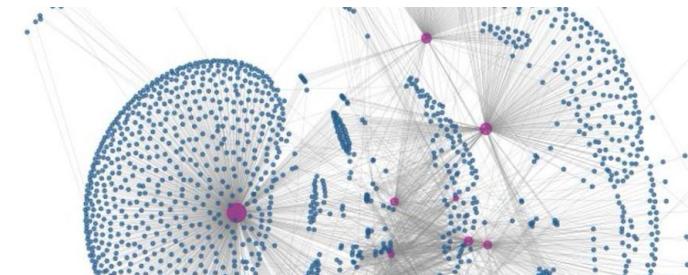
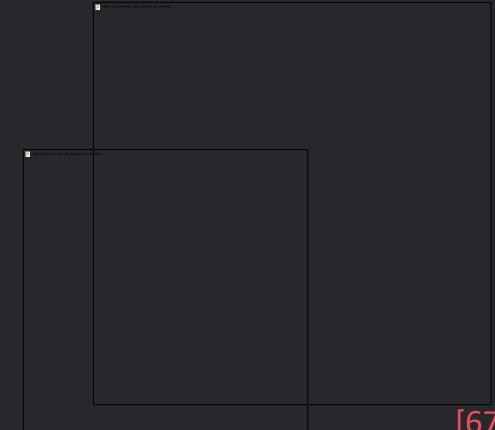


Figura 1. Representação de um modelo de dados em rede.

Modelo em rede

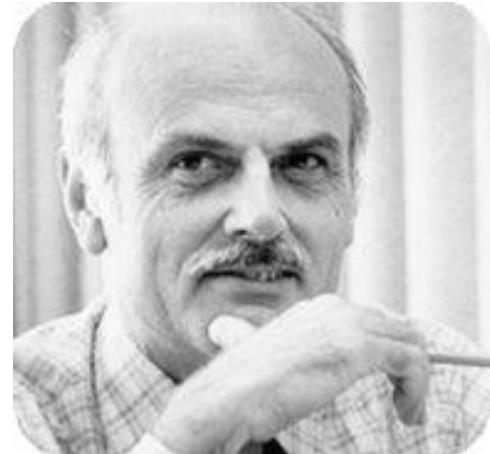
Modelo de Banco de dados Relacional



Modelo Relacional

Características

- Álgebra relacional
- Relações
- TAD para armazenamento
- Transparência



1970

Codd, E. F. A relational model for large shared data banks. Communications of the ACM 13(6):377-387, 1970.

Modelo Relacional

Modelo Relacional

Usuários de BDs



User convencional



Administrador do BD

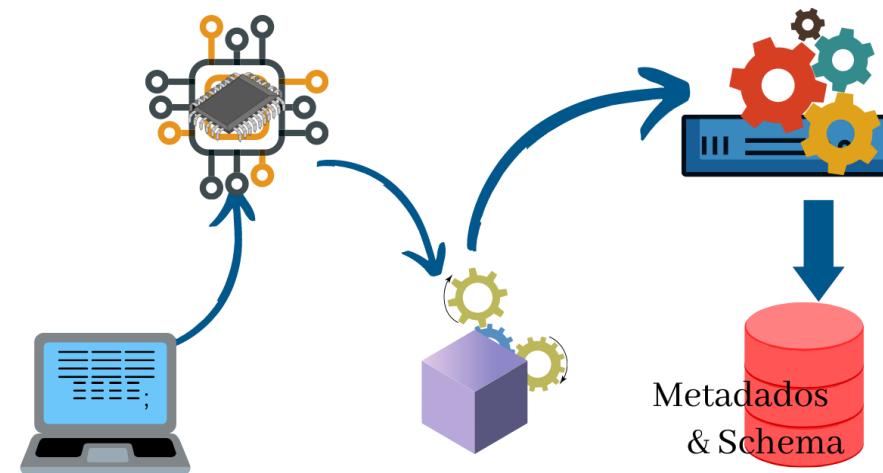
Modelo Relacional

- Definição das tabelas e constraints para dados
- Comandos traduzidos pelo processador LDD

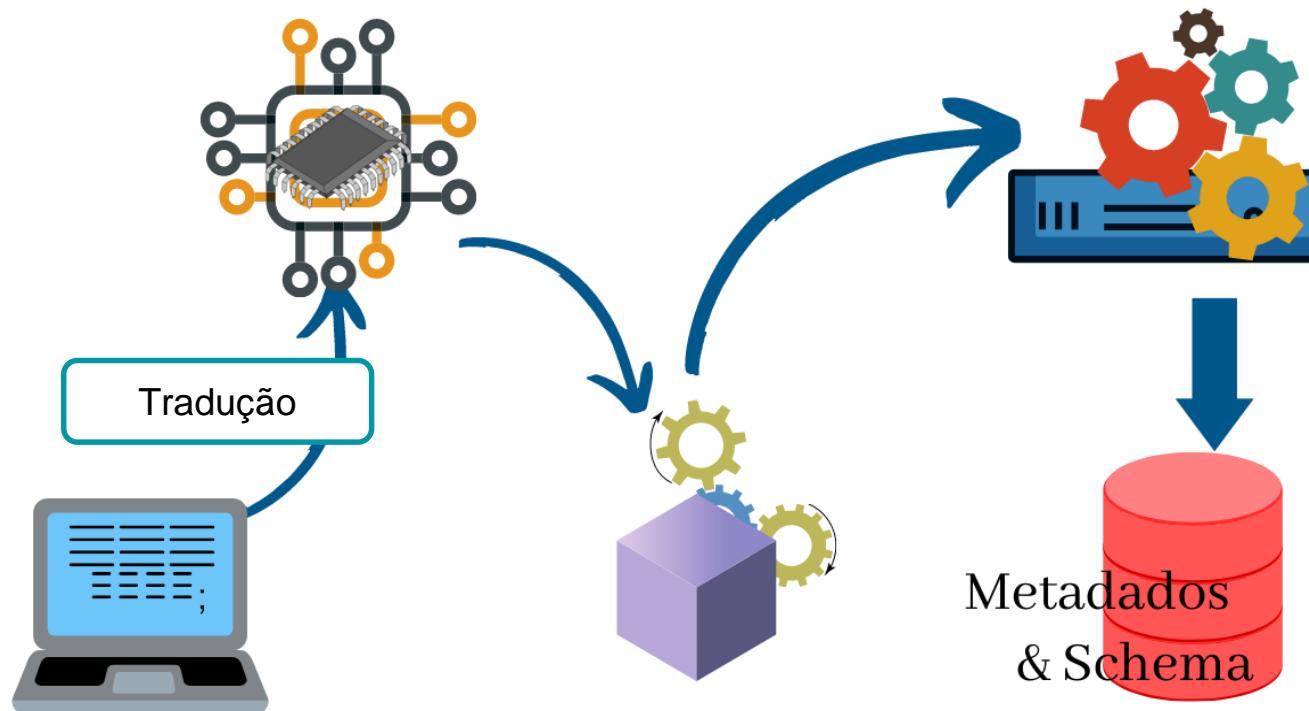


LDD – Linguagem de Definição de Dados

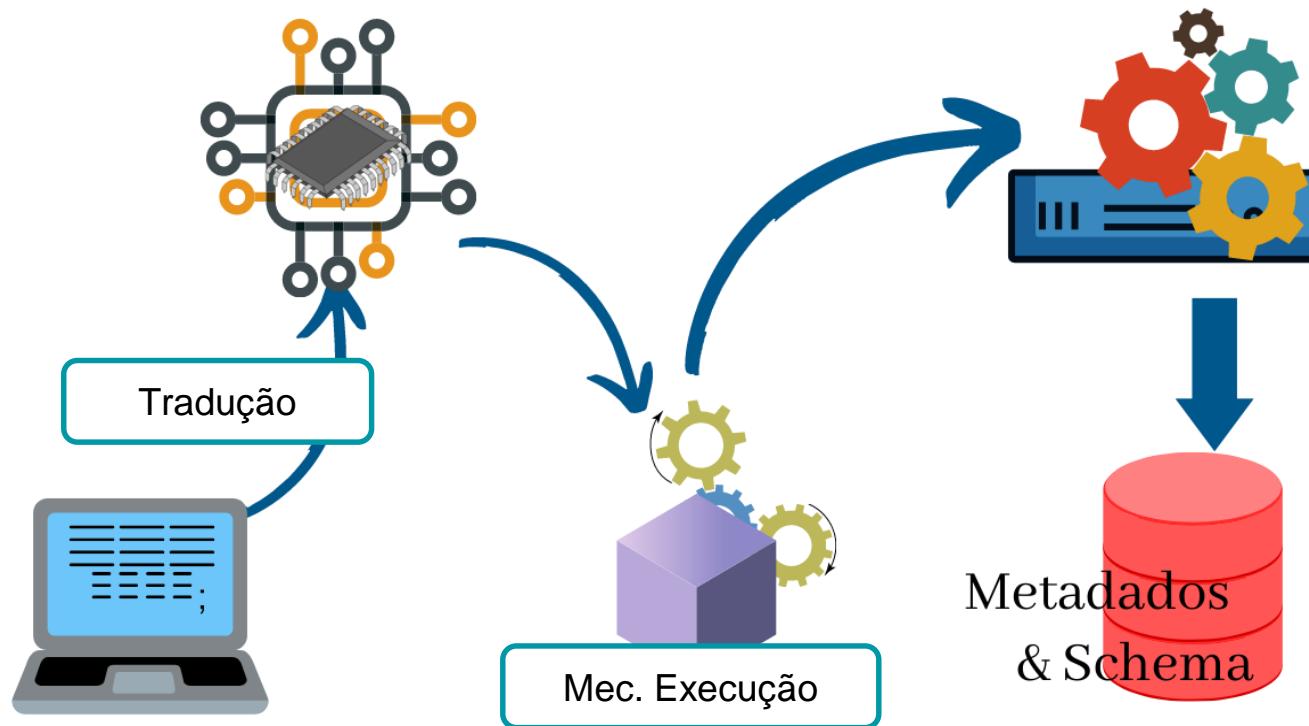
Modelo Relacional



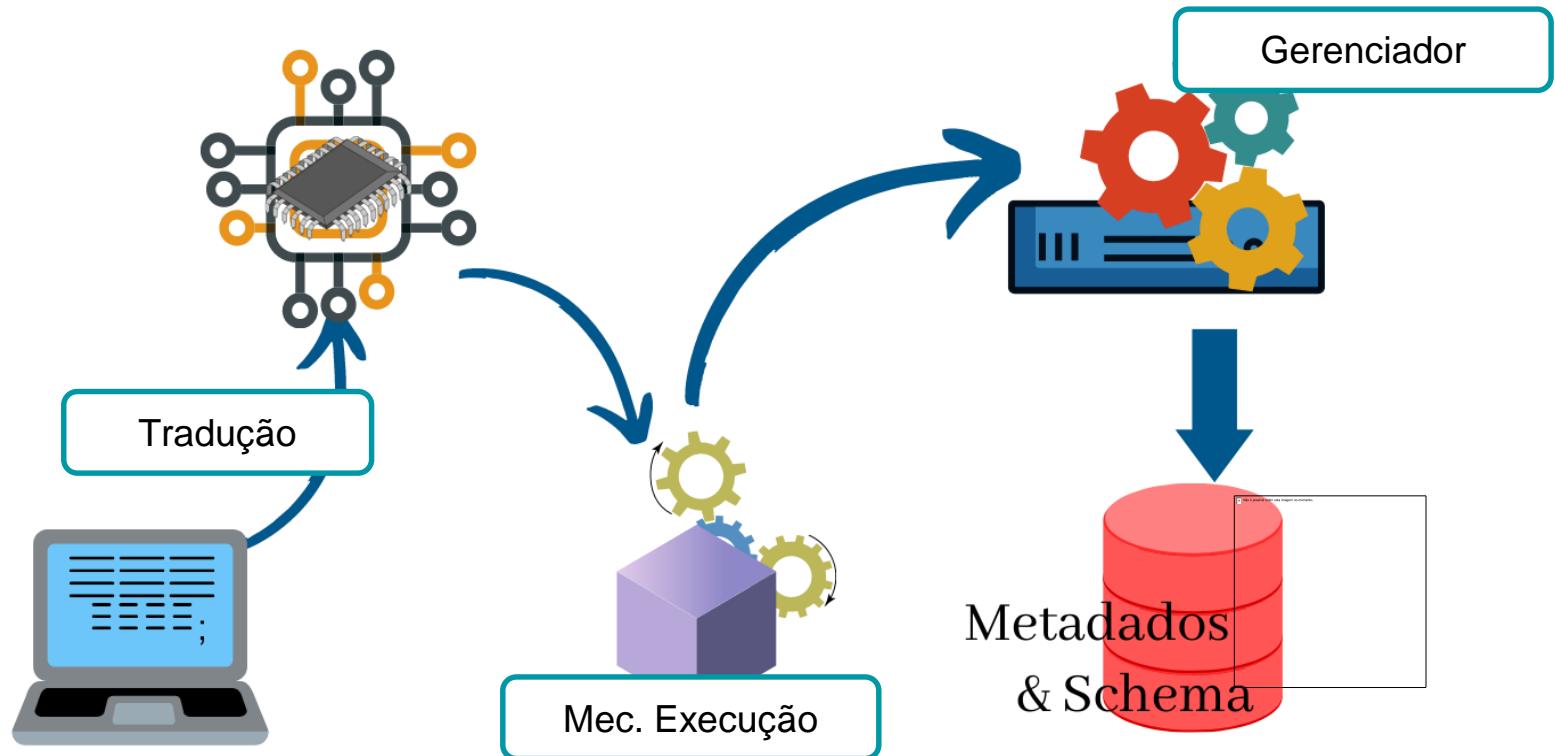
Modelo Relacional



Modelo Relacional



Modelo Relacional



Modelo Relacional

Características:

- Altera e extrai informações
- Duráveis

Transações



LMD – Linguagem de Definição de Dados

Modelo Relacional

Características:

- Altera e extrai informações
- Duráveis

Agrupar para executar

Transações

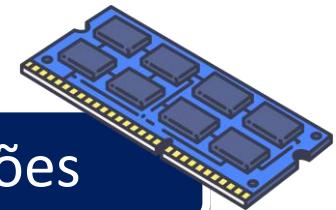


LMD – Linguagem de Definição de Dados

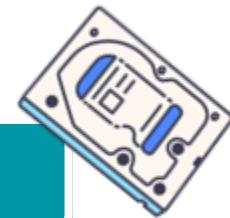
Storage & Buffer

- Gerenciador de armazenamento
- Gerenciador de buffer

Ações



Dados



LMD – Linguagem de Definição de Dados

Storage & Buffer

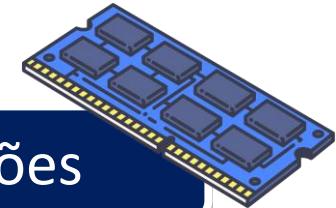
Movimento

- Gerenciador de armazenamento

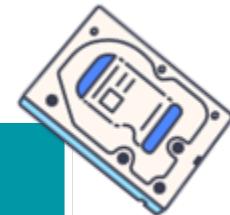
Troca

- Gerenciador de buffer

Ações

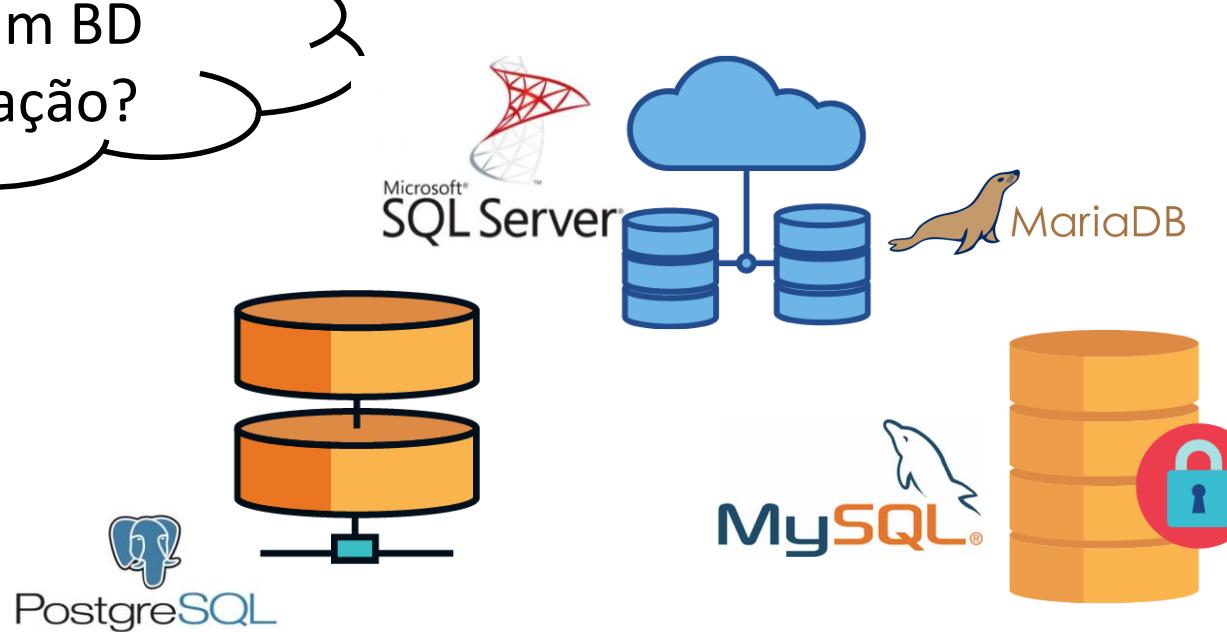
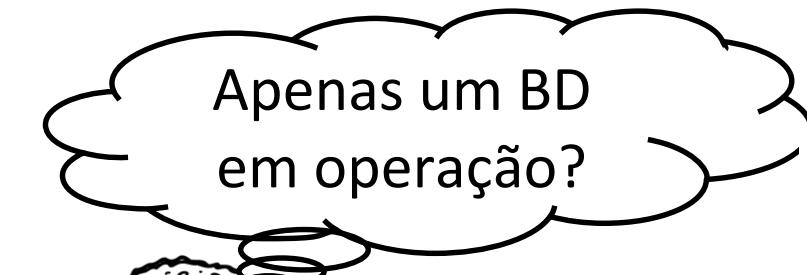


Dados

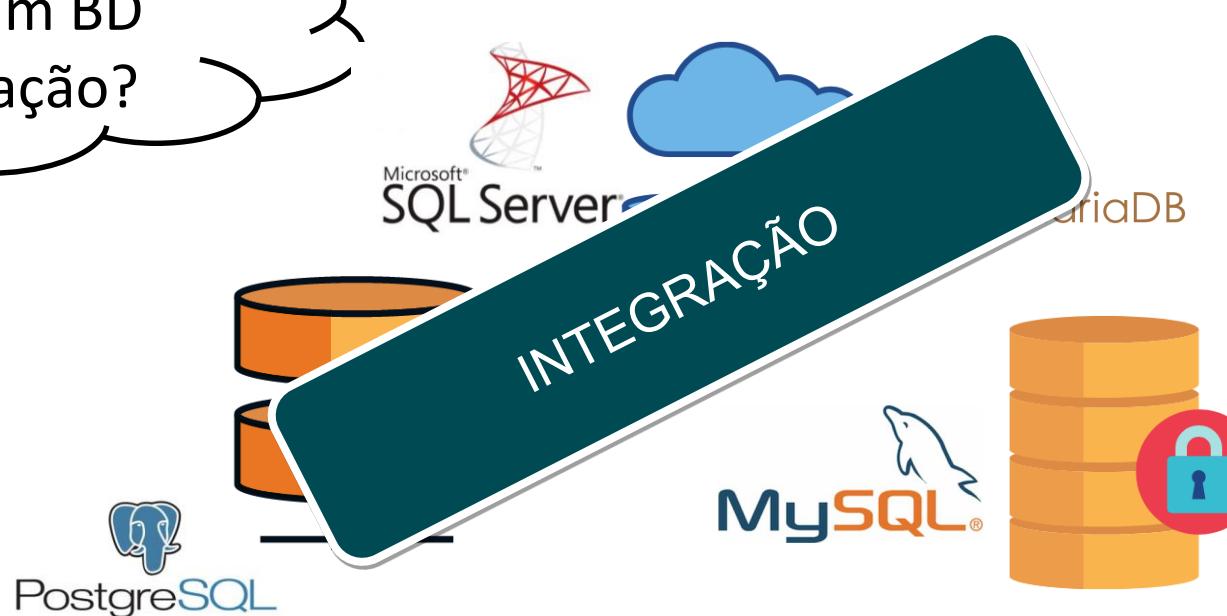
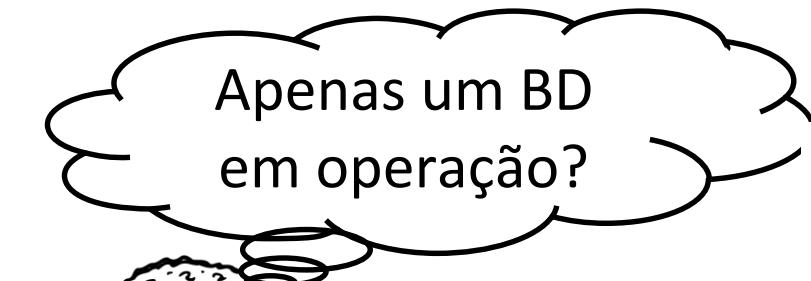


LMD – Linguagem de Definição de Dados

Cenário



Cenário



Cenário



Data warehouses

- Repositórios centralizados
- Mediadores



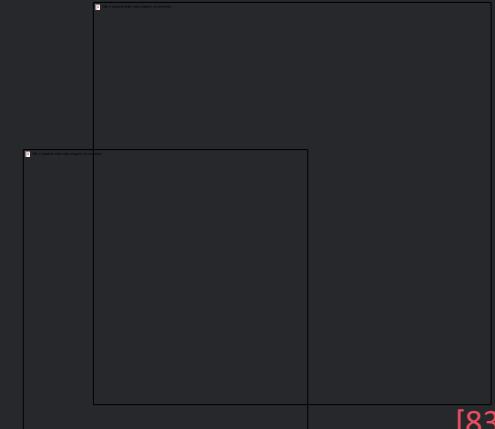
Middleware





Robertson, T., et al. (2014). The GBIF Integrated Publishing Toolkit: Facilitating the Efficient Publishing of Biodiversity Data on the Internet. PLoS ONE, 9(8), e102623.

SGBDs utilizados pelo mercado



Mais utilizados pelo mercado



ORACLE®



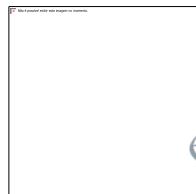
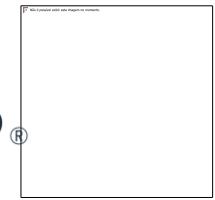
MySQL®



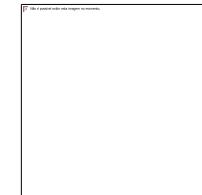
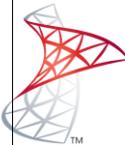
PostgreSQL



mongoDB®



**Microsoft®
SQL Server®**



redis

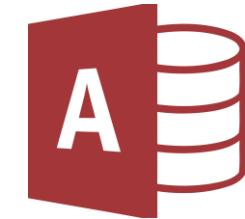
T-SQL

<https://db-engines.com/en/ranking>

Mais utilizados pelo mercado



ElasticSearch



12



MariaDB



cassandra

11

Mais utilizados pelo mercado

Popularidade

Tempo de mercado

Documentação

Robustez

Confiabilidade

Segurança

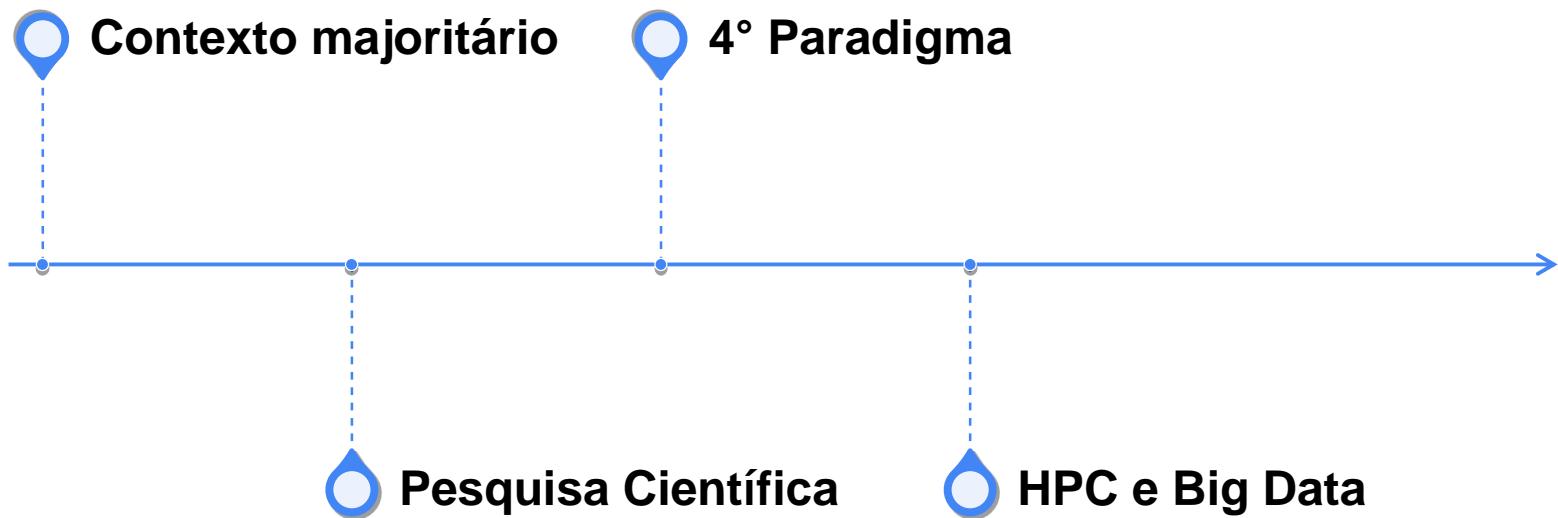
Multiplataforma

Etapa 3

A era dos dados e o futuro da modelagem

// Introdução à Banco e dados

Conversa



Contexto dos dados

- Papel central – Sistemas Corporativos

MIN/MAX

COUNT

MÉDIA

SOMA

Maioria dos cenários



Researching



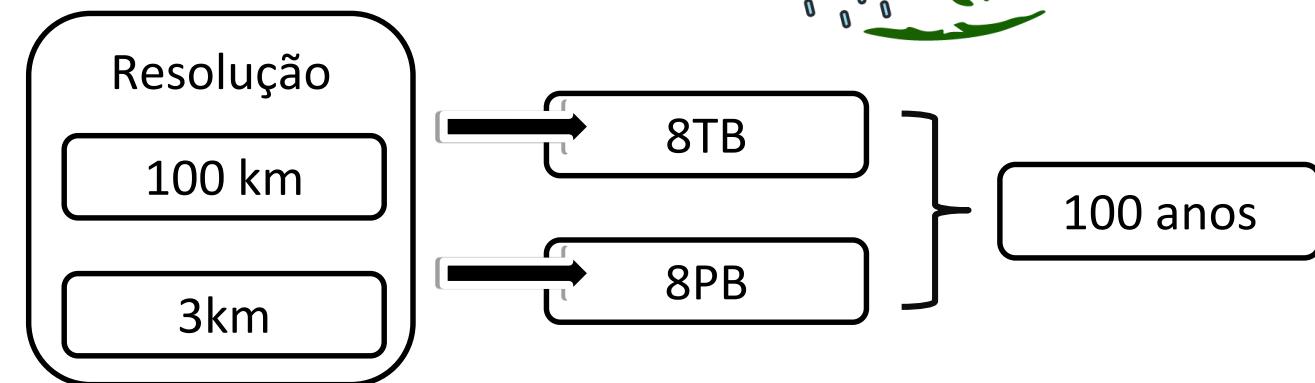
Researching



- N° de tarefas computacionais
- Quantidade de dados
- Heterogeneidade
- Computação paralela e distribuída

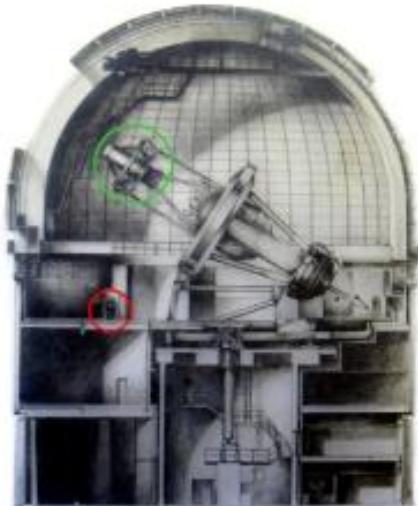
Researching

Exemplos

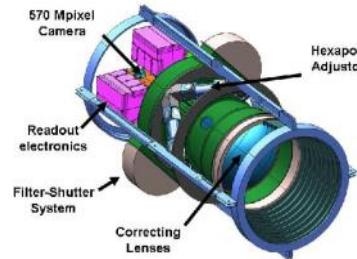


Researching

Exemplos



Fonte: Dark Energy Survey (<http://www.darkenergysurvey.org>)

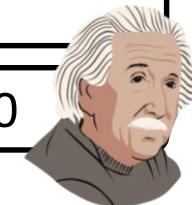


Mapeamento de galáxias,
supernovas e padrões

6.6TB/dia

400

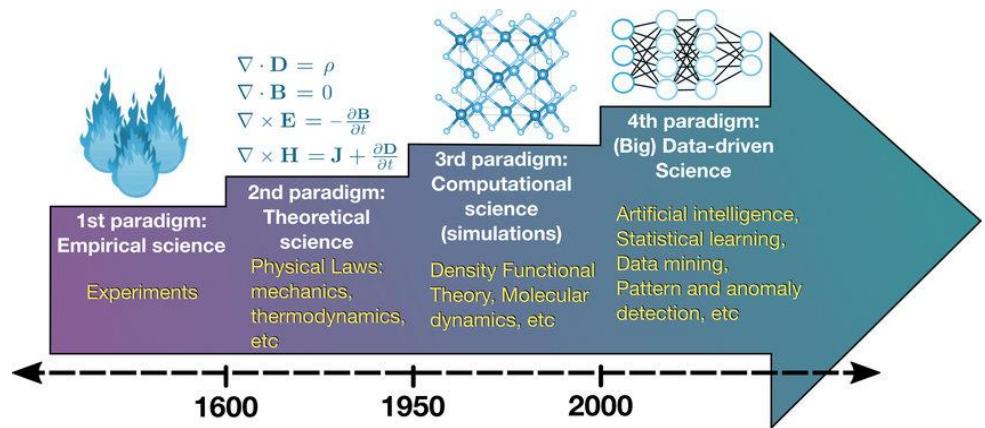
25 instituições



4º Paradigma

Instrumentos e simulações que geram grande volume de dados

Novo modelo: base na análise e exploração de dados (e-Ciência)



Fonte: From DFT to Machine Learning: recent approaches to Materials Science – a review

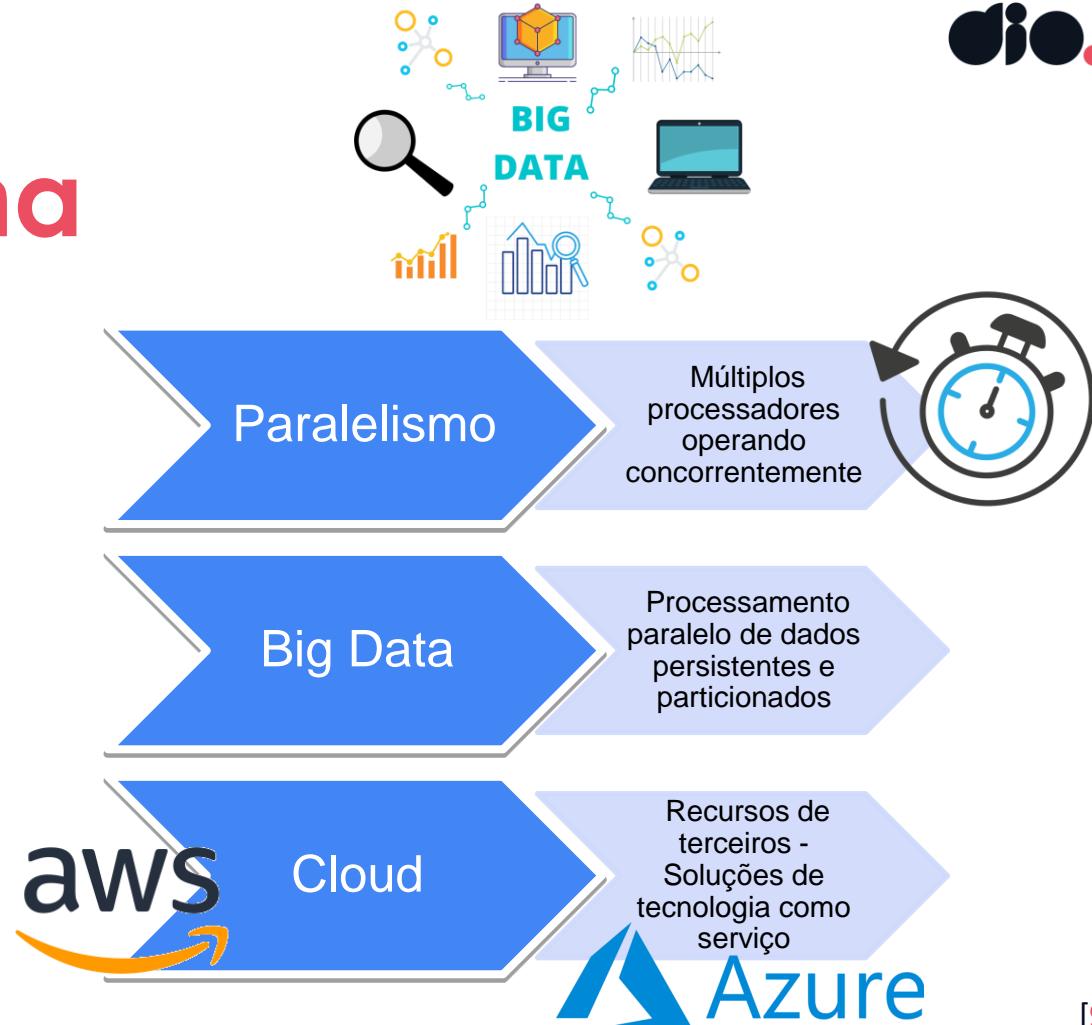
Modelo anterior: empírico, teórico e computacional

4º Paradigma

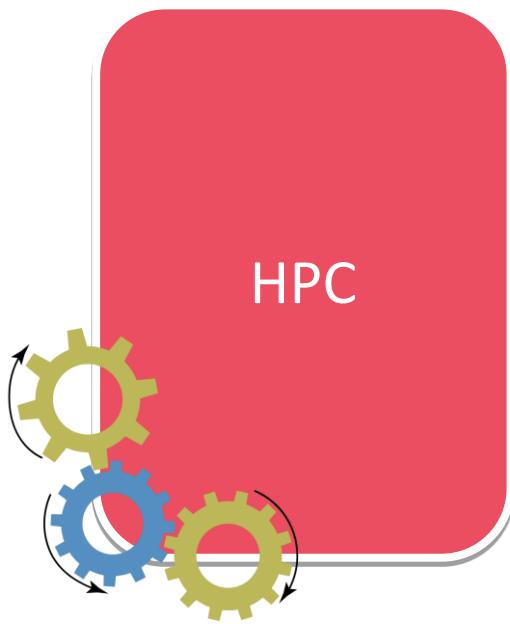


4º Paradigma

Experimentos
realizados em larga
escala

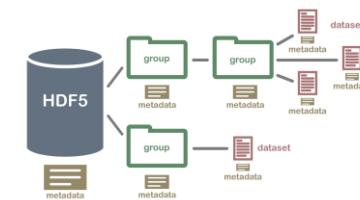


High Performance Computing



- Nós de processamento
- Sistema de arquivos paralelos – sem persistência
- Modelos: MPI, OpenMP, OpenCL
- Acesso: HFF5 e NetCDF

lustre™



Big Data



- Process e Storage: nós de processamento
- Sistema de arquivos paralelos – persistente
- Modelos: MapReduce, Spark, SGBDs paralelos

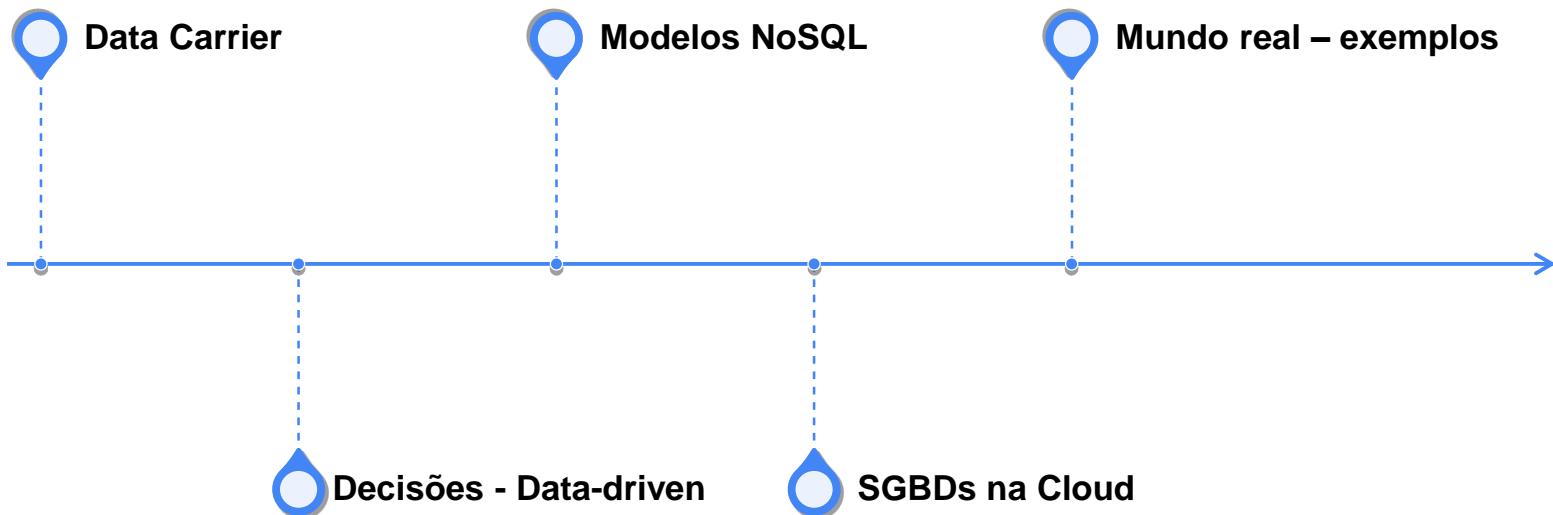


Etapa 4

Novo cenário e novas tecnologias - E agora?

// Introdução à Banco e dados

Conversa



Novo cenário



- Carreira Tech em Data
- Data-driven
- Novos modelos de SGBDs



Mercado de data



Perfil de profissional em data

Mercado de data



Engenheiro de dados

- Desenho/Construção/
- Sustentação das soluções de dados

Extração de dados de fontes heterogêneas
Disponibilizar os dados para serem
consumidos pelos analistas e cientistas

Engenheiro de dados

Mercado de data



Cientista de dados

- Modelagem
- Reconhecimento de padrões / Predição

Busca responder perguntas atreladas ao contexto do negócio. Buscando insights através de técnicas de modelagem

Cientista de dados

Mercado de data

Analista de dados

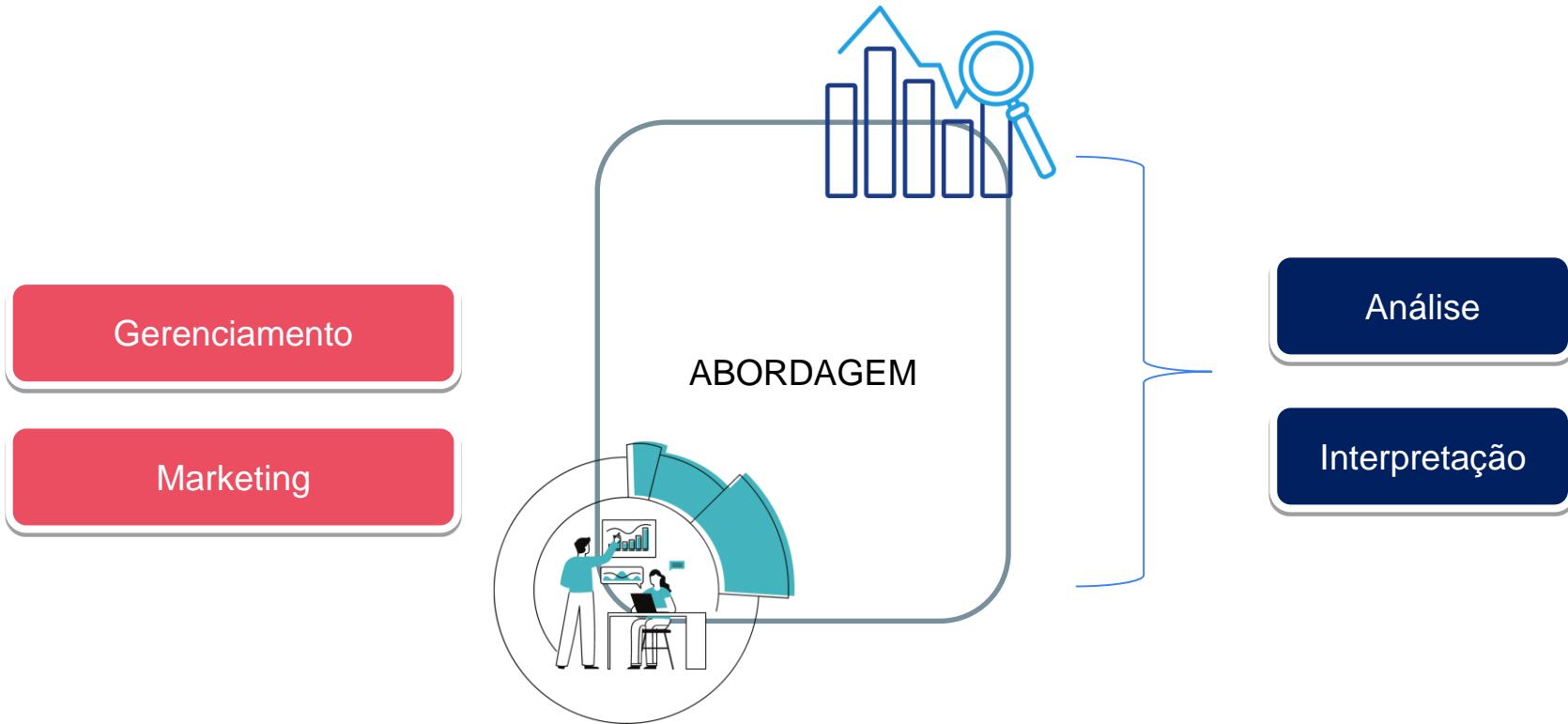


- Criação de dashboards
- Apresentação visual dos dados

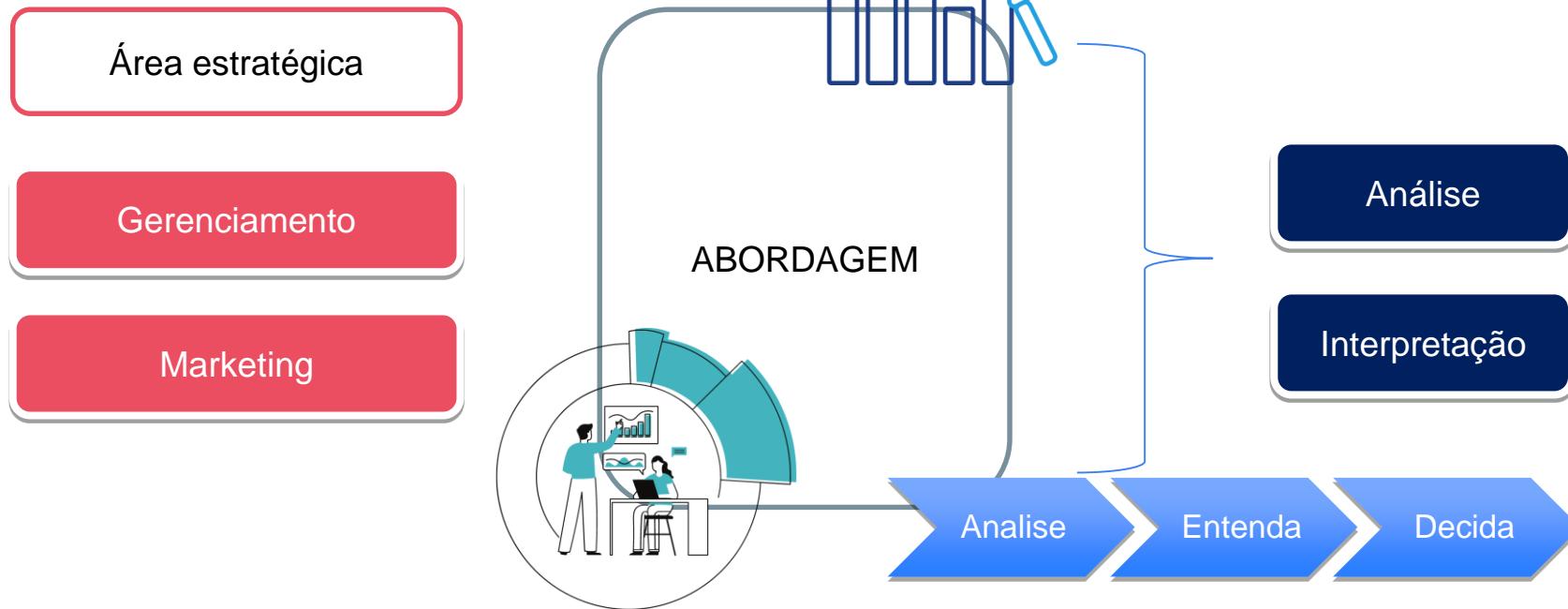
Busca entender o comportamento do negócio a partir dos dados. Realiza o diagnóstico, identifica possíveis motivos para comportamentos e verifica métricas

Analista de dados

Data-driven



Data-driven



Modelos NoSQL

SGBDs NoSQL

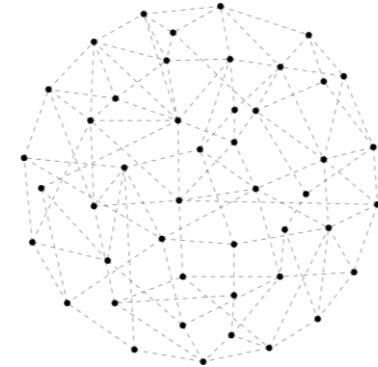
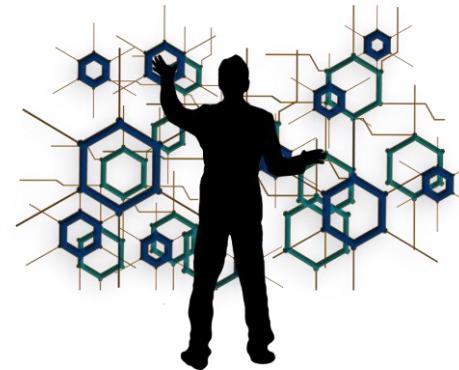
Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Modelos NoSQL

SGBDs NoSQL

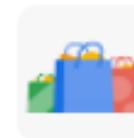
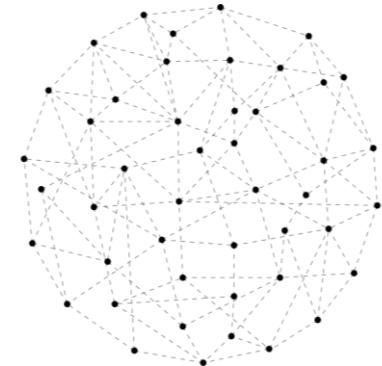
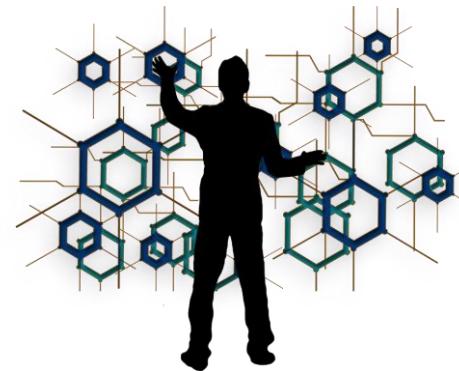
Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Black Friday

Friday, November 25, 2022

⋮



Modelos NoSQL

SGBDs NoSQL

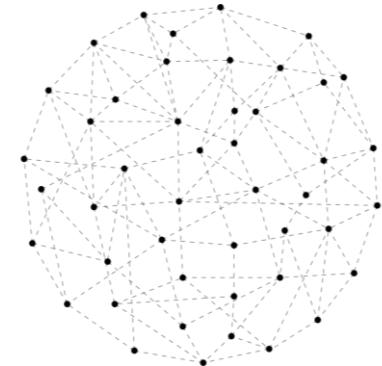
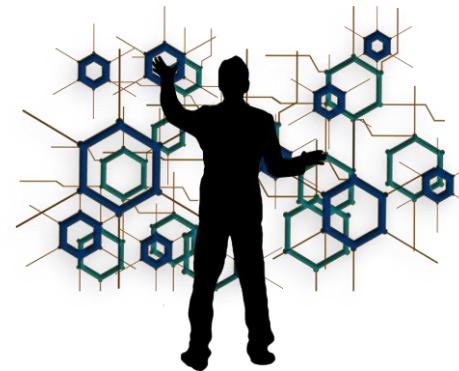
Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



NoSQL

Not only SQL



Modelos NoSQL

SGBDs NoSQL

Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Orientado à Documentos

- Baixa curva de aprendizado
- Baseado em JSON
- Escalabilidade horizontal
- Multi-plataforma
- Transações ACID para multi-documento
- Consultas: Suporta javascript

Modelos NoSQL

SGBDs NoSQL

Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Orientado à Colunas

- Origem: Facebook
- Open-source: 2008
- Performático
- Descentralizado
- Consultas: CQL



Modelos NoSQL

SGBDs NoSQL

Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Orientado à Key-Value

- 2009 - Escrito em C
- Compatível c/ outras linguagens
- Performático
- Support: strings, lists, maps, sets, JSON, Graphs ...

Modelos NoSQL

SGBDs NoSQL

Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Orientado à Grafos

- 2007- escrito em java
- TAD: grafos
- Cypher: query para grafos
- Data science
- Compatível: Python, NodeJS, GO, .NET e Java ...



Modelos NoSQL

SGBDs NoSQL

Documentos

Wide-columns

Key-Value

Grafos

Orientado à Objetos



Orientado à Objetos

- 2008 – open-source
- Escrito em .NET e Java
- Cross-plataform

db4o contains a function to store any object:

```
objectContainer.store(new SomeClass());
```

DB & Cloud



Amazon **Aurora**



DynamoDB



Amazon **Redshift**



Azure BD



Mundo Real



ORACLE
DATABASE



ORACLE
DATABASE

NETFLIX 
MySQL



DB
DB.io
Database of
Databases

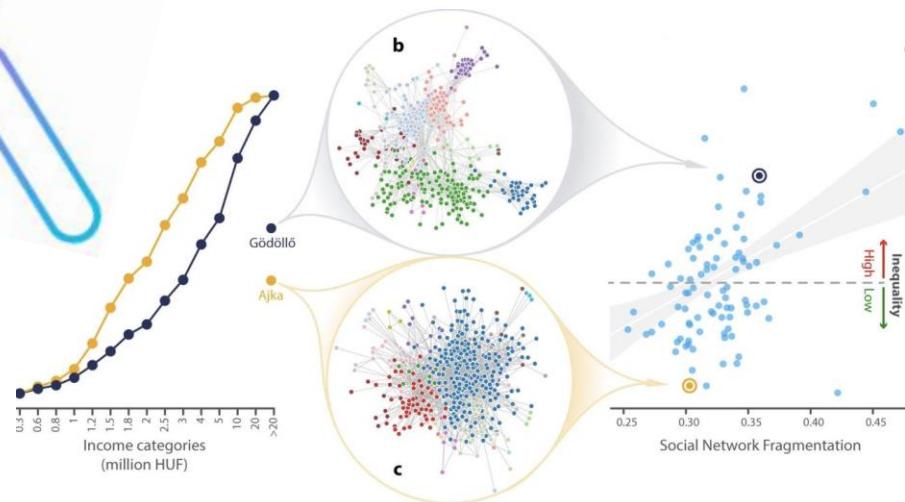


Mundo Real



Black Friday

Friday, November 25, 2022



Etapa 5

Explorando a abordagem de um SGBD – Isolamento, Auto-descrição, Compartilhamento e Visões

// Introdução à Banco e dados

Conversa

Abordagem de BDs

Por que utilizar?

Isolamento de dados e programa

2º das principais característica de SGBD

Compartilhamento e Processamento de transações

4º das principais característica de SGBD

Auto-descrição

1º das principais característica de SGBD

Múltiplas Visões

3º das principais característica de SGBD

Abordagem de BD



Abordagem de BD



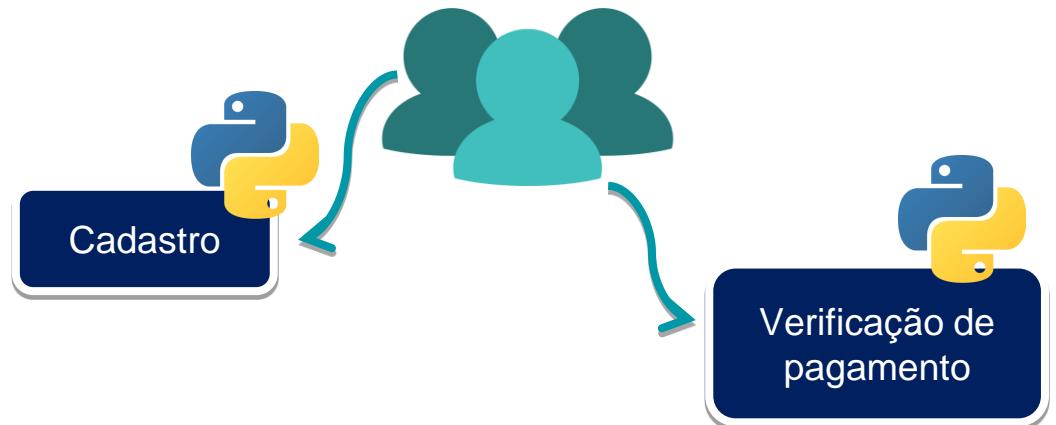
Abordagem tradicional



Abordagem BDs

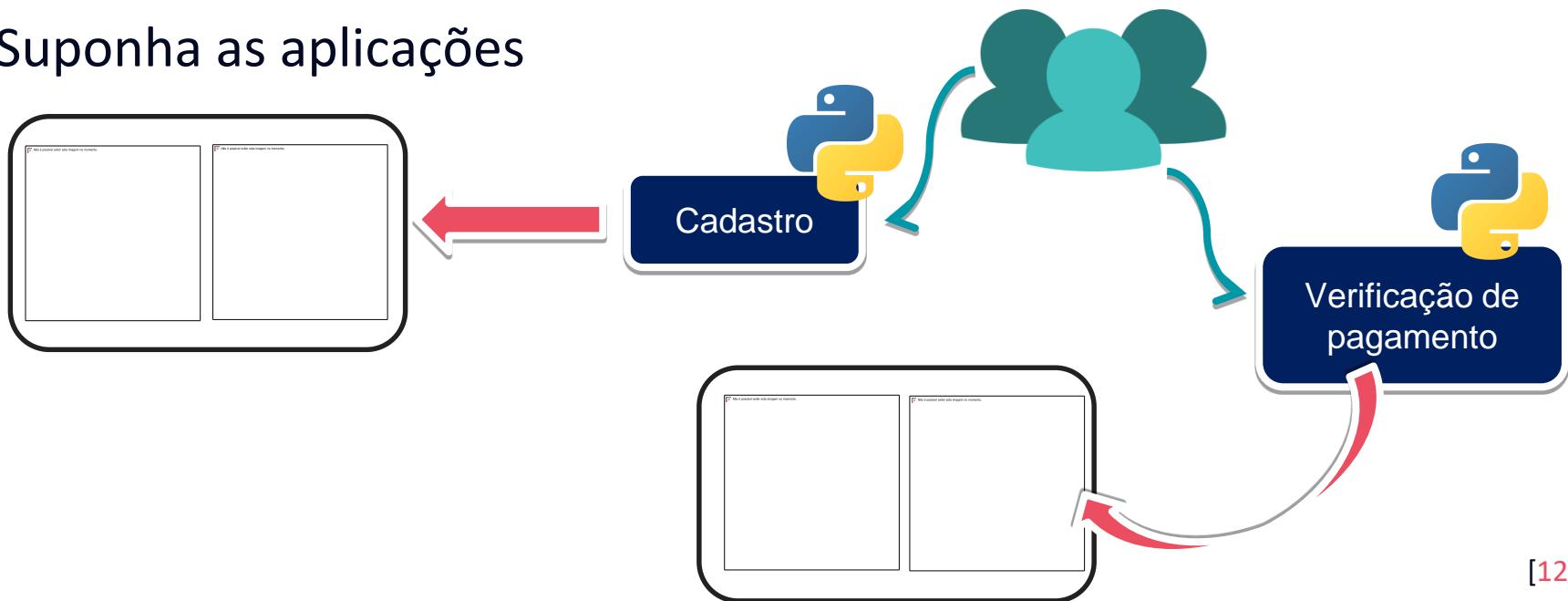
Abordagem de BD

Suponha as aplicações



Abordagem de BD

Suponha as aplicações

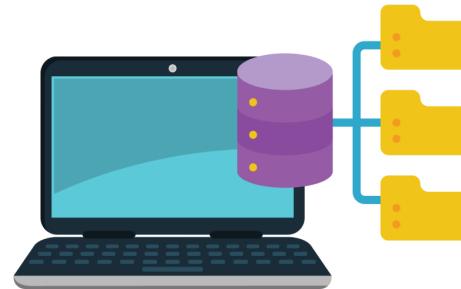
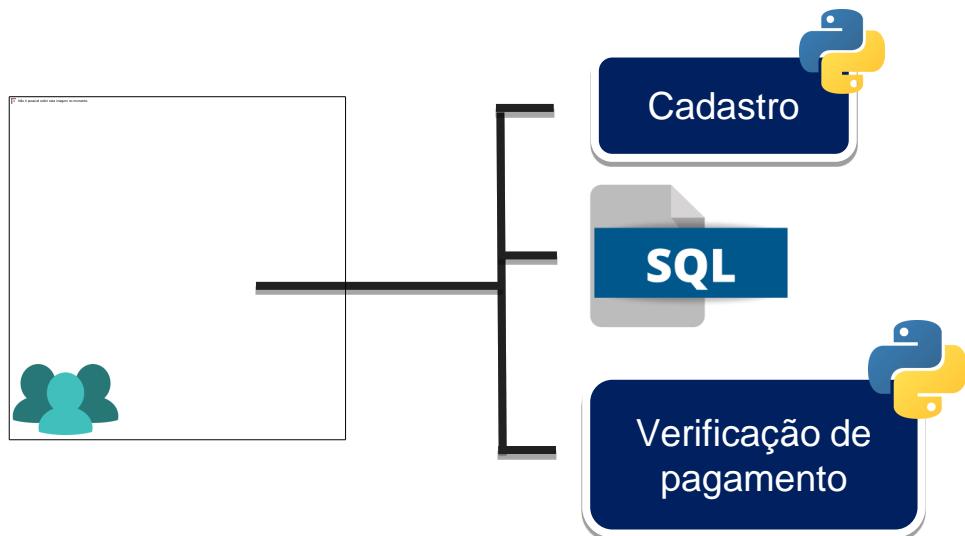


Abordagem de BD

Suponha as aplicações:



Abordagem de BD



Abordagem BDs

Abordagem de BD

Características principais:

Abstração

Auto-descrição

Isolamento

Compartilhamento

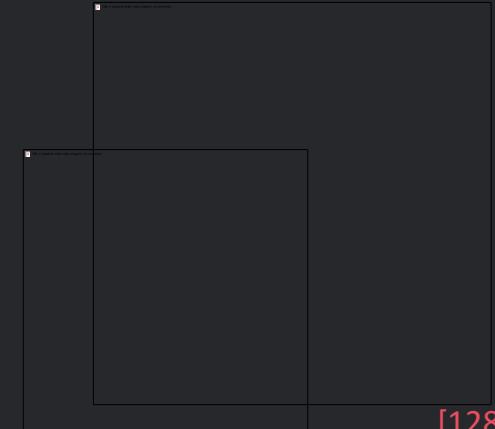
Múltiplas visões

Transação
multiuser

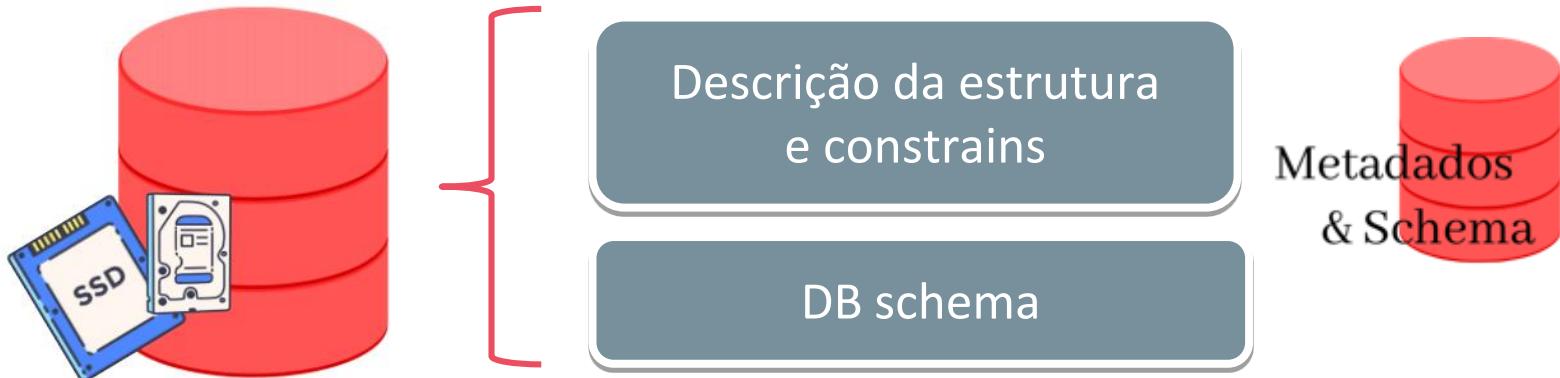


Abordagem BDs

Natureza auto-descritiva da abordage de BD



Natureza Auto-descritiva



Natureza Auto-descritiva



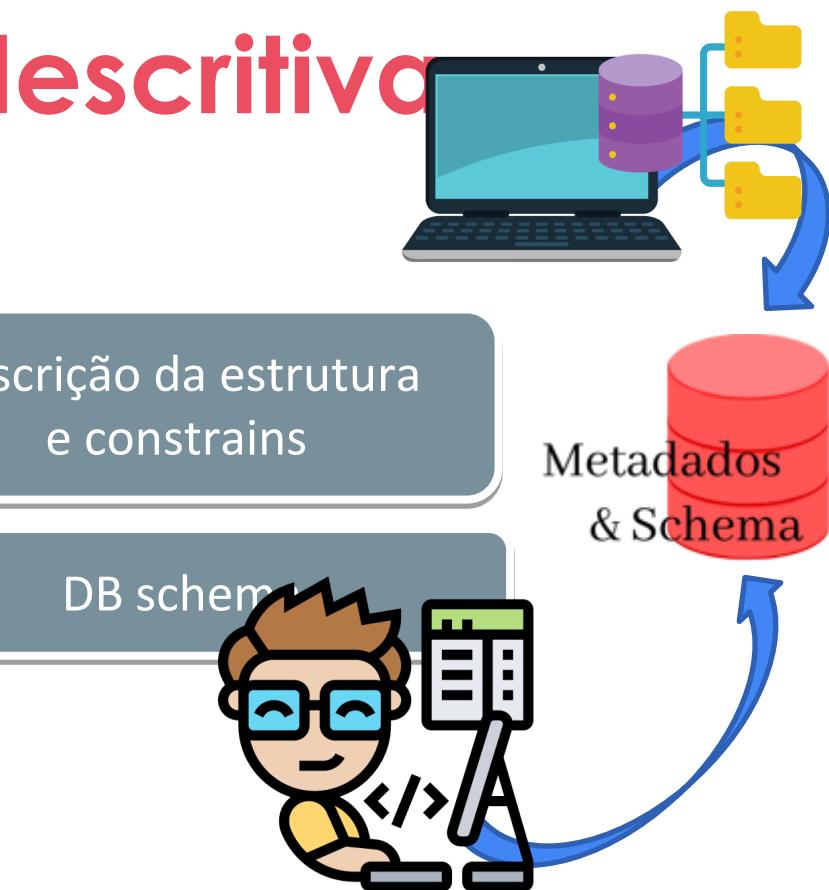
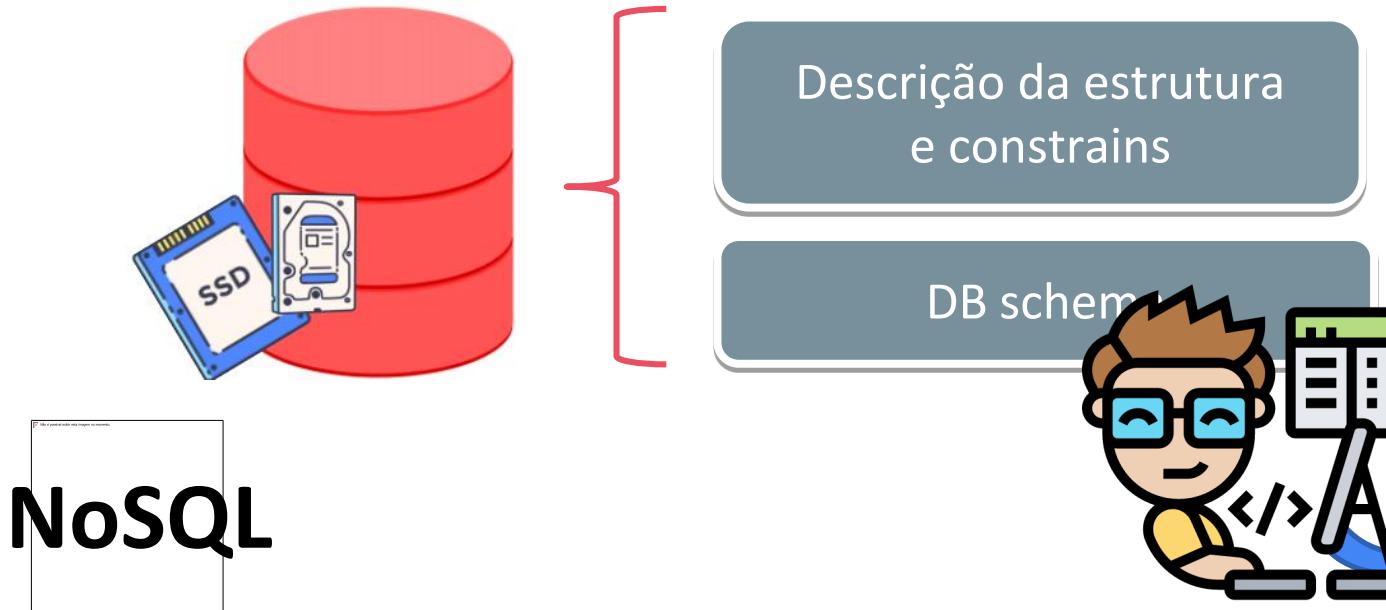
Descrição da estrutura
e constraints

DB schema



NoSQL

Natureza Auto-descritiva

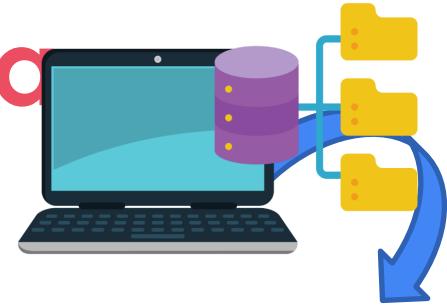


Natureza Autônoma

amazon.com.br

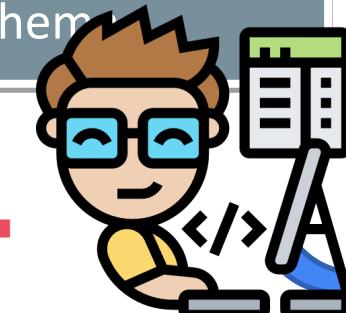


critiva



Descrição da estrutura
e constraints

DB schema



NoSQL

Natureza Auto-descritiva



Abordagem tradicional



Programa da Aplicação

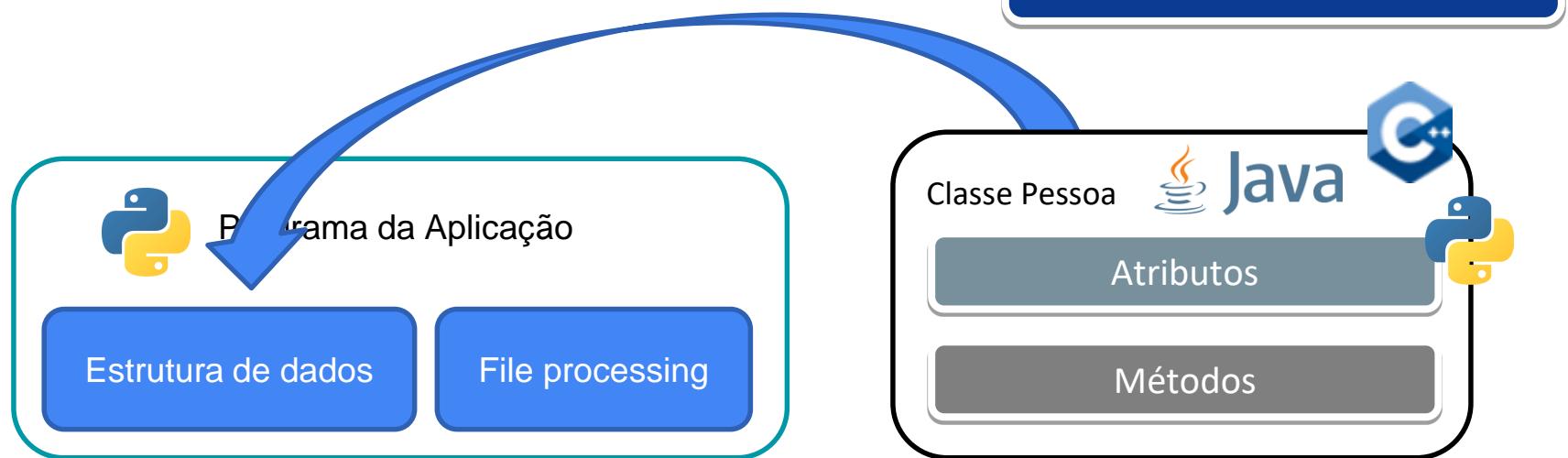
Estrutura de dados

File processing

Natureza Auto-descritiva



Abordagem tradicional



Catálogo

RELATIONS

Relation_name	No_of_columns
STUDENT	4
COURSE	4
SECTION	5
GRADE_REPORT	3
PREREQUISITE	2

COLUMNS

Column_name	Data_type	Belongs_to_relation
Name	Character (30)	STUDENT
Student_number	Character (4)	STUDENT
Class	Integer (1)	STUDENT
Major	Major_type	STUDENT
Course_name	Character (10)	COURSE
Course_number	XXXXNNNN	COURSE
....
....
....
Prerequisite_number	XXXXNNNN	PREREQUISITE

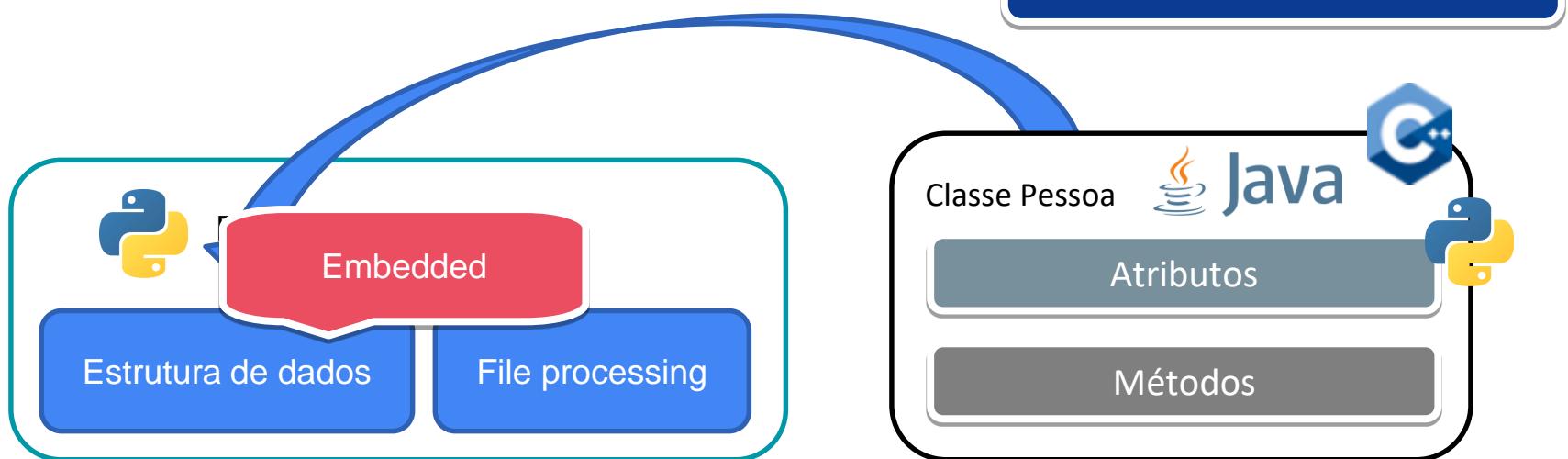
Isolamento entre Program/Data e Abstração



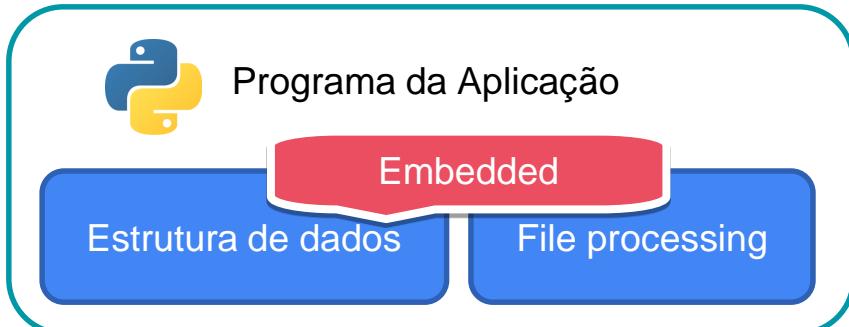
Isolamento e abstração



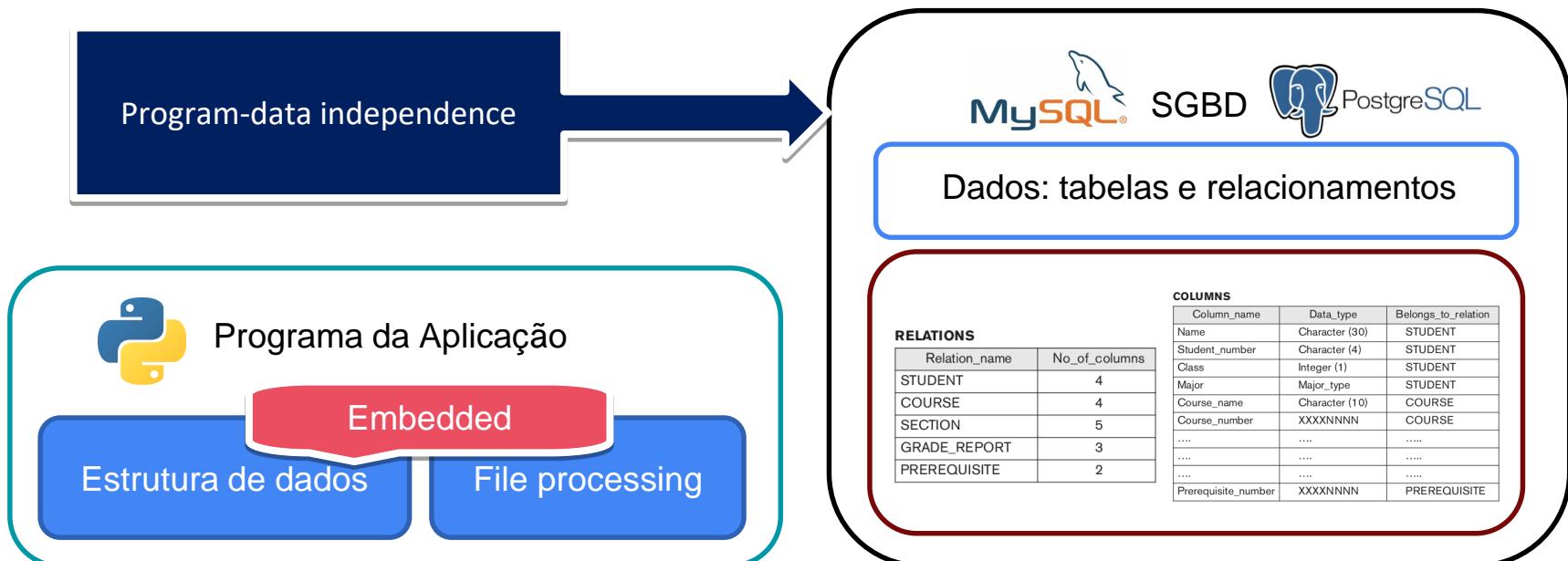
Abordagem tradicional



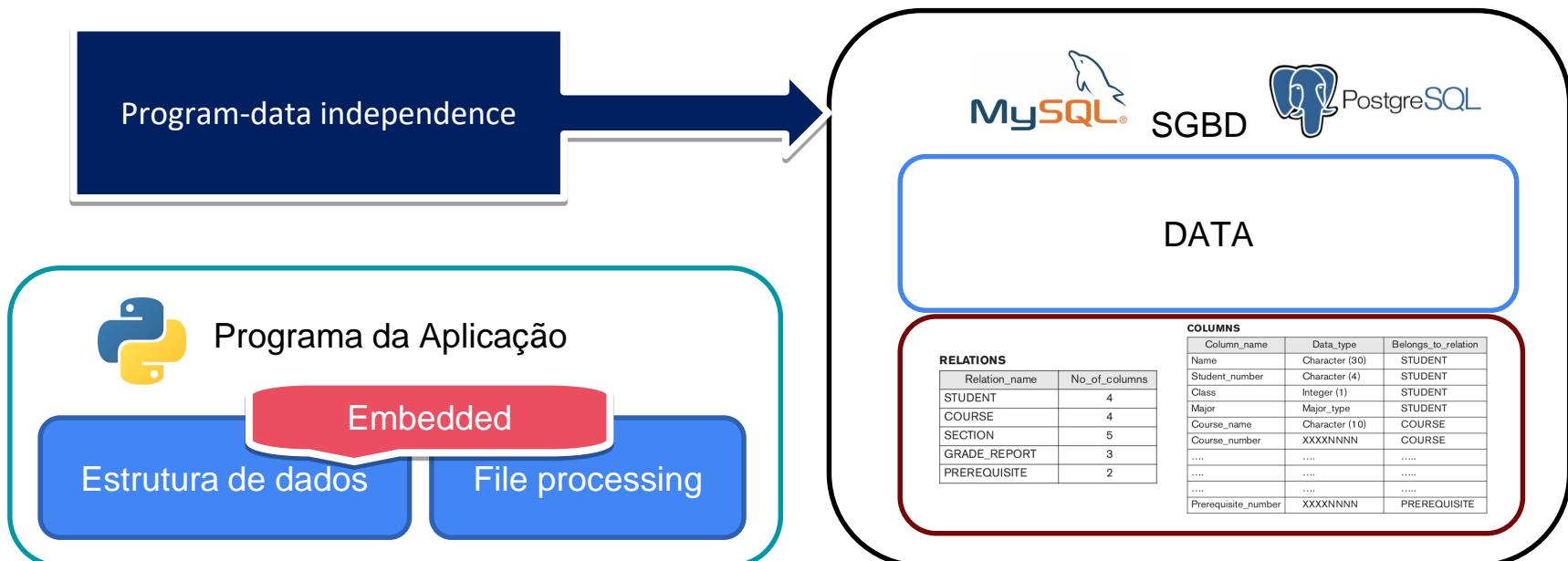
Isolamento e abstração



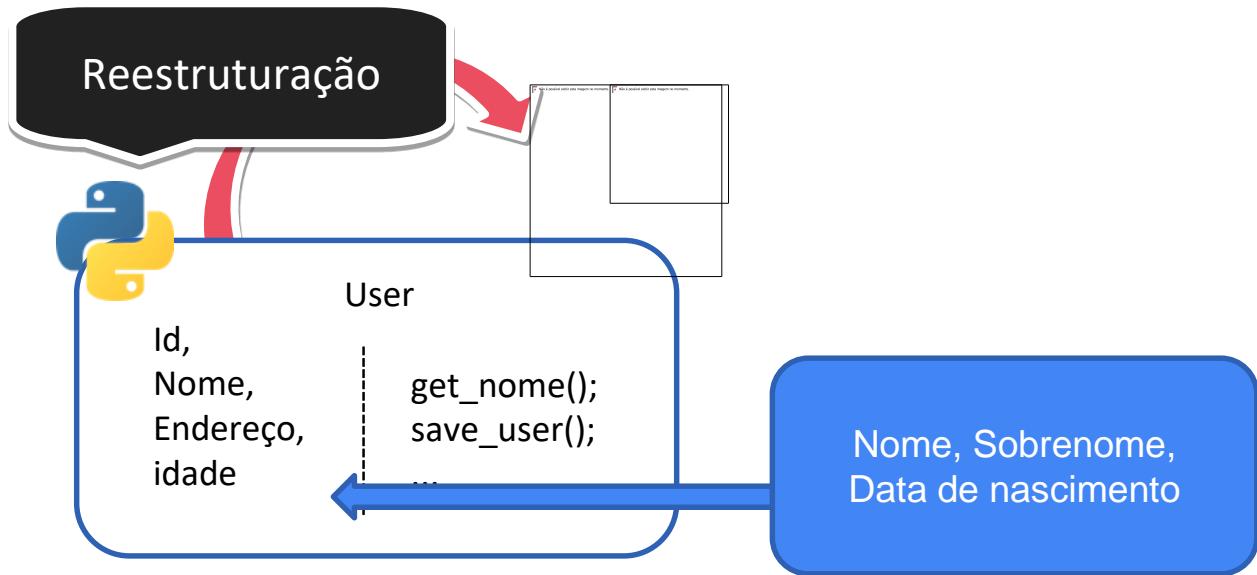
Isolamento e abstração



Isolamento e abstração



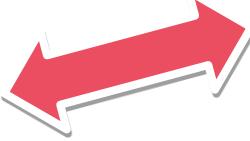
Isolamento e abstração



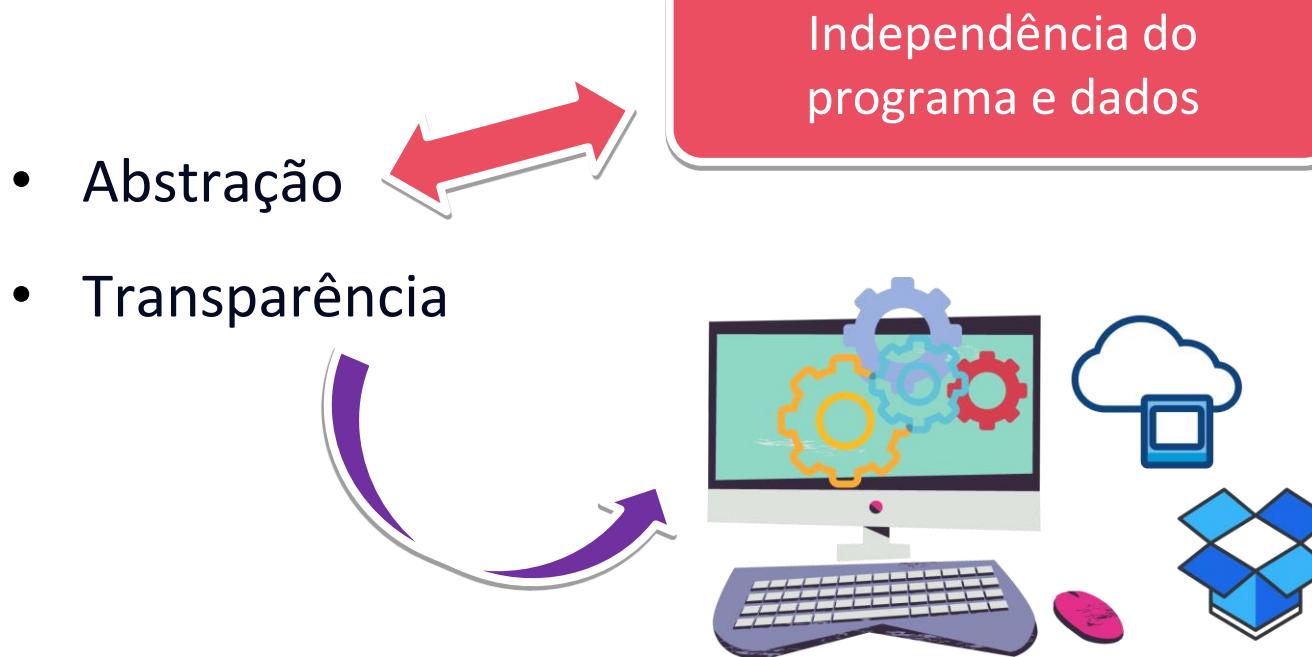
Isolamento e abstração



Isolamento e abstração

- Abstração
 - Transparência
- 
- Independência do
programa e dados

Isolamento e abstração



Isolamento e abstração

Data Item Name	Starting Position in Record	Length in Characters (bytes)
Name	1	30
Student_number	31	4
Class	35	1
Major	36	4



Catálogo

Suporte a Múltiplas Visões dos dados

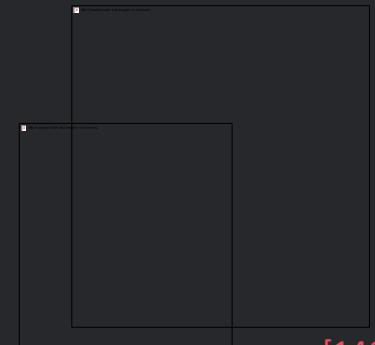


Table Views

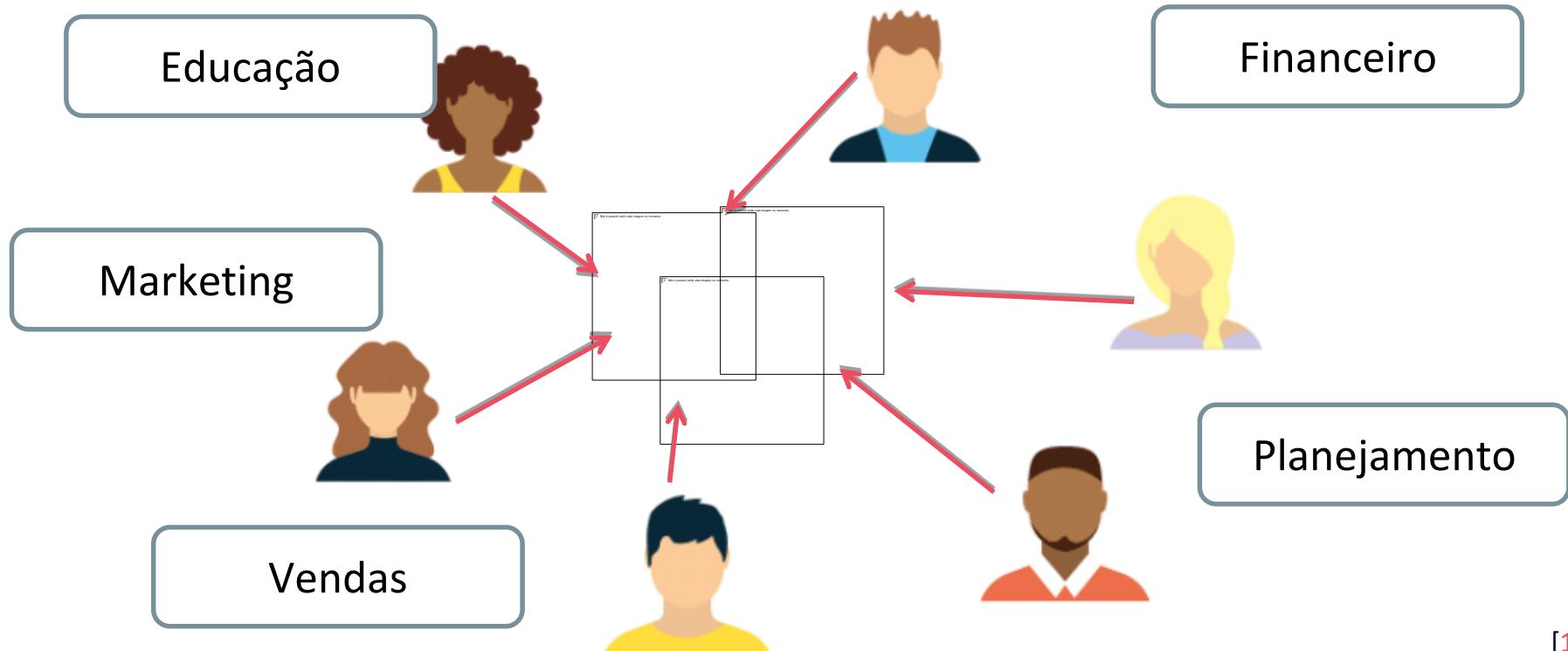


Table Views

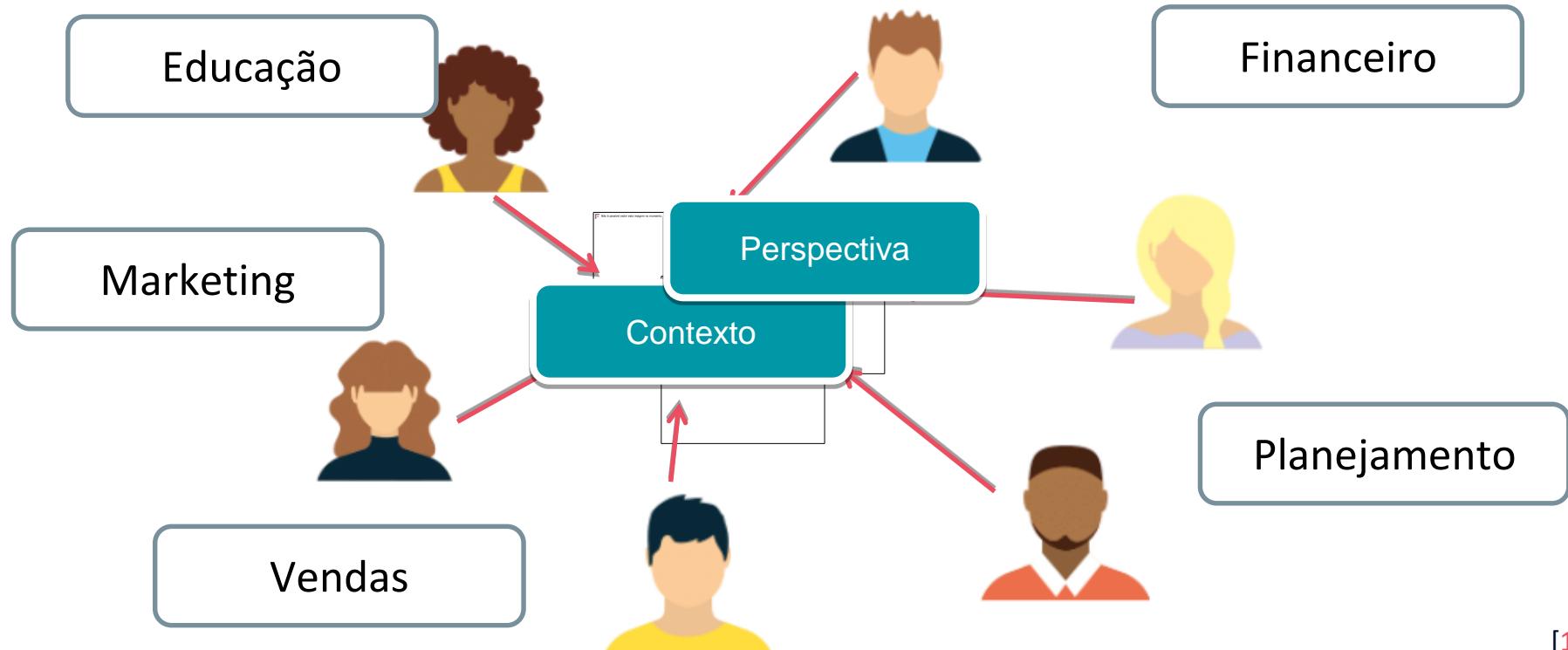


Table Views

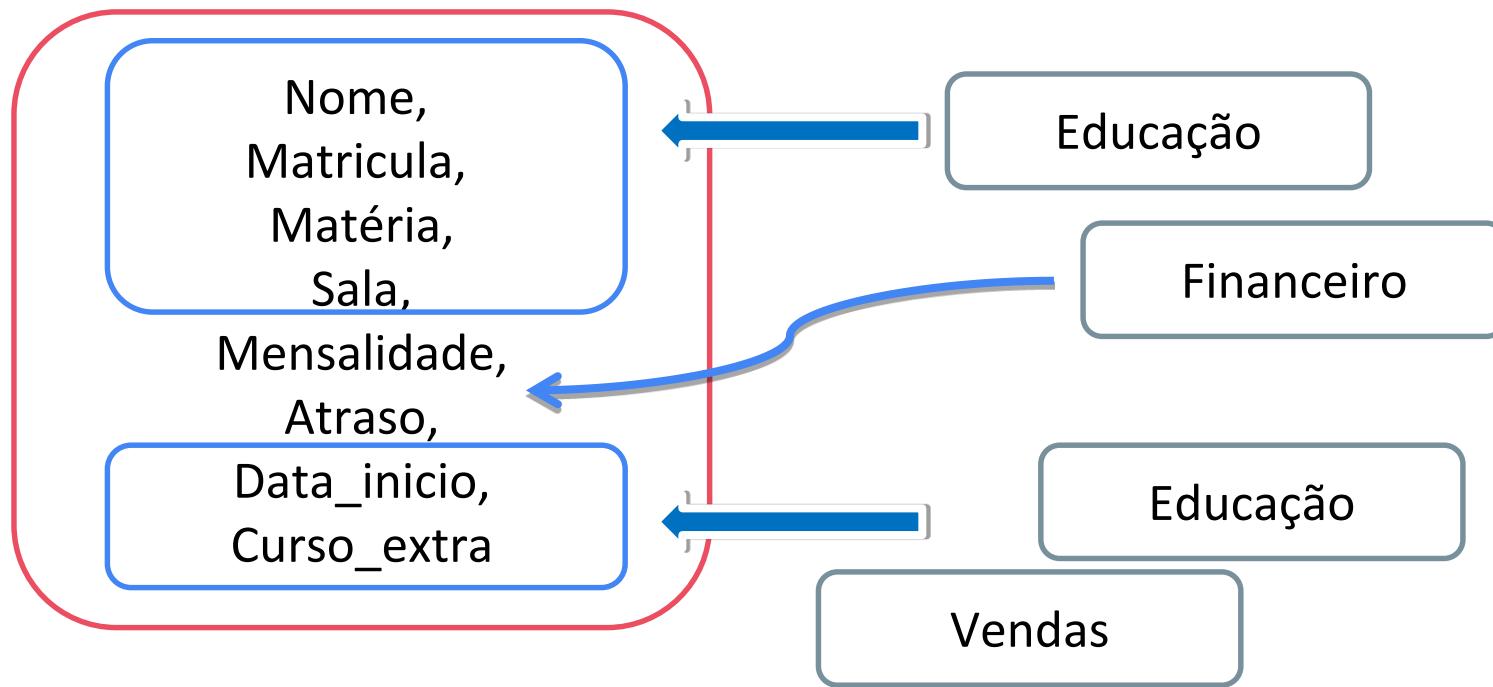


Table Views

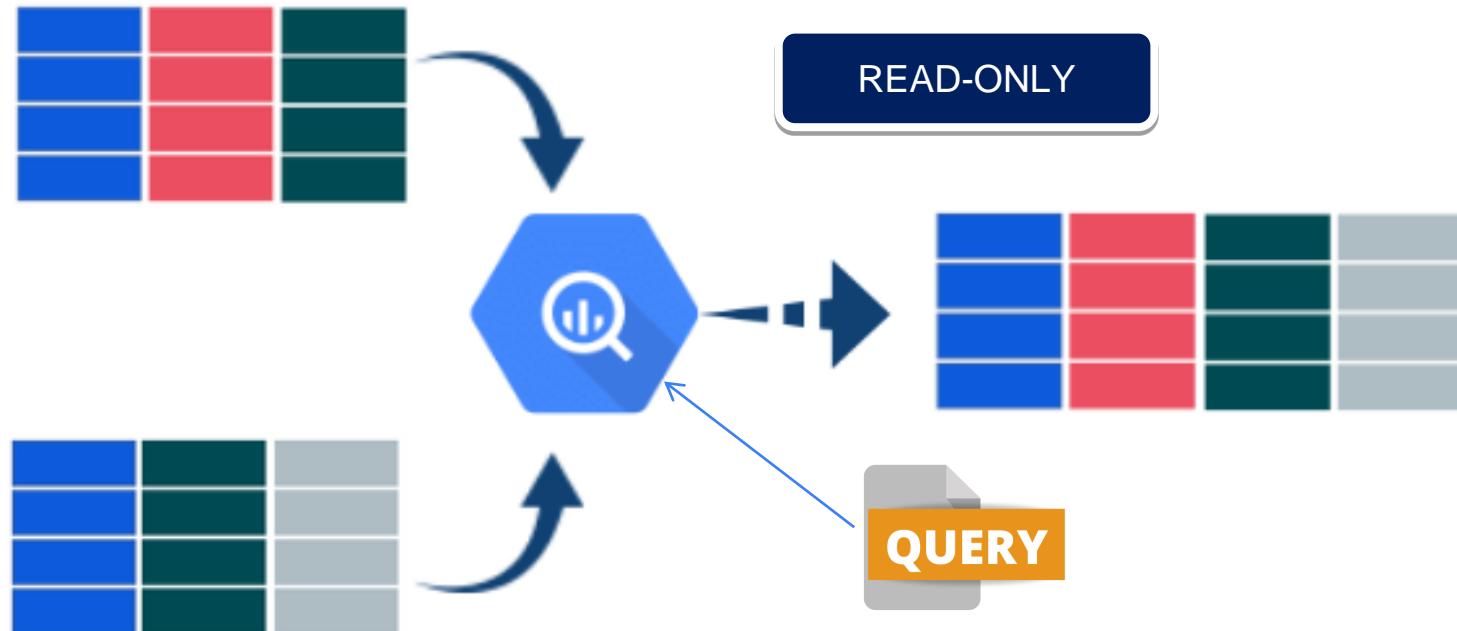


Table Views

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

**COURSE_PREREQUISITES**

Course_name	Course_number	Prerequisites
		CS3320
Database	CS3380	MATH2410
Data Structures	CS3320	CS1310

Table Views



TRANSCRIPT

Student_name	Student_transcript				
	Course_number	Grade	Semester	Year	Section_id
Smith	CS1310	C	Fall	08	119
	MATH2410	B	Fall	08	112
Brown	MATH2410	A	Fall	07	85
	CS1310	A	Fall	07	92
	CS3320	B	Spring	08	102
	CS3380	A	Fall	08	135

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

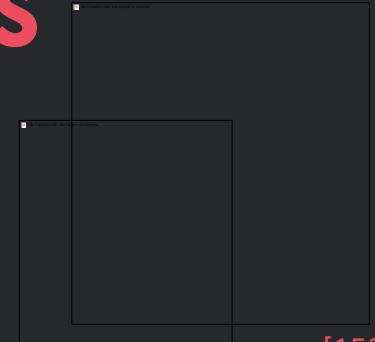
GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

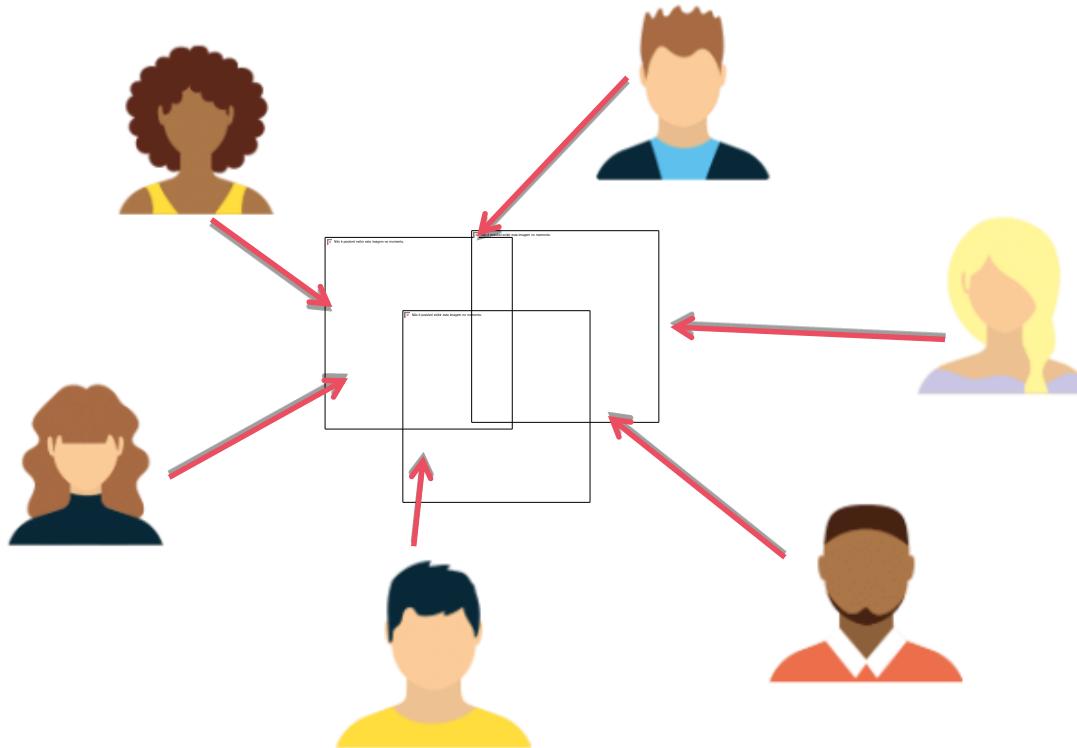
SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone

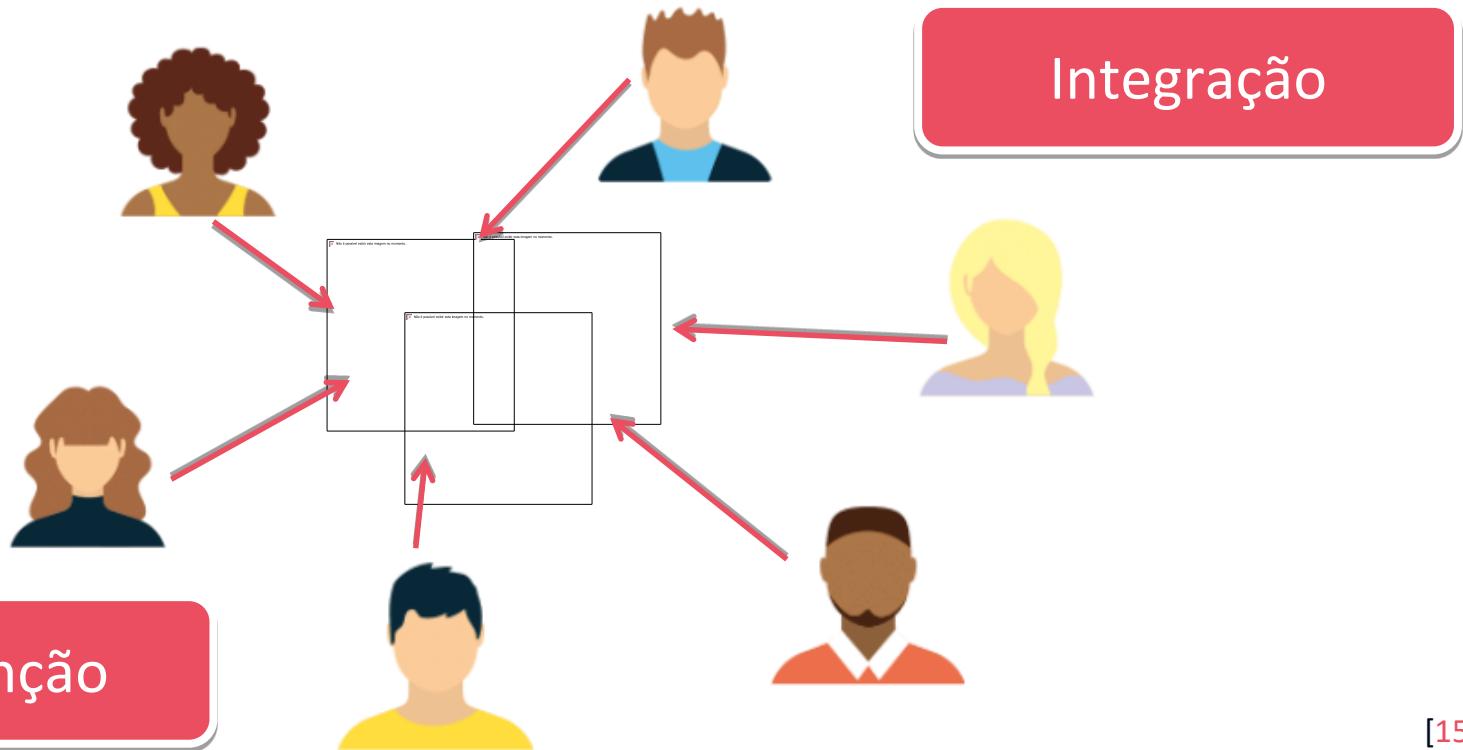
Compartilhamento de dados e processamento de transações multiusuários



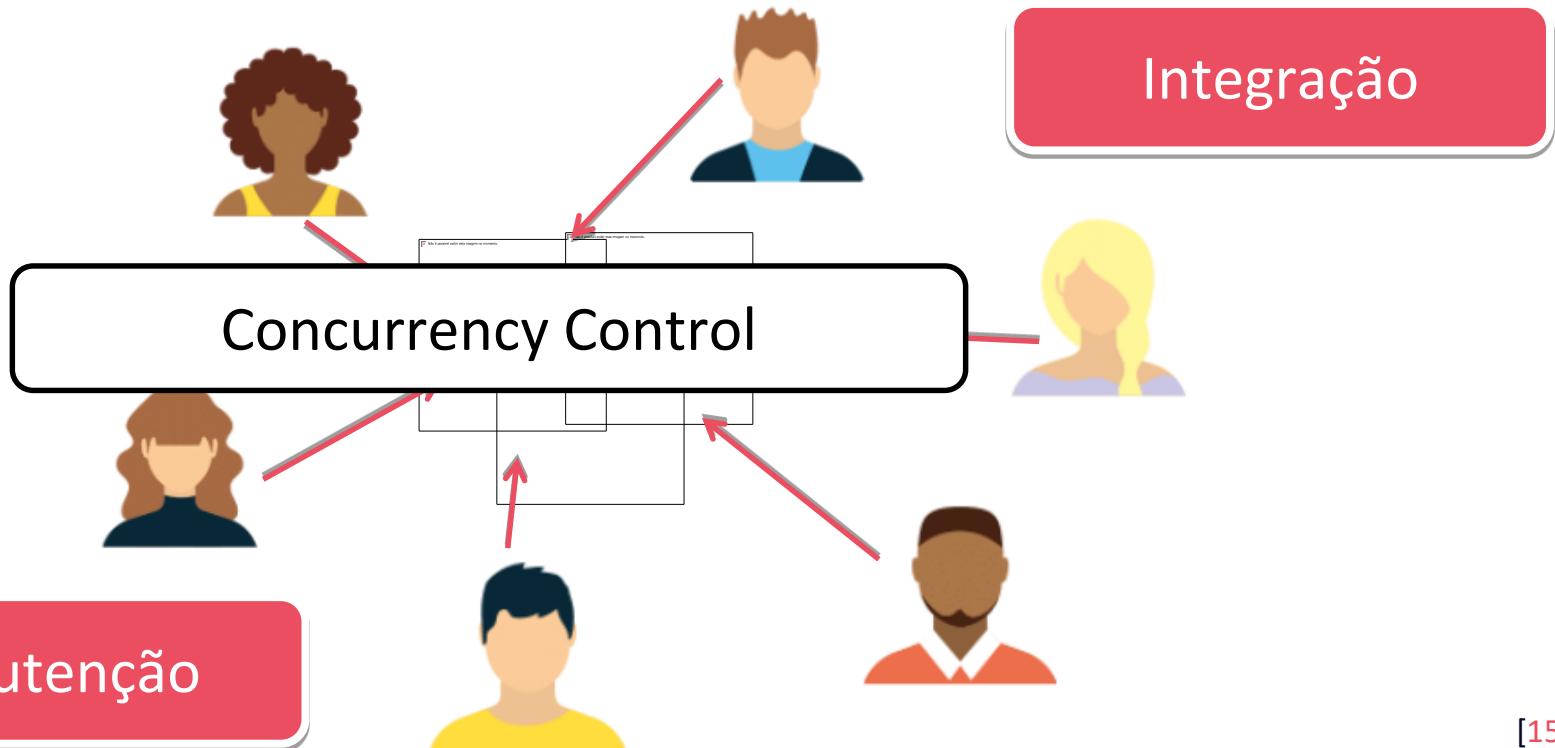
Design – Múltiplos acessos



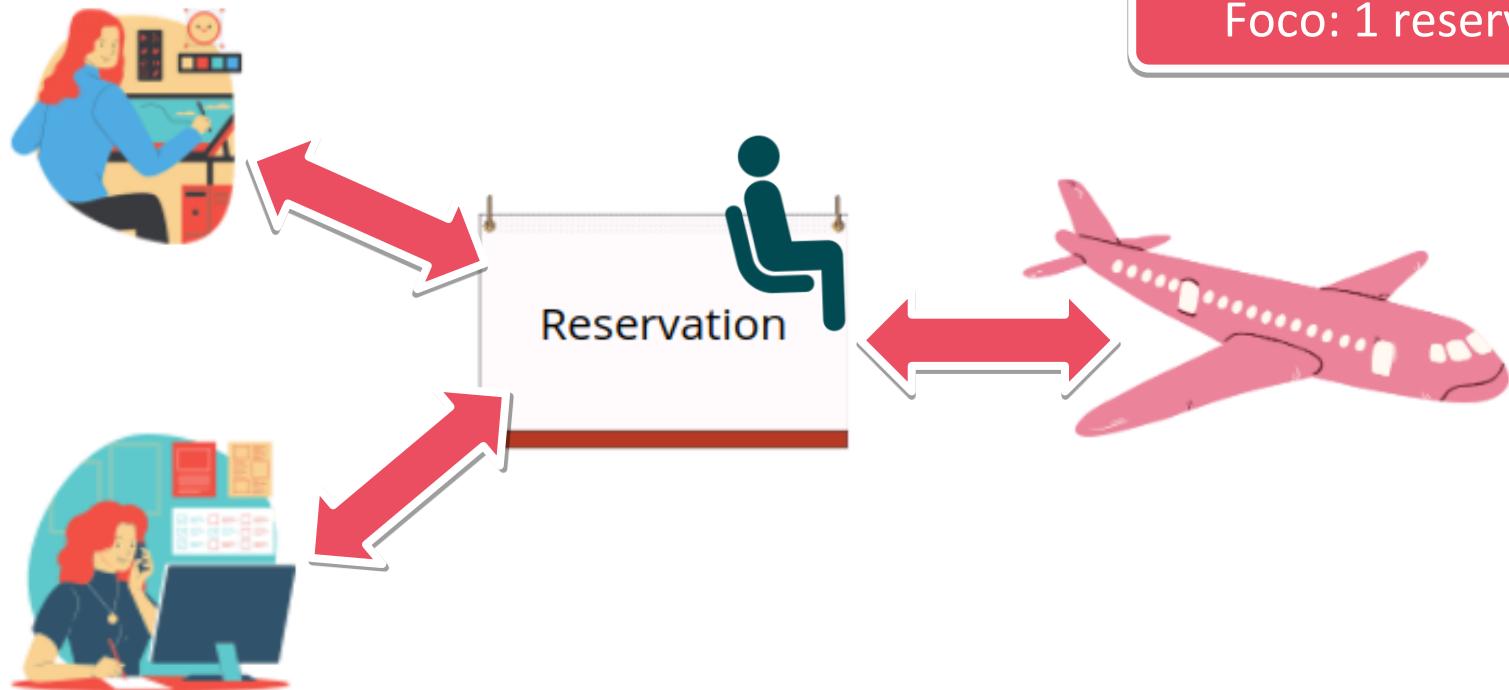
Design – Múltiplos acessos



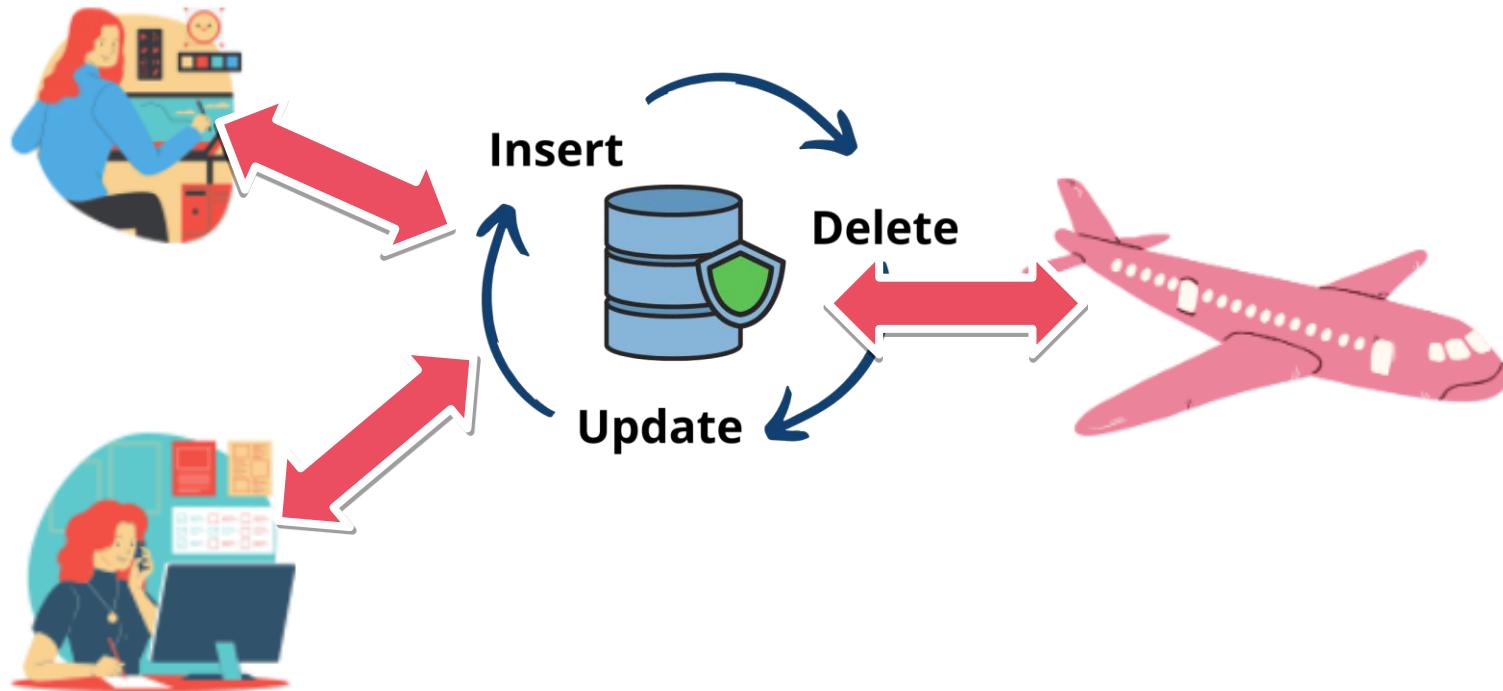
Concorrência



Múltiplos acessos



OLTP



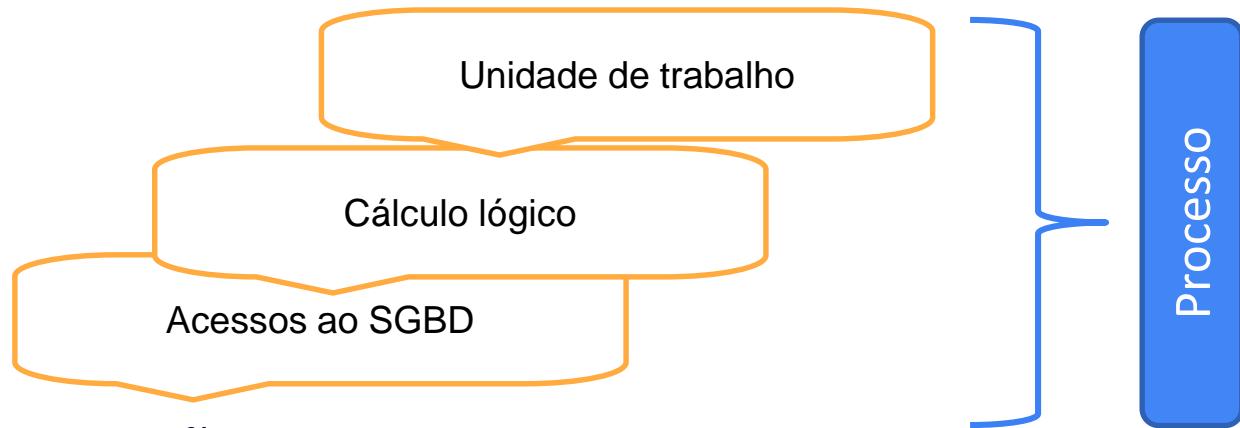
OLTP

- App multiuser
- Gerenciador: transações concorrentes

Online Transaction Processing

OLTP

- App multiuser
- Gerenciador: transações concorrentes



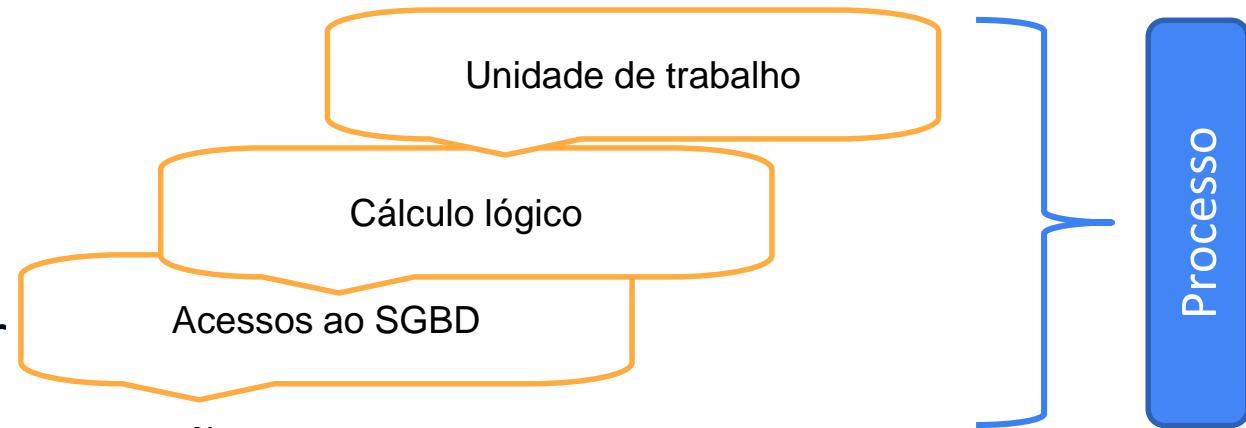
Execução sem interferência

Isolamento

Online Transaction Processing

OLTP

- App multiuser
- Gerenciador: transações concorrentes



Execução sem interferência

Atomicidade

8 ou 80!

Online Transaction Processing

OLTP



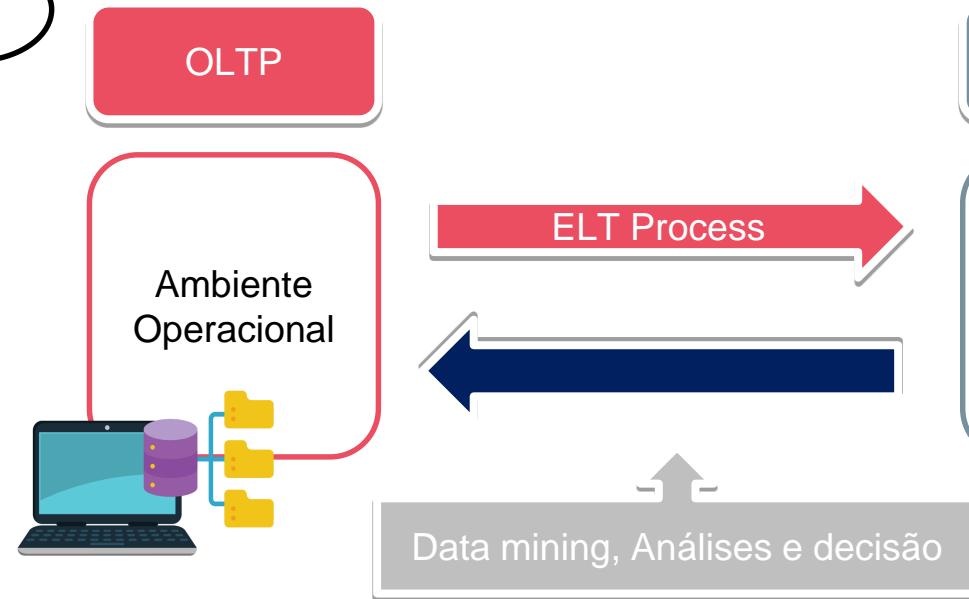
Operacional

Processamento de dados

Processamento de dados

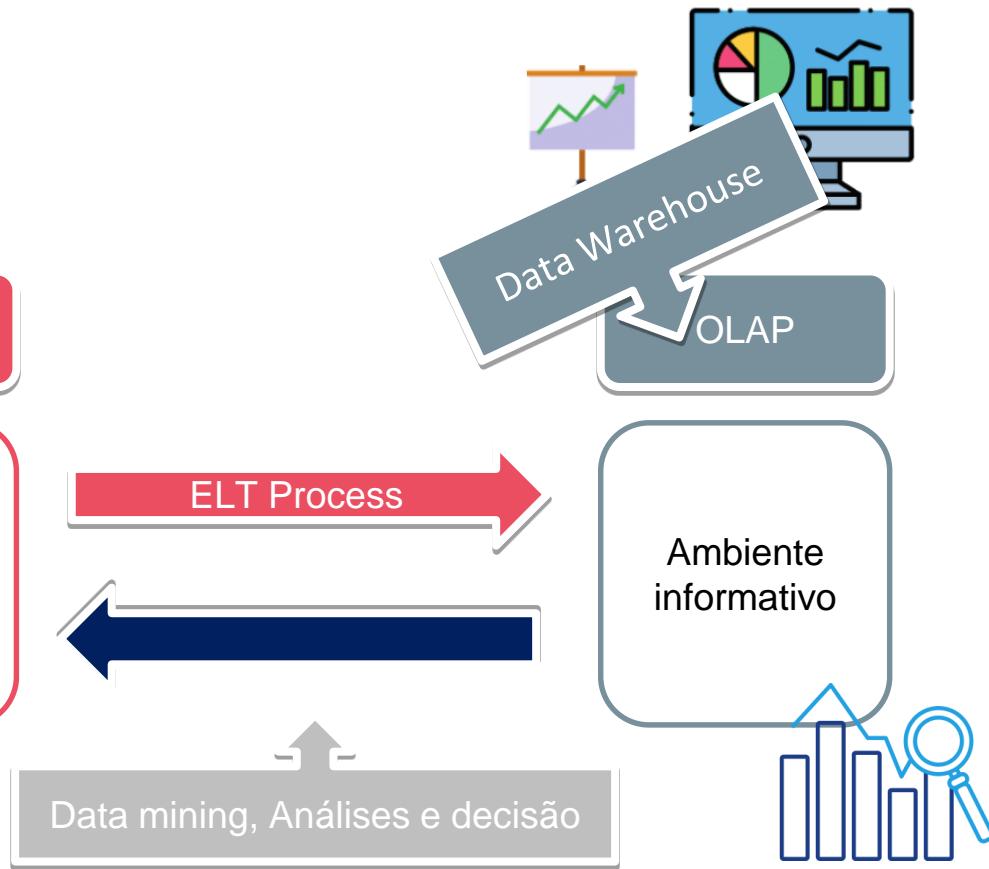
Transaction-driven

OLTP



Data mining, Análises e decisão

OLTP

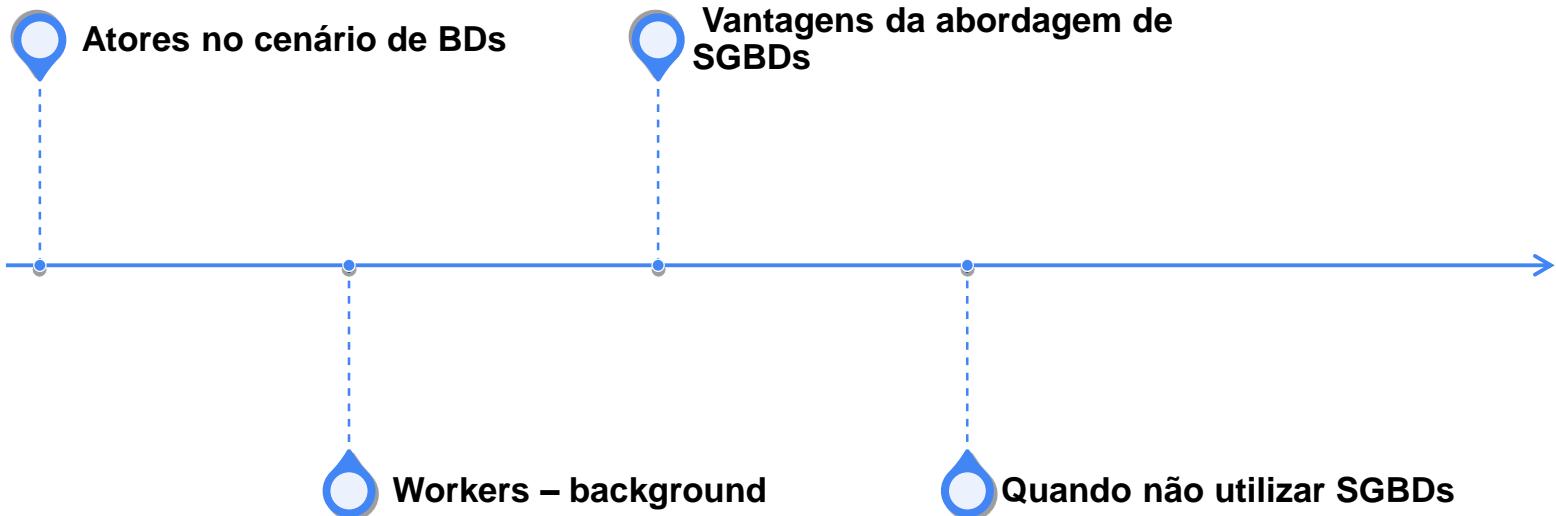


Etapa 6

Explorando abordagem de SGBDs – Atores, Workers nos bastidores, Vantagens e Quando não utilizar?

// Introdução à Banco de dados

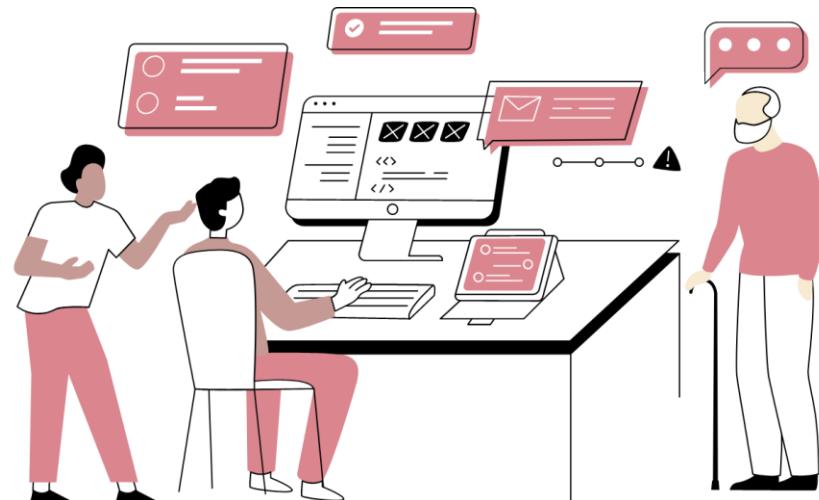
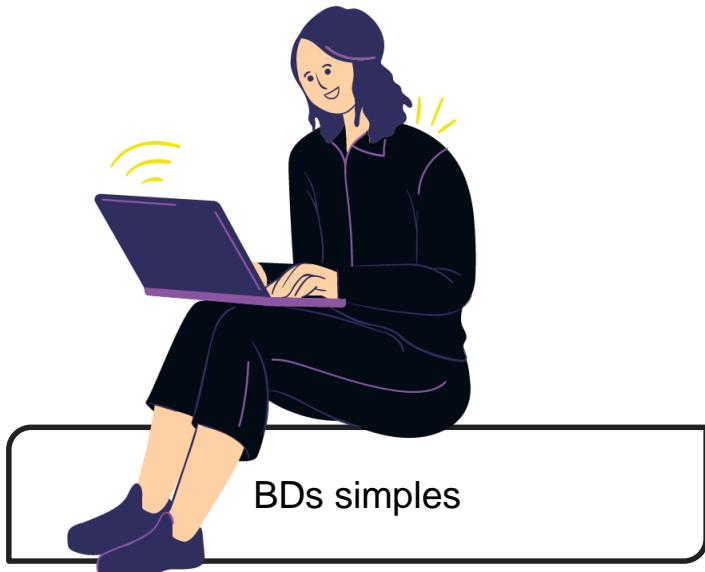
Conversa



Quais são os atores em Banco de Dados?

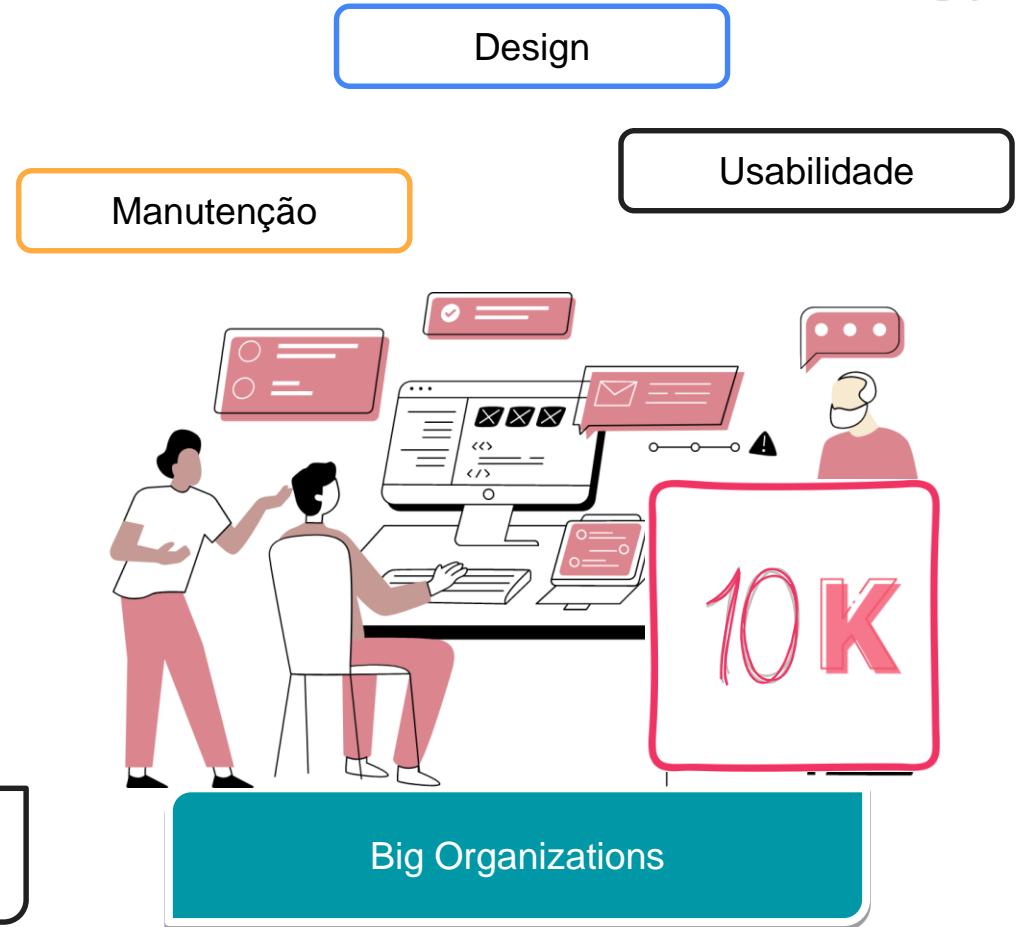
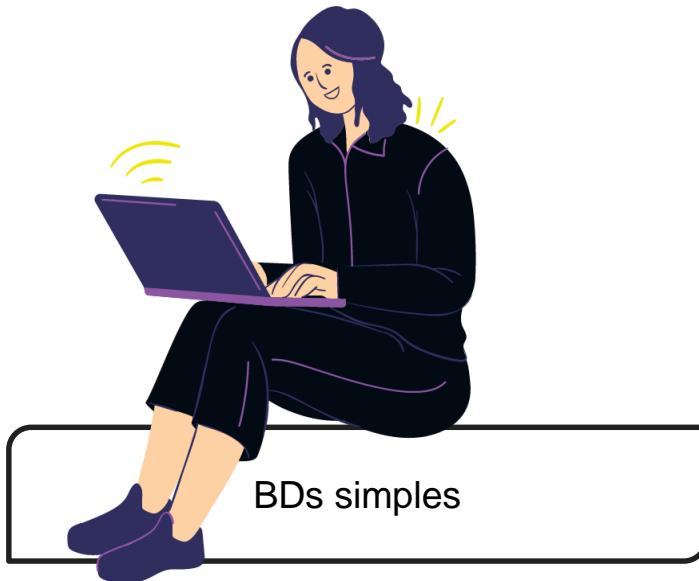


Atores



Big Organizations

Atores



Atores



Administrador

Designers

- Dia-a-dia
- Diretamente ligados ao contexto

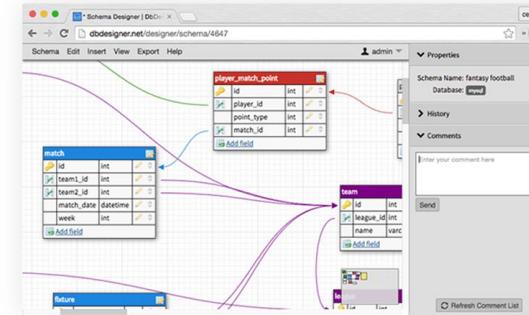
Usuários finais



Atores - Designer



Designer

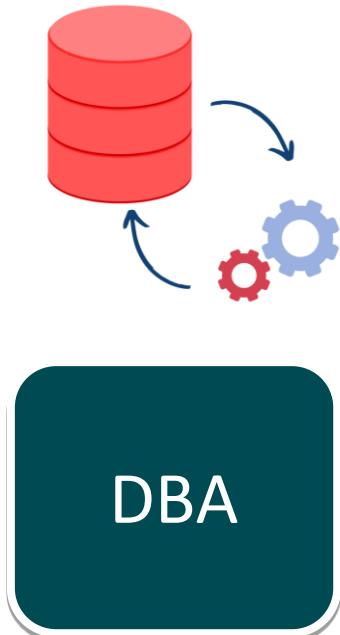


- Identificar dados e requisitos
- Represenação e Estrutura
- Fase preliminar

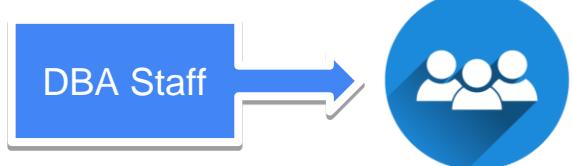
Modelagem



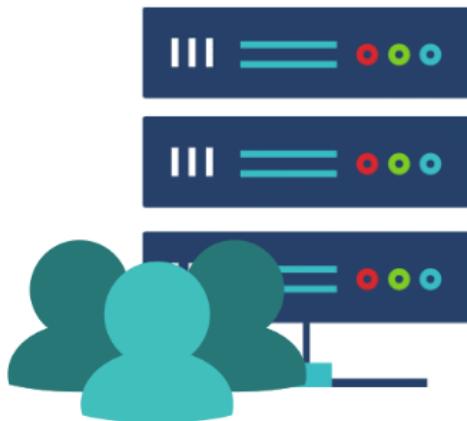
Atores - Administrador



- Gerencia Recursos
- Orquestração
- Autorização de acesso



Atores - Usuários Finais



- Acesso -> Querying
- Categorizados



Propósito do SGBD

Atores - Usuários Finais

- Casuais
- Ingênuos
- Sofisticados
- Standalone

Acessos ocasionais

Diferentes informações

Uso de APIs



Propósito do SGBD

Atores - Usuários Finais

- Casuais
- Ingênuos
- Sofisticados
- Standalone

Considerável porção

Canned Transactions

Erro: raro



Propósito do SGBD

Atores - Usuários Finais

- Casuais
- **Ingênuos**
- Sofisticados
- Standalone



Propósito do SGBD

Atores - Usuários Finais

- Casuais
- Ingênuos
- **Sofisticados**
- Standalone

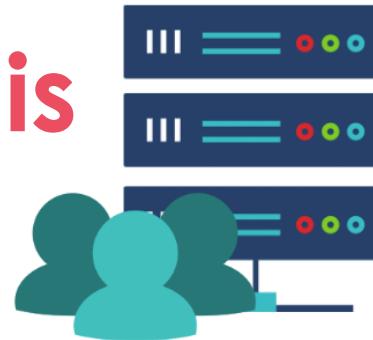
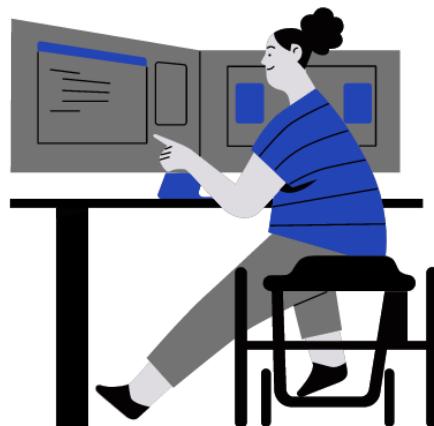


Propósito do SGBD

Atores - Usuários Finais

- Casuais
- Ingênuos
- Sofisticados
- **Standalone**

BD pessoal



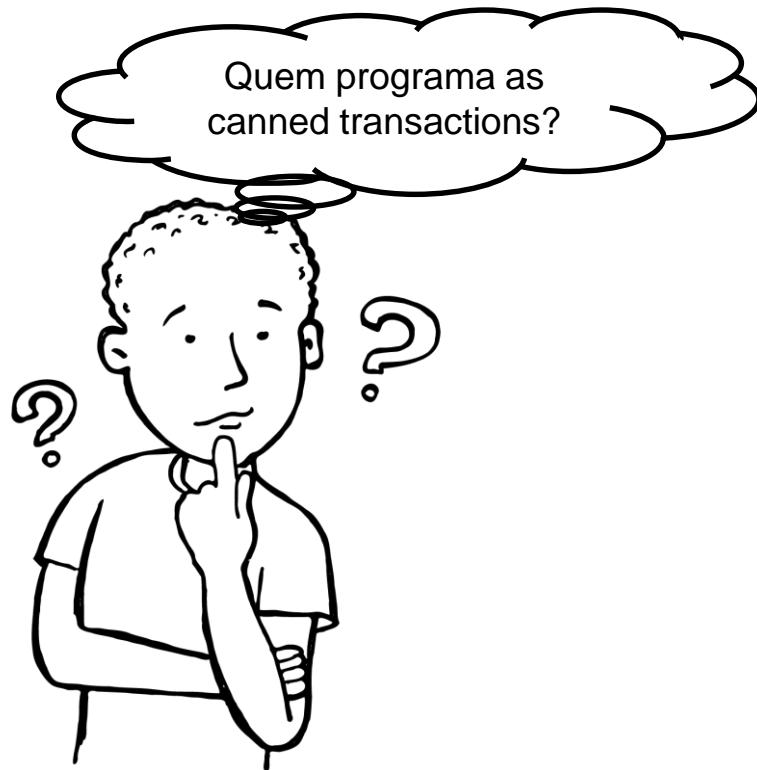
Propósito do SGBD

Atores - Usuários Finais

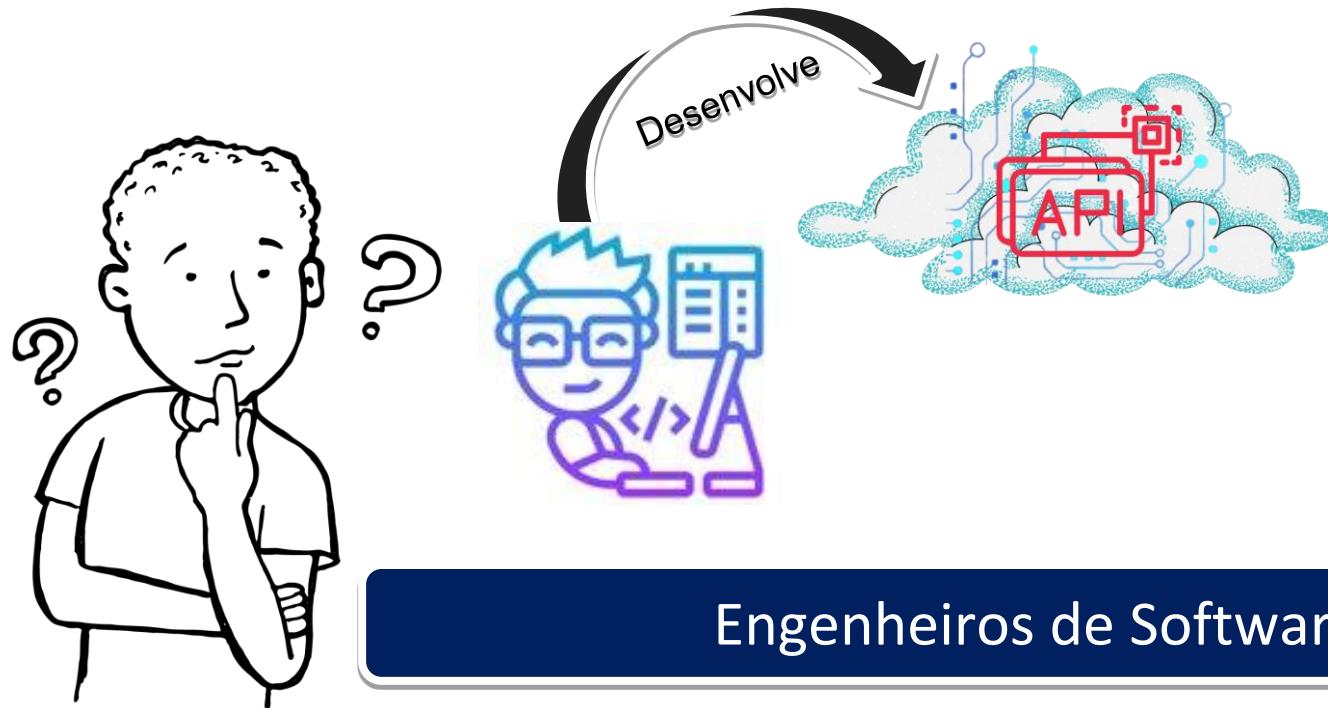


Diversas facilidades são implementadas para os users do SGBD

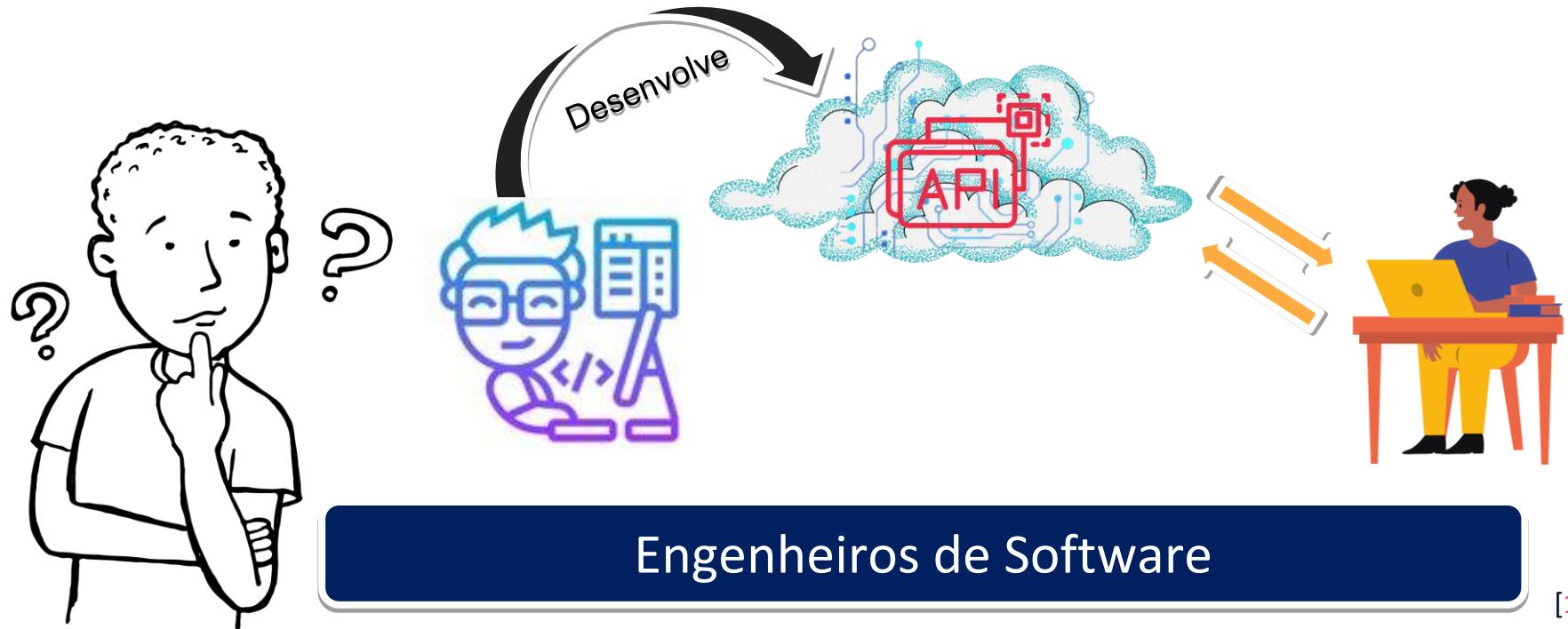
Atores



Atores



Atores



Atores



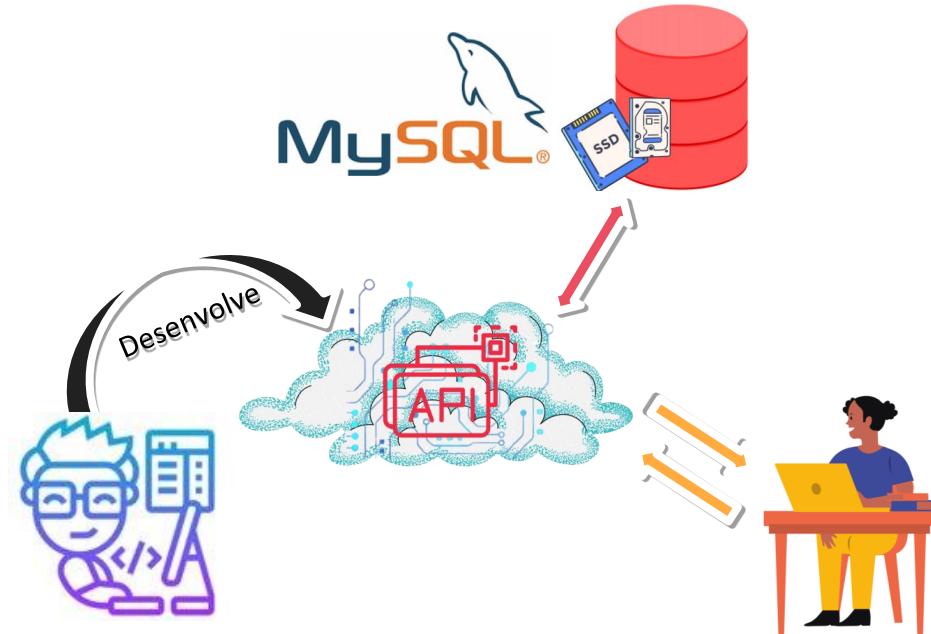
Engenheiros de Software

Atores

Análise de Sistema

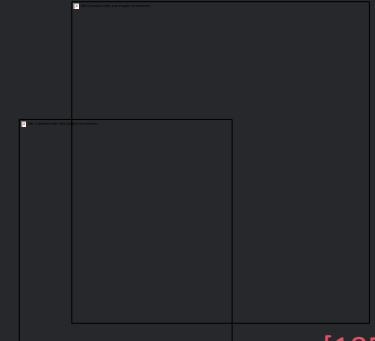
Desenvolvimento da aplicação

Teste e documentação da aplicação



Engenheiros de Software

Workers em background – Banco de dados



Background

Fora do contexto de BD

Designer do sistema de SGBD

Pessoal de operação e manutenção

Implementação do sistema de SGBD

Desenvolvedores de ferramentas

Background

Mantém o SGBD disponível para users

Designer do sistema de SGBD

Pessoal de operação e manutenção

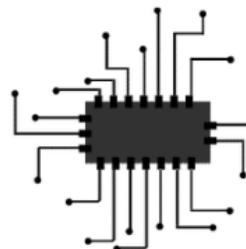
Implementação do sistema de SGBD

Desenvolvedores de ferramentas

Background



Background



Responsável pelo ambiente de hardware e software para SGBD



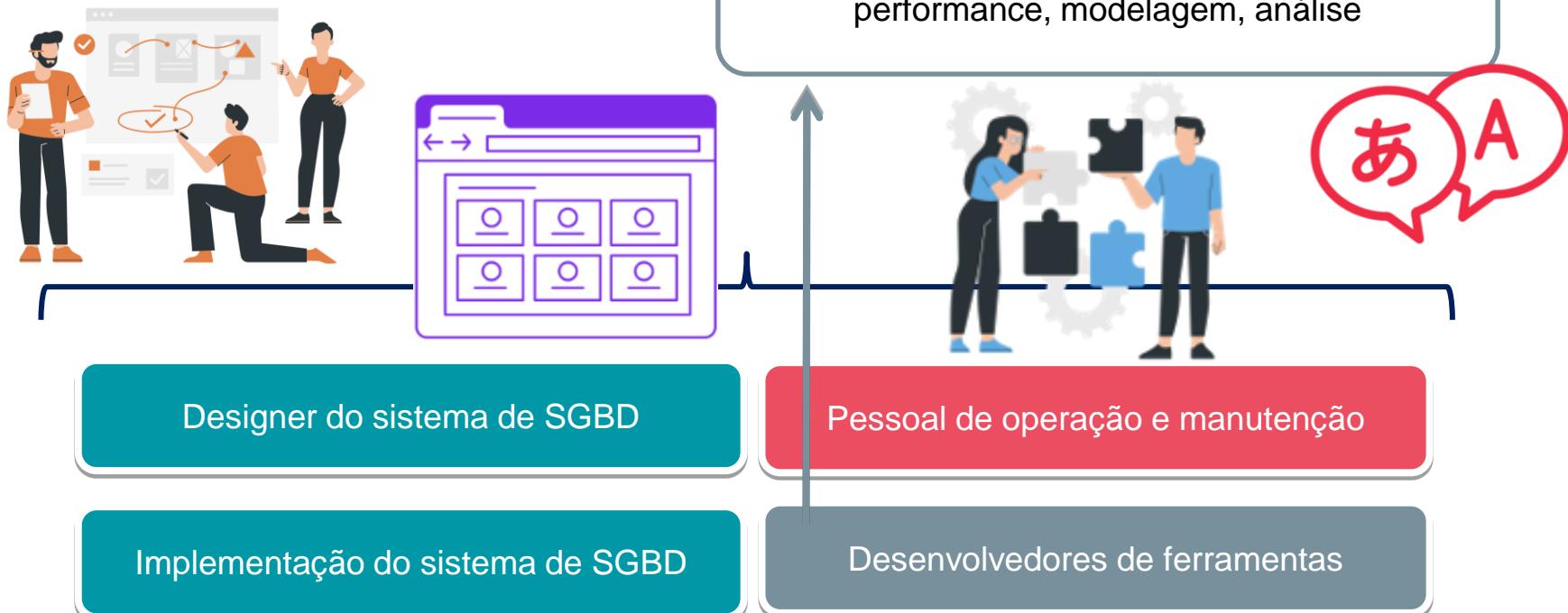
Designer do sistema de SGBD

Pessoal de operação e manutenção

Implementação do sistema de SGBD

Desenvolvedores de ferramentas

Background



Vantagens de utilizar a abordagem com SGBD



Vantagens do SGBD

Abstração

Auto-descrição

Isolamento

Compartilhamento

Múltiplas visões

Transação
multiuser

Além das 4 características...

Vantagens do SGBD



Controle de Redundância

Restrição de acesso

Storage – prove persistência

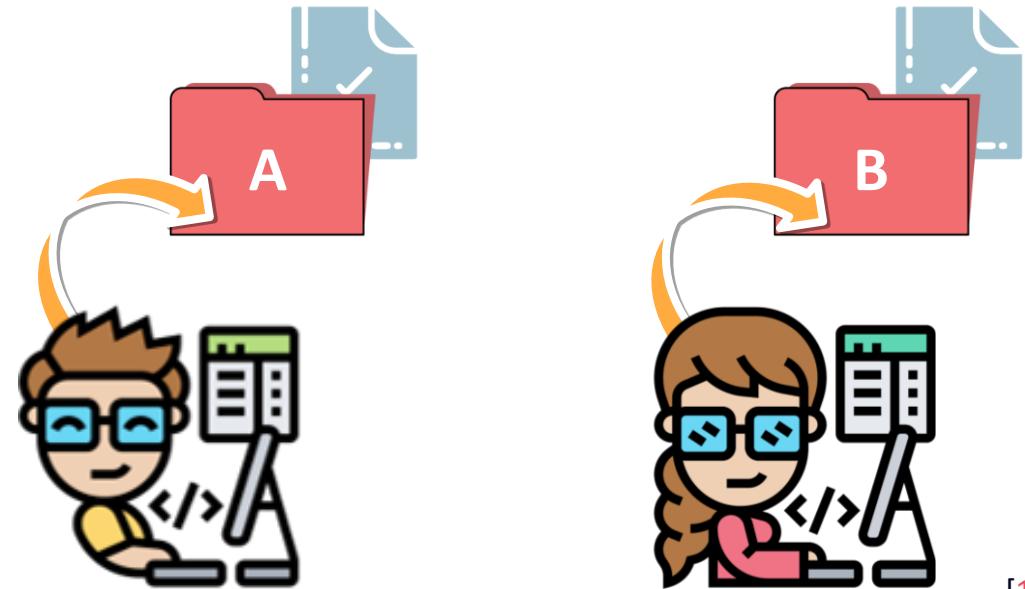
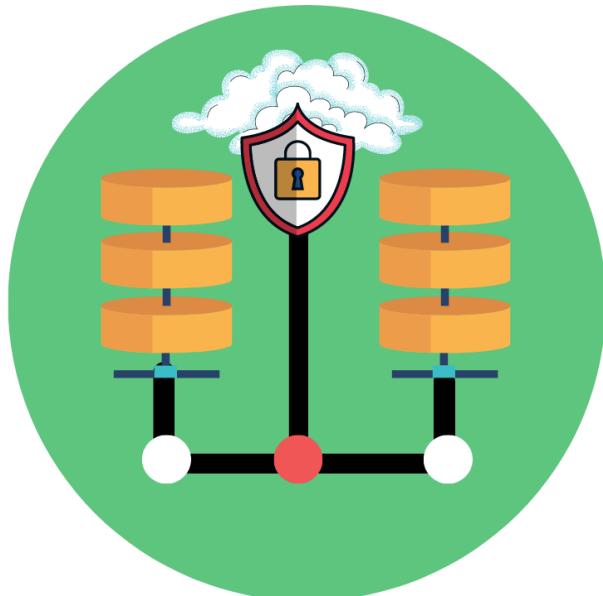
Storage – prove estrutura

Backup e Recovery

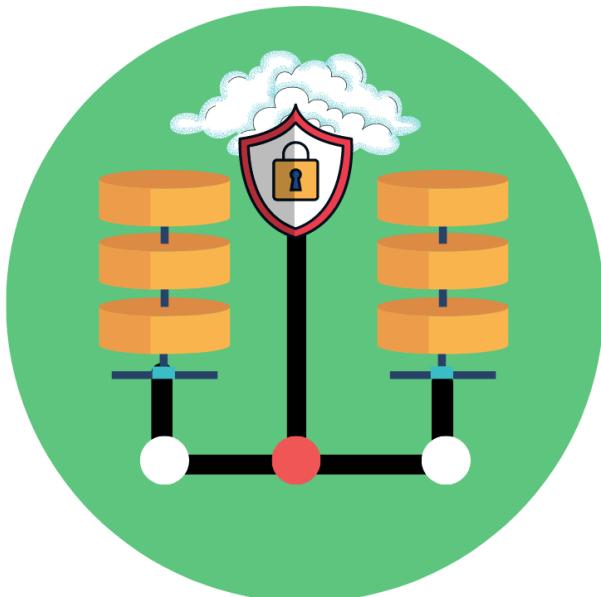


Vantagens do SGBD

Controle de Redundância



Vantagens do SGBD



Controle de Redundância

C: (storage)
Estudantes
Cursos
Relação alunoxcurso
...



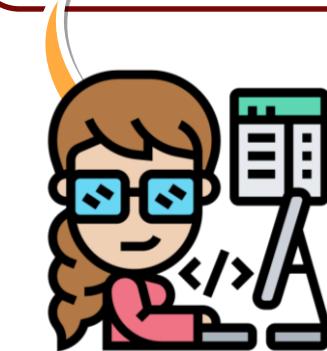
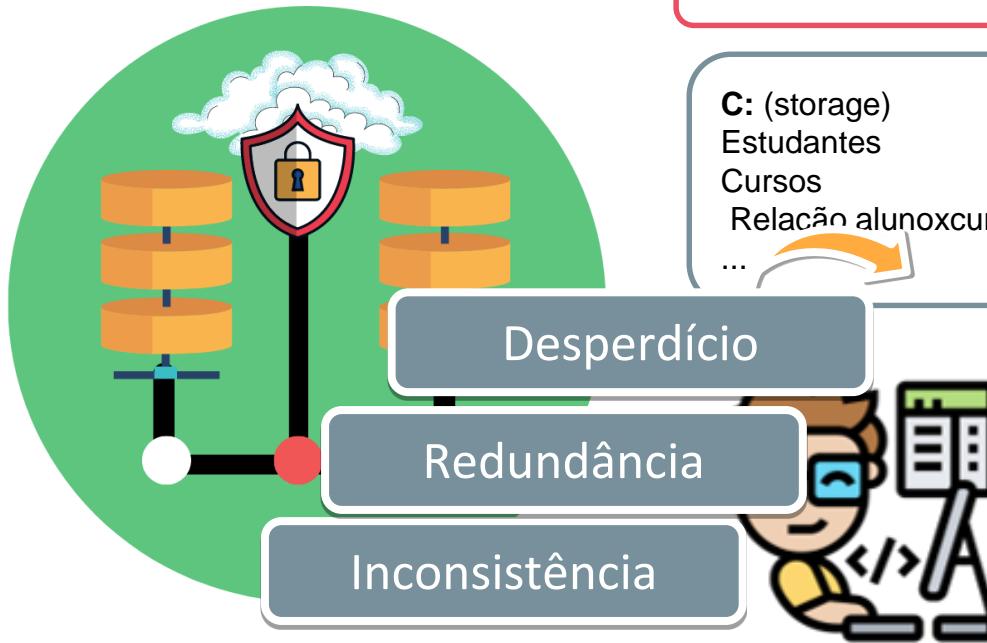
D: (storage)
Estudantes
Cursos
Relação alunoxcurso
...



Vantagens do SGBD

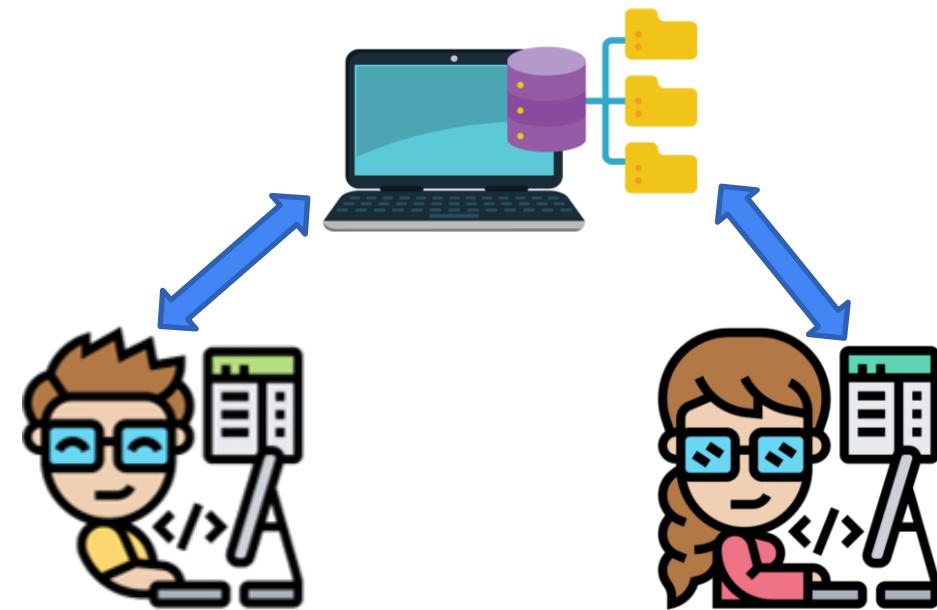
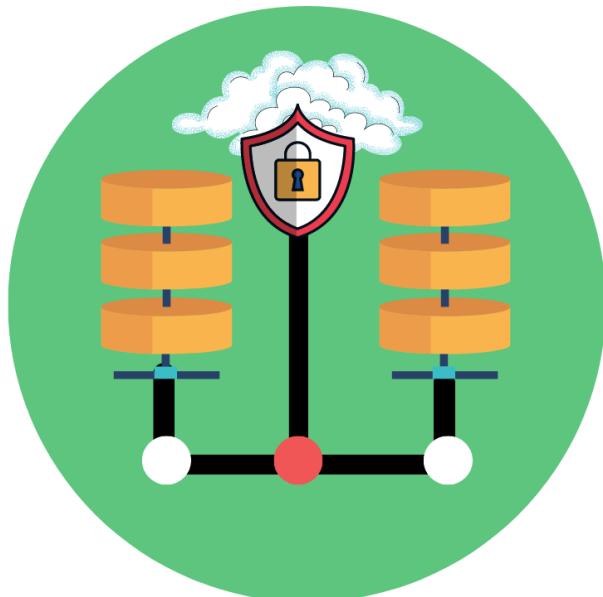
Updates desnecessários

Controle de Redundância

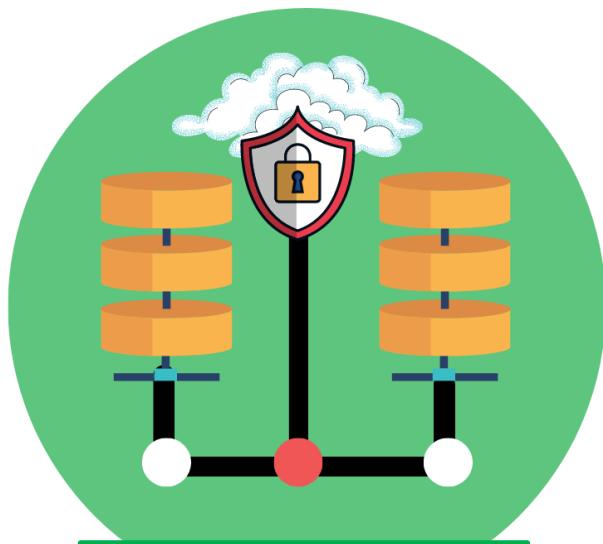


Vantagens do SGBD

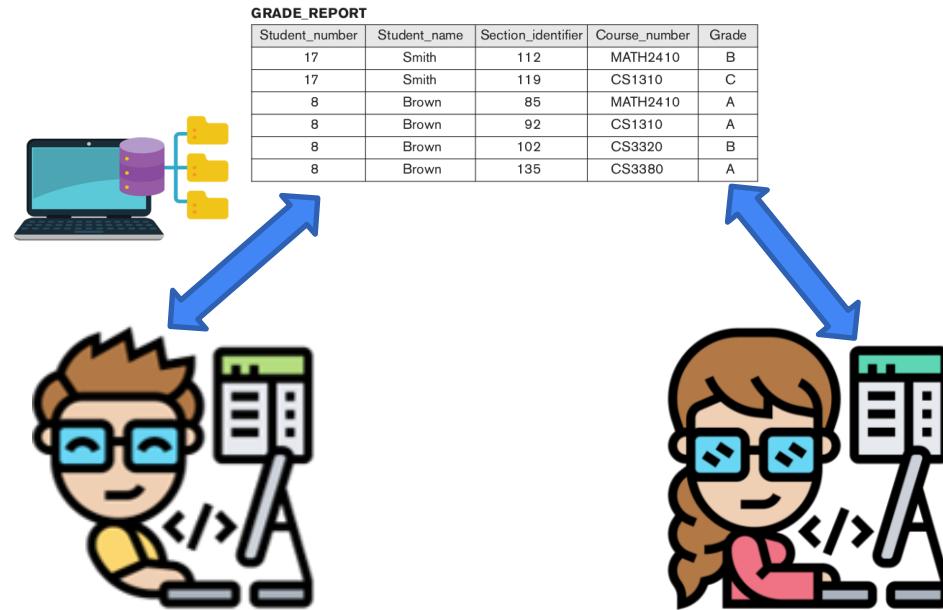
Controle de Redundância



Vantagens do SGBD



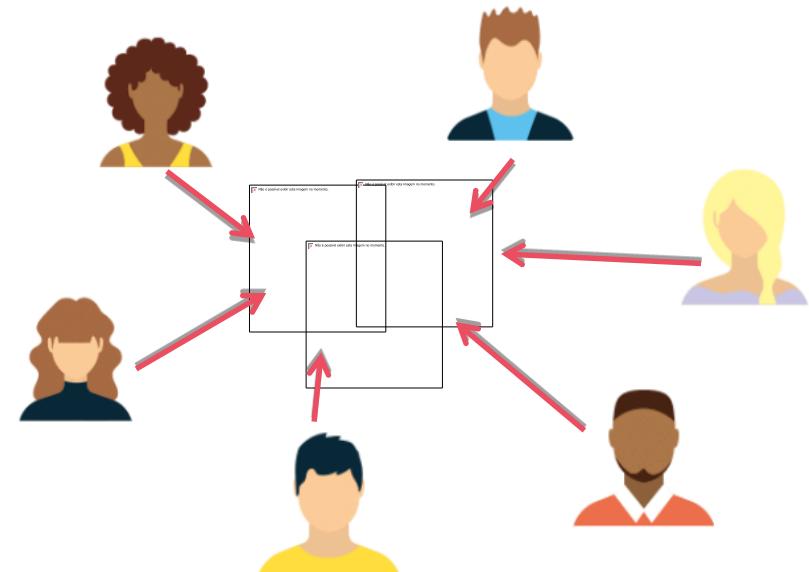
Controle de Redundância



Vantagens do SGBD



Restrição de acesso

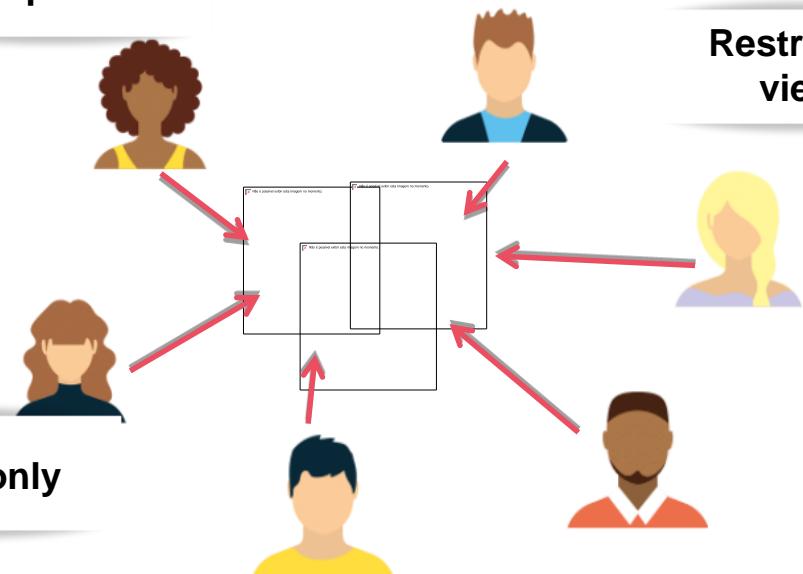


Vantagens do SGBD



Restrição de acesso

Update



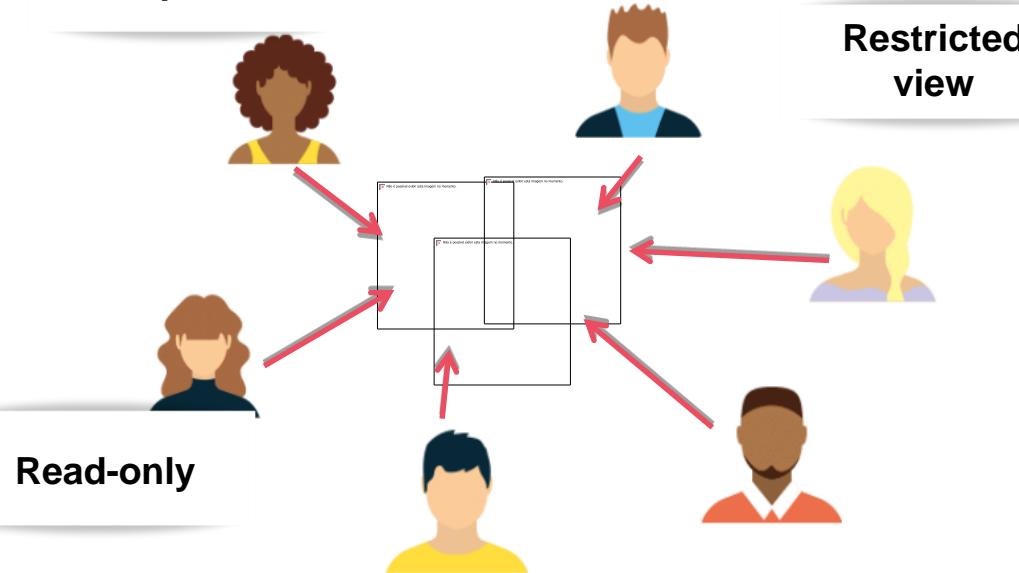
Vantagens do SGBD



DBA

Restrição de acesso

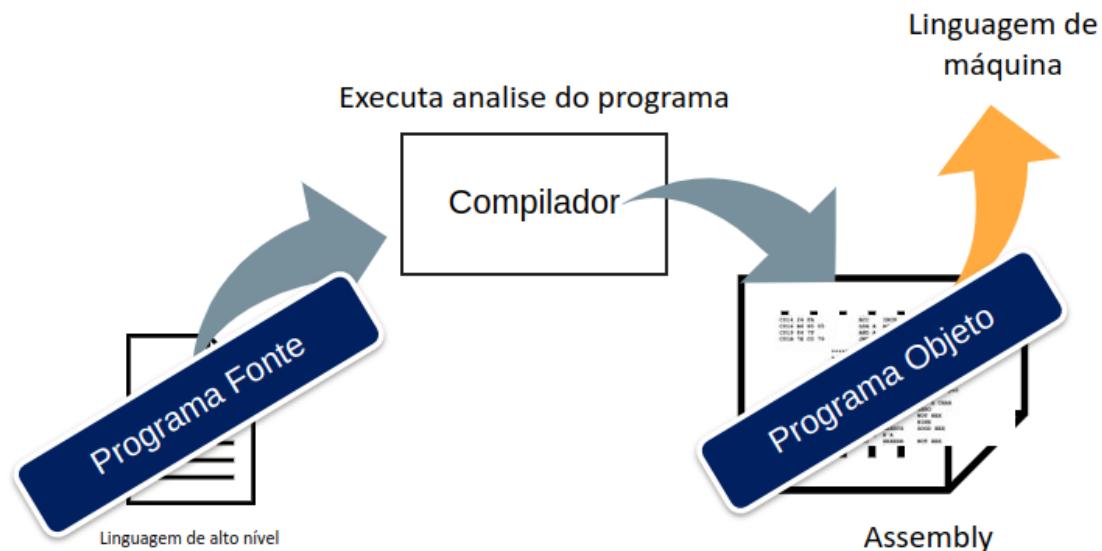
Update



Subsistema secundário

Vantagens do SGBD

Provendo Persistência

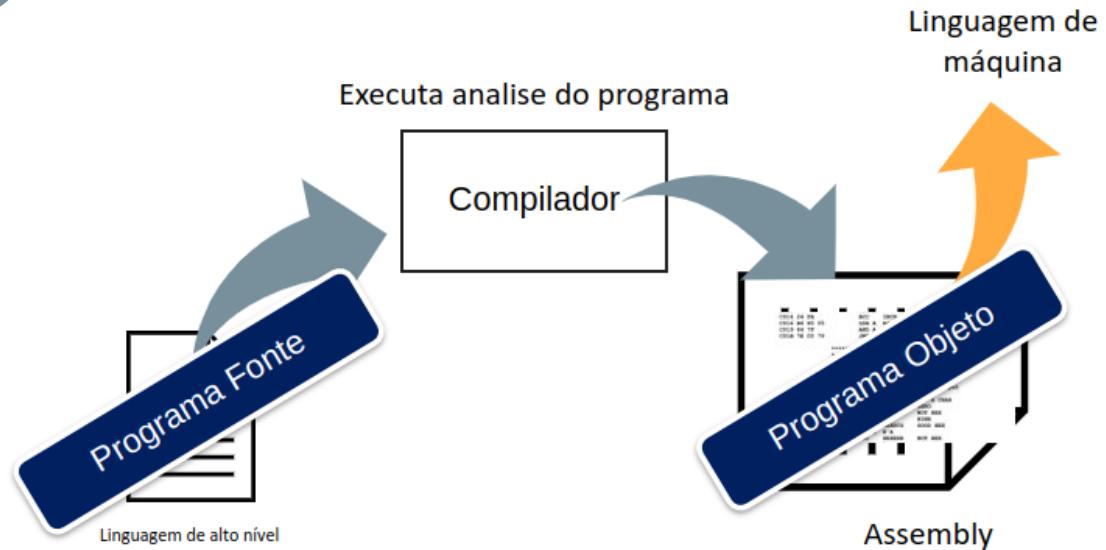


Vantagens do SGBD

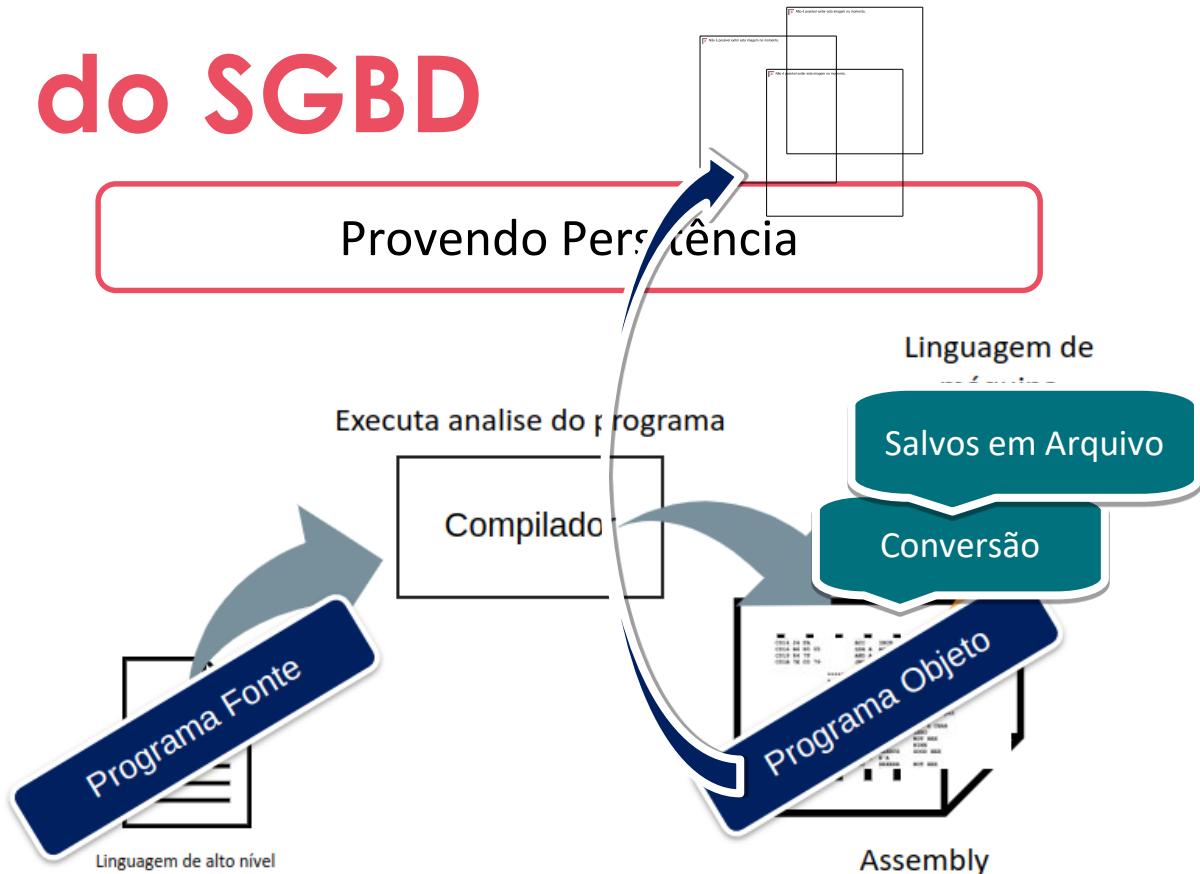
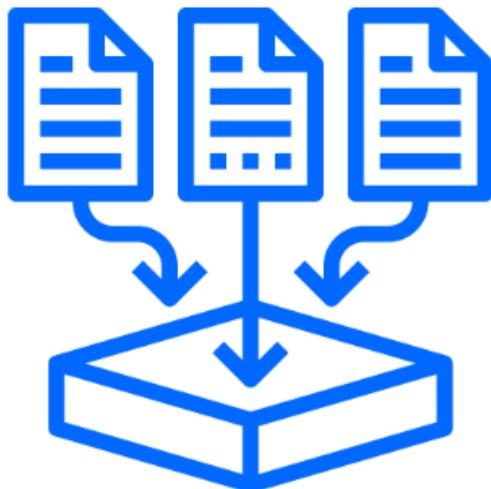
O que acontece com
os dados de um
programa objeto?



Provendo Persistência

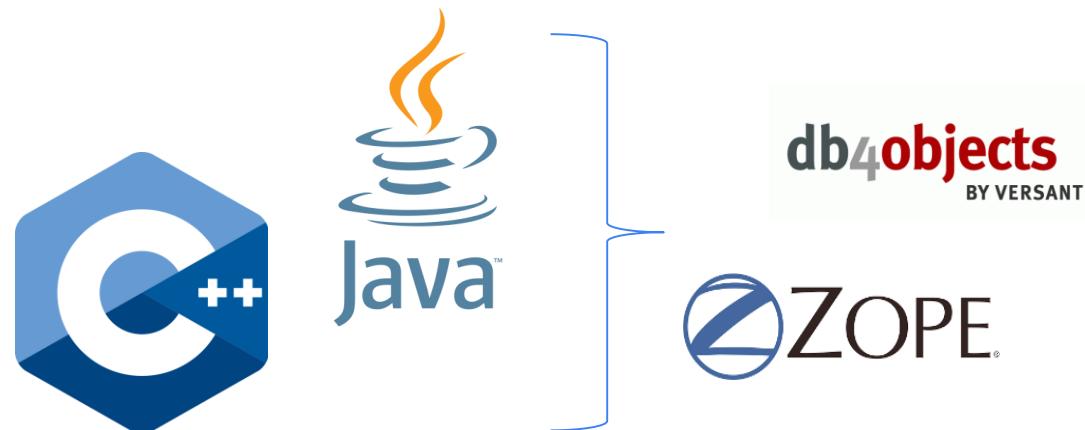
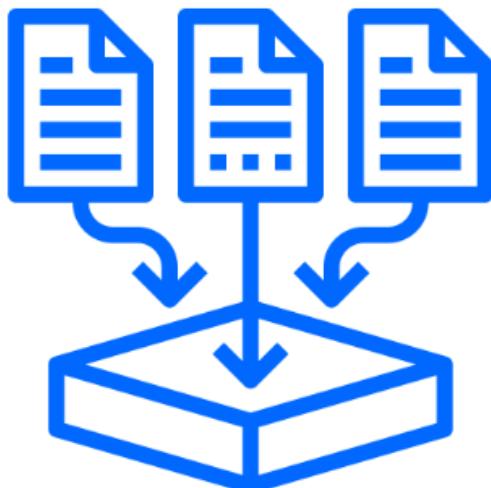


Vantagens do SGBD



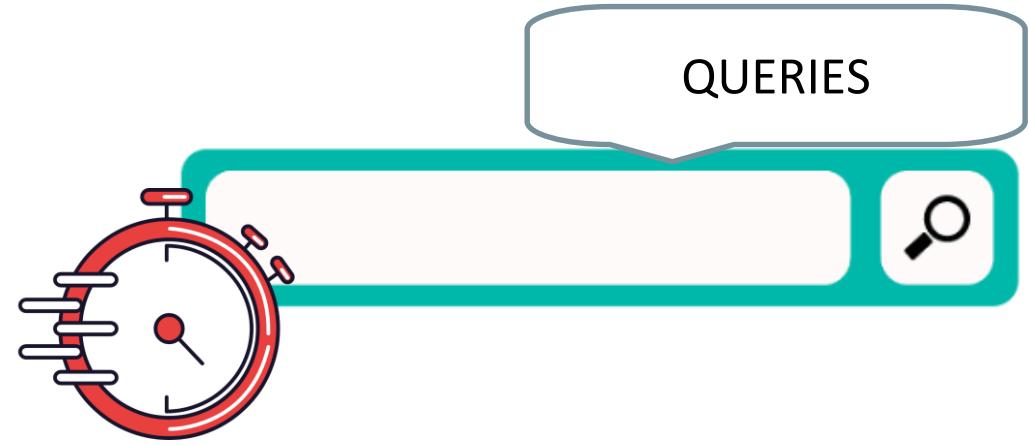
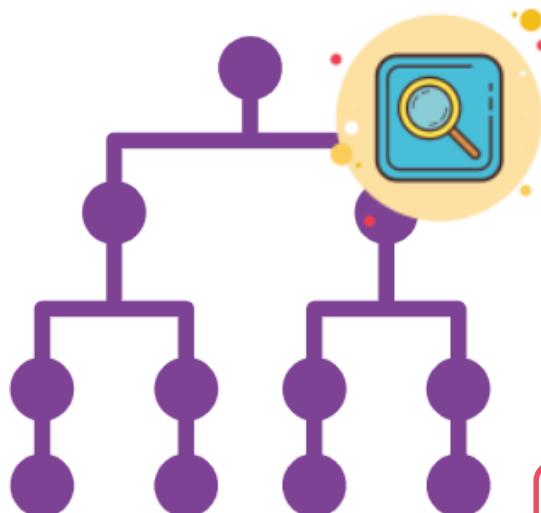
Vantagens do SGBD

Provendo Persistência



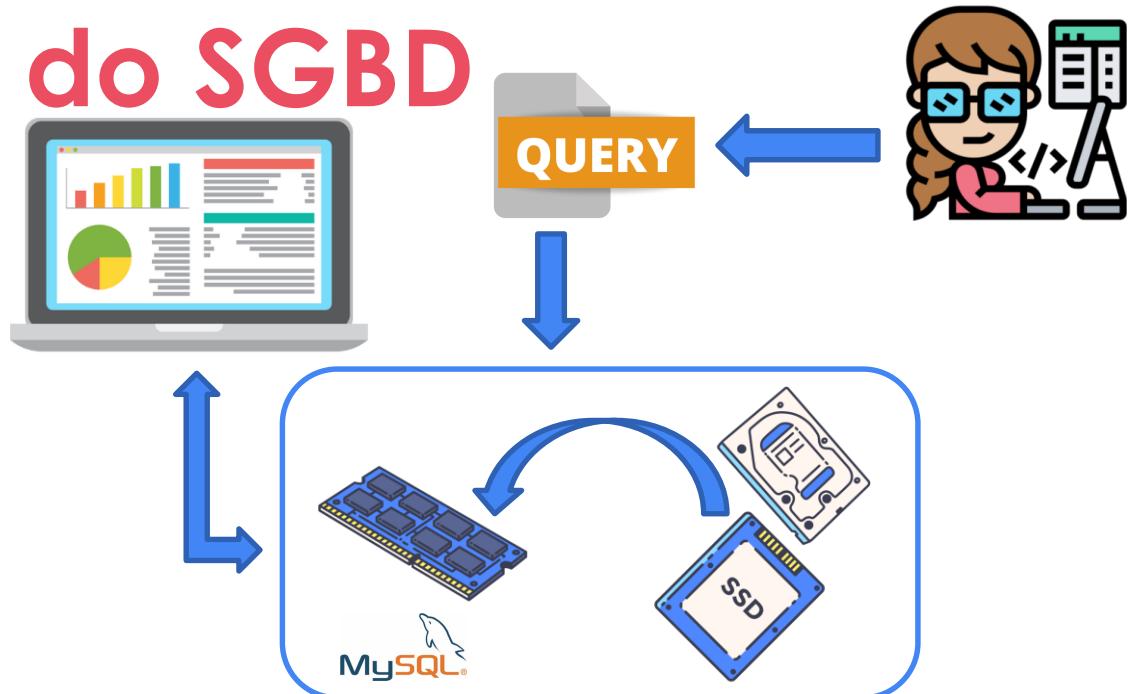
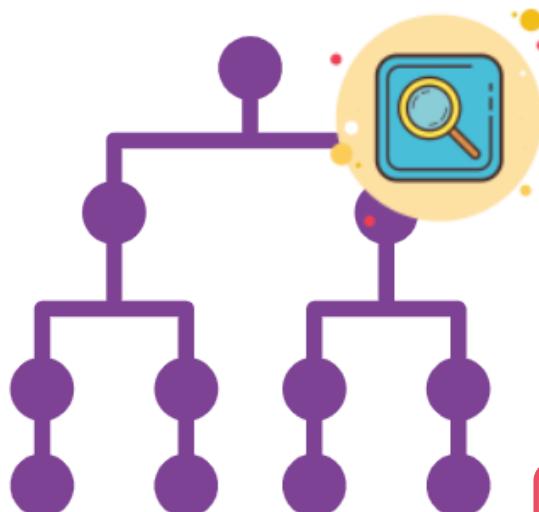
Impedance Mismatch Problem

Vantagens do SGBD



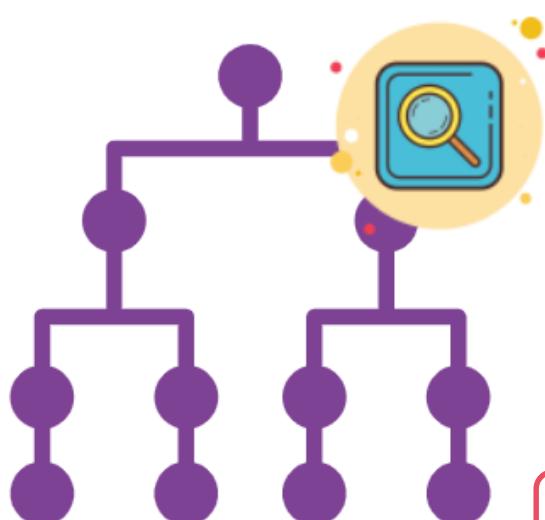
Estrutura de armazenamento e Técnicas de busca

Vantagens do SGBD



Estrutura de armazenamento e Técnicas de busca

Vantagens do SGBD



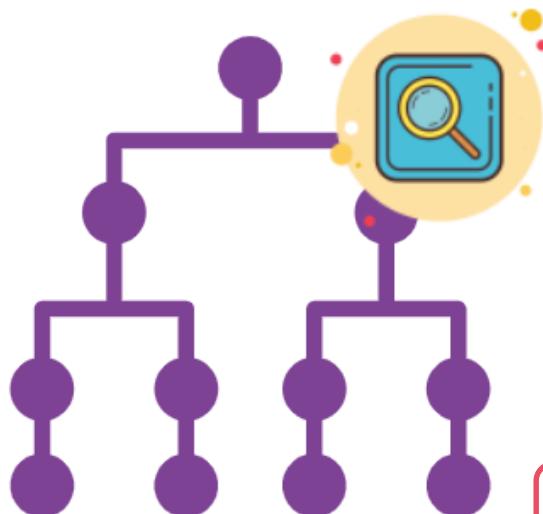
```
SELECT course_nome FROM COURSES WHERE  
Credit_hours = MAX(Credit_hours)
```

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

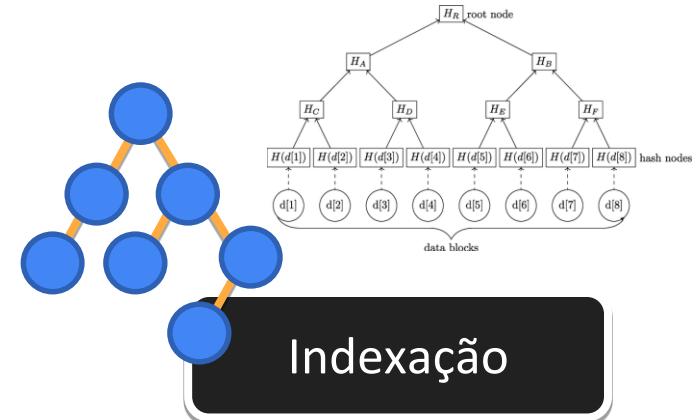
Estrutura de armazenamento e Técnicas de busca

Vantagens do SGBD



Caching

Buffering



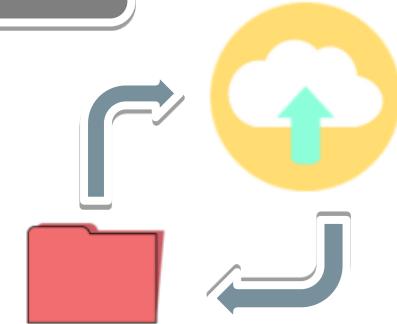
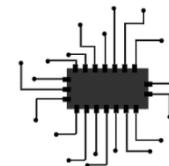
Estrutura de armazenamento e Técnicas de busca

Vantagens do SGBD

Backup e Recovery

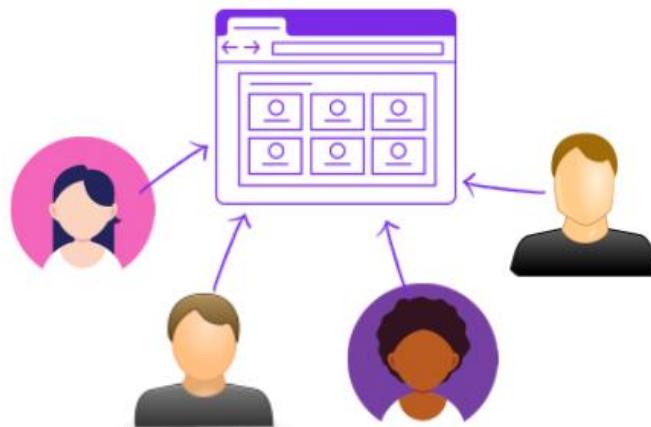


Recursos de Recovery



Vantagens do SGBD

Provendo interface Multi-user



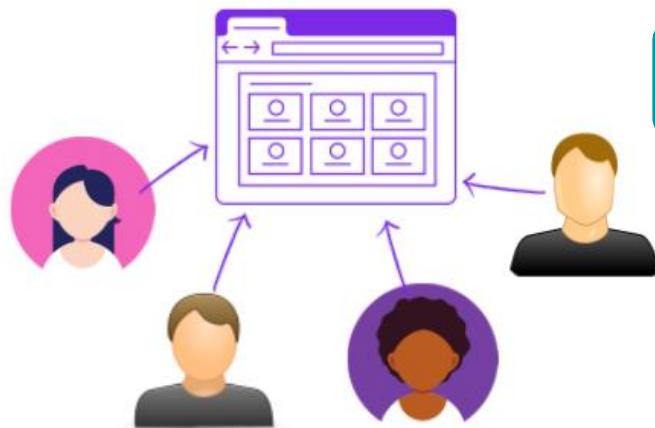
Perfis de usuário

Interfaces

Vantagens do SGBD

Mobile apps

Provendo interface Multi-user



Natural Language Interface

Query language

Forms & command codes



Menu-driven

Programming lang. interface

Vantagens do SGBD



Repres. Relações complexas

- Variedade de dados inter-relacionados

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

Vantagens do SGBD

Integridade de dados



Data type



Definição e Imposição

Vantagens do SGBD

Integridade de dados

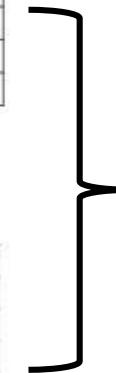


COURSE

	Course_name	Course_number	Credit_hours	Department
In	to Computer Science	CS1310	4	CS
D	ata Structures	CS3320	4	CS
D	crete Mathematics	MATH2410	3	MATH
D	atabase	CS3380	3	CS

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone



Integridade
de
Referência

Vantagens do SGBD

Integridade de dados



Regras de Domínio

Asserções

Integridade Referencial

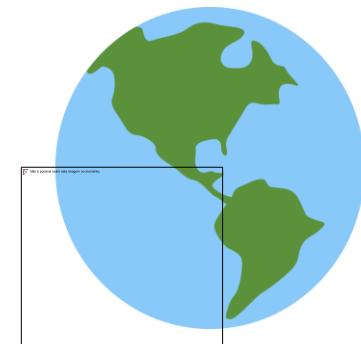
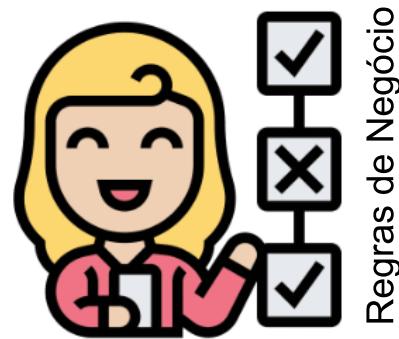
Gatilhos

Dependências Funcionais

Constrains and Triggers

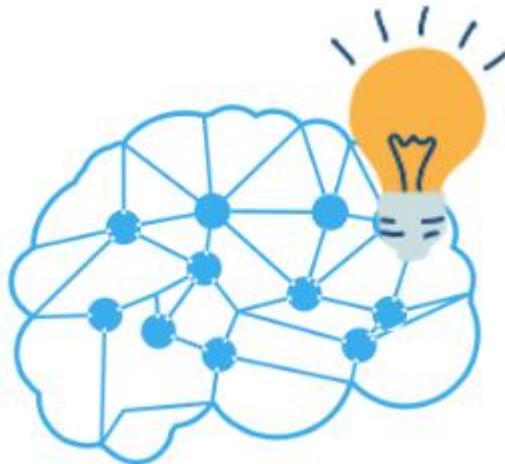
Vantagens do SGBD

Integridade de dados

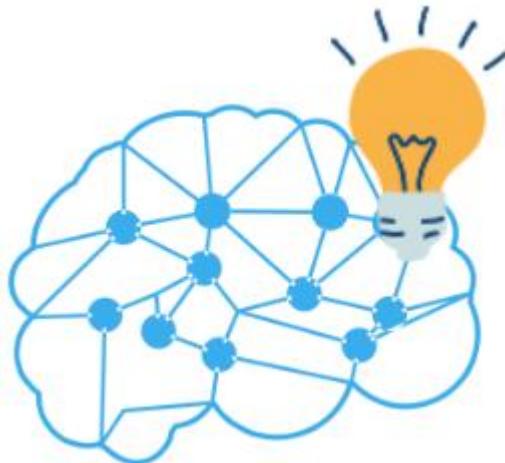


Semântica

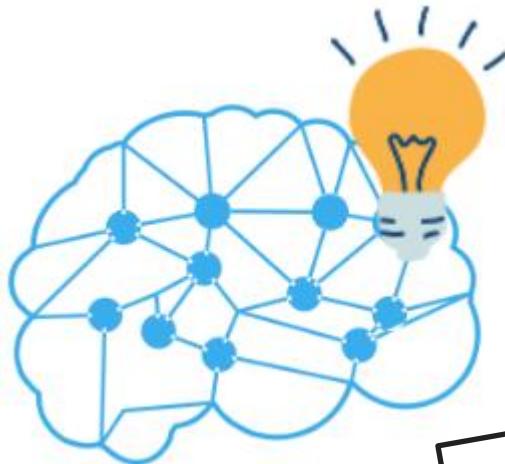
Vantagens do SGBD



Vantagens do SGBD



Vantagens do SGBD



Inferência | ações com regras | Triggers

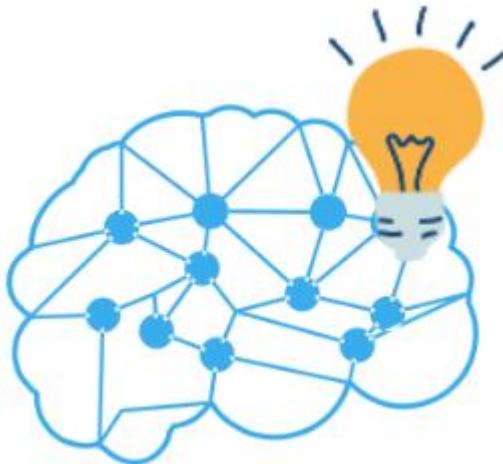
Regras e dedução



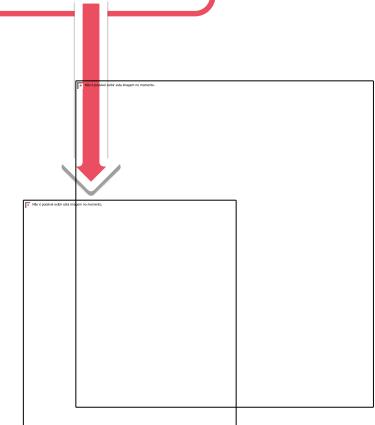
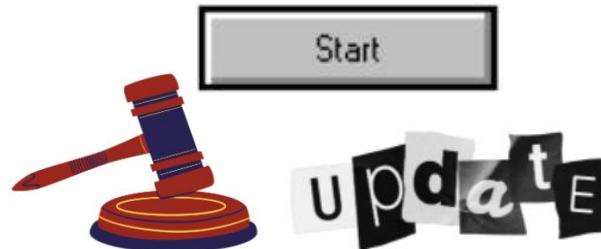
Regra Declarativa



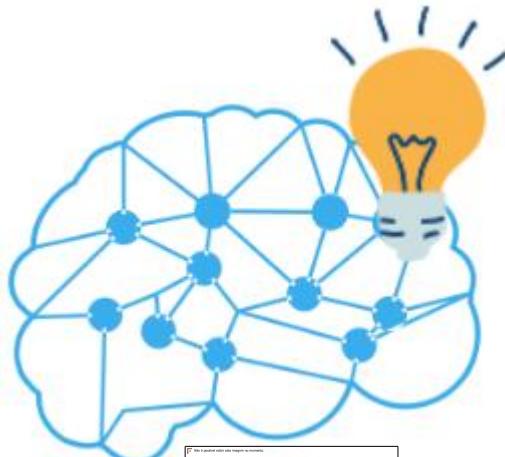
Vantagens do SGBD



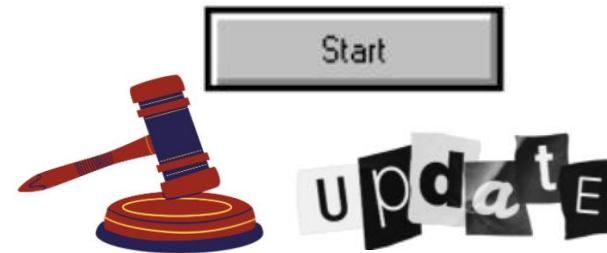
Inferência | ações com regras | Triggers



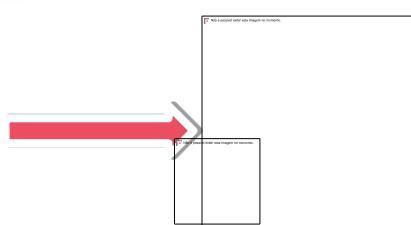
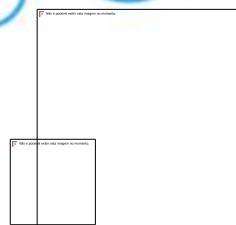
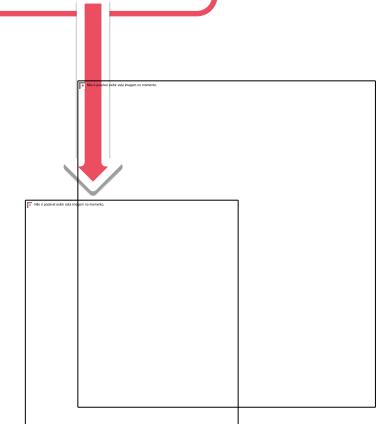
Vantagens do SGBD



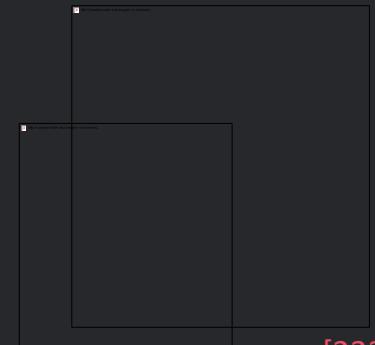
Inferência | ações com regras | Triggers



update



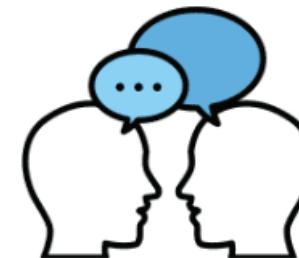
Ganhos em utilizar Sistemas de Gerenciamento de Banco de Dados



Ganhos com SGBD



- Padronização
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade

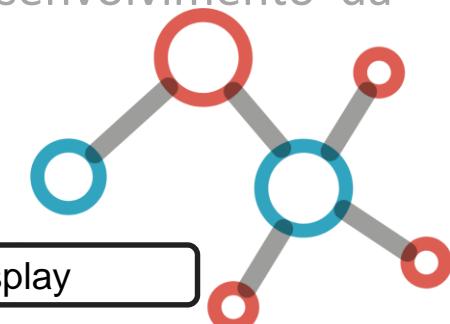


Ganhos com SGBD

Entre databases dentro da organização.



- Padronização
- Redução de tempo no desenvolvimento da
Tipos de dados
 - Flexibilidade
 - Disponibilidade de
Display
 - Economia com escalabilidade
Relatórios



Padronização

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

COURSE

Tipo de dados

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

SECTION

Estrutura definida

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone

Base dos relatórios

GRADE REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

Ganhos com SGBD



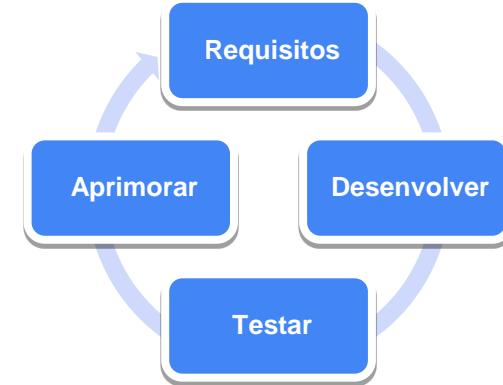
- P Features do app descontinuadas:
retrieval
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade



Ganhos com SGBD



- Padronização
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade



Ganhos com SGBD



- Padronização
- Reduz ~ tempo de desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade



Novo requisito



Time

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	M
CS3320	C

Adicionar ano que cursou matéria

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
		2	CS

Adicionar coordenador

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
	CS1310	Fall	08	Anderson
	CS3380	Fall	08	Stone

GRADE REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

Ganhos com SGBD

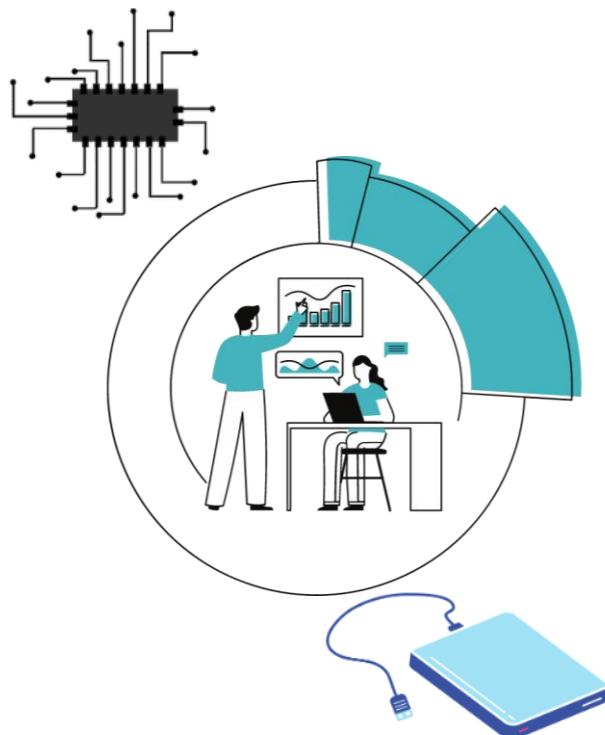


- Padronização
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info up-to-date
- Economia com escalabilidade

Update imediato



Ganhos com SGBD



- Padronização
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade
- Economia de escala

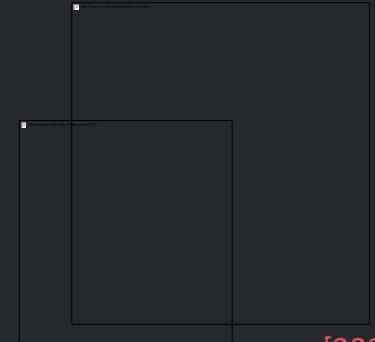
Operacional &
Gerenciamento



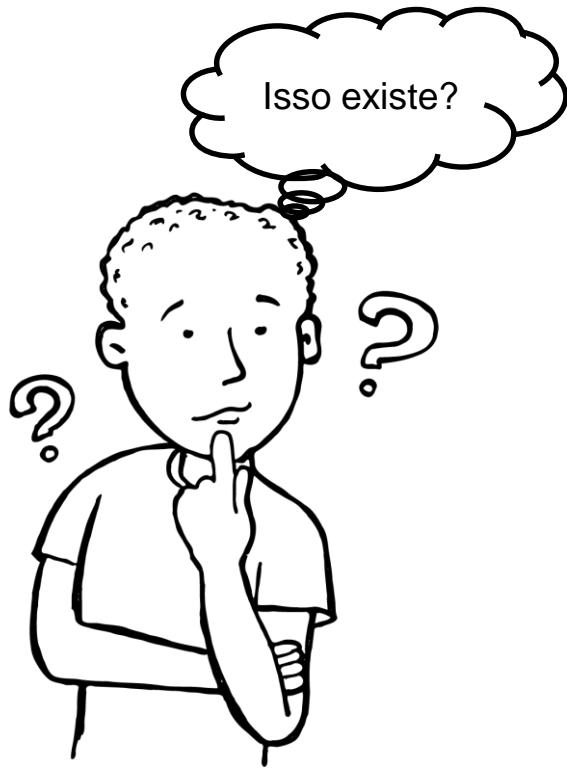
Overlap



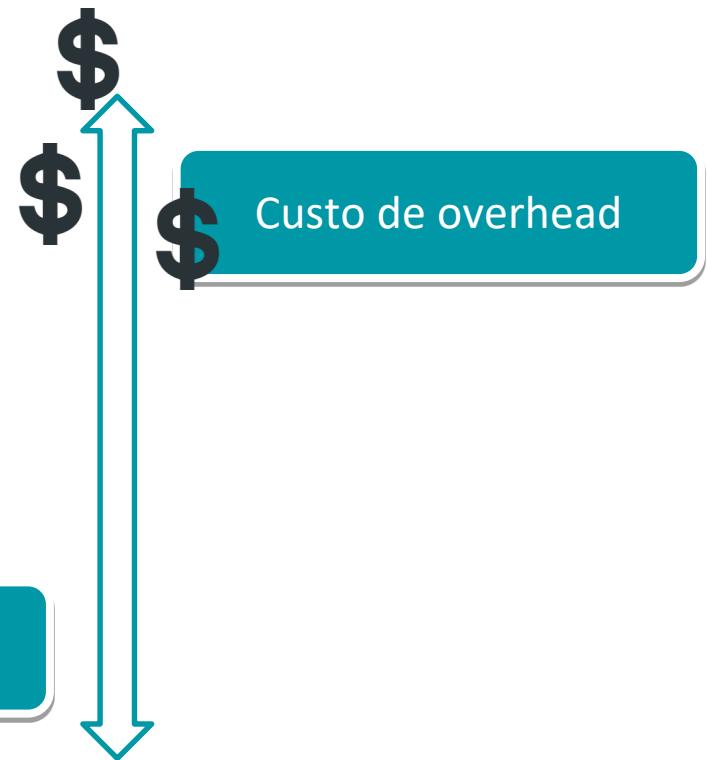
Quando não usar um SGBD?



Not use!



Custo-benefício



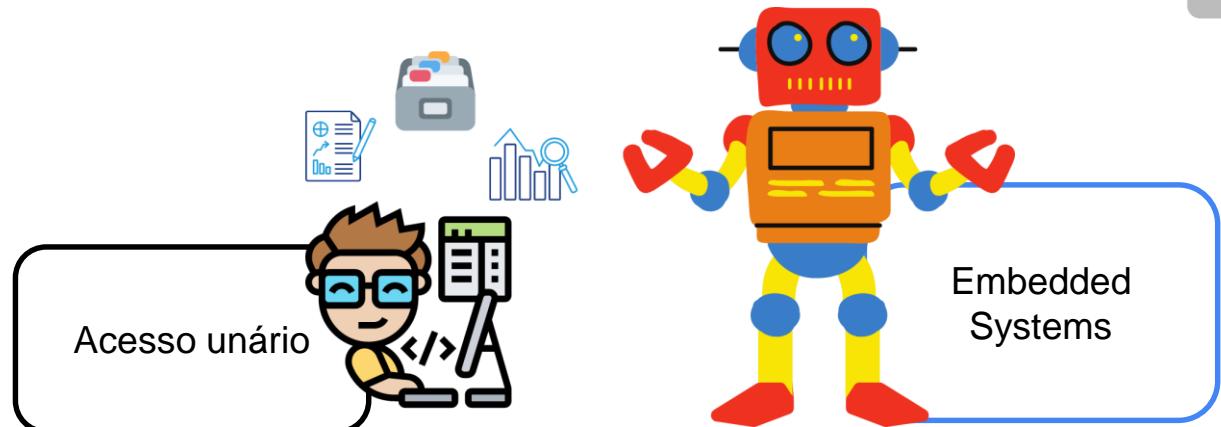
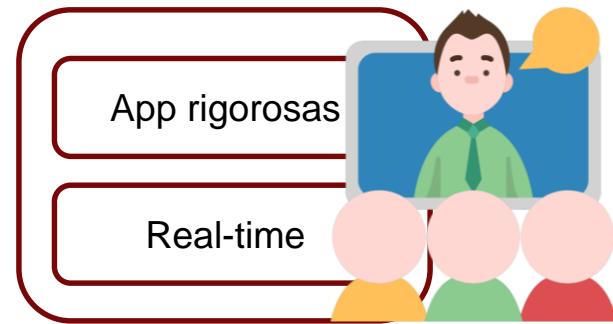
Not use!



Custo

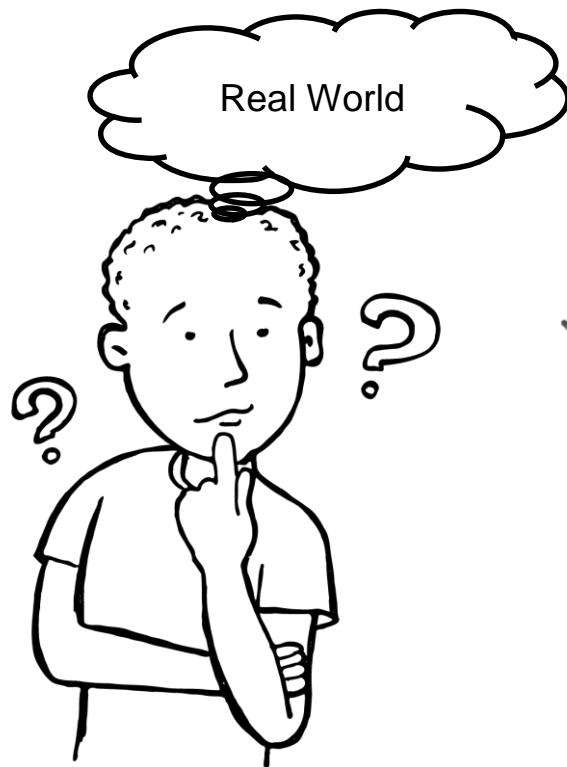
- Investimento inicial
- Generelidade na definição e processamento
- Segurança, controle de concorrência, recovery, funções de integridade

Not use!

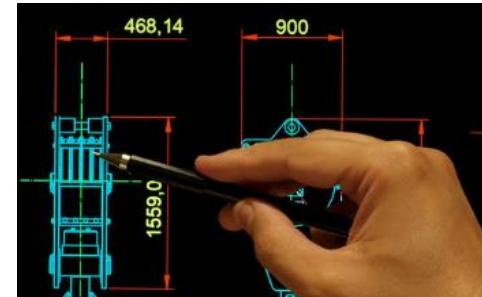


Situações

Not use!



A AUTOCAD®



COMUTAÇÃO



Etapa 7

Introdução à Modelagem de Banco de Dados e SQL

// Introdução à Banco e dados

Conversa



Por que modelar?

Desenvolvimento
Protótipos

Construção
Plantas baixa

Eletrônicos
Esquema de circuitos

Compreensão do sistema

Modelagem

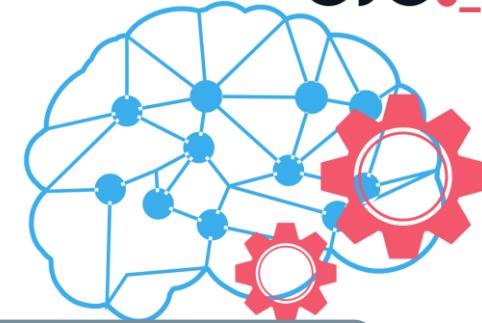


Modelagem

Representação

Modelo

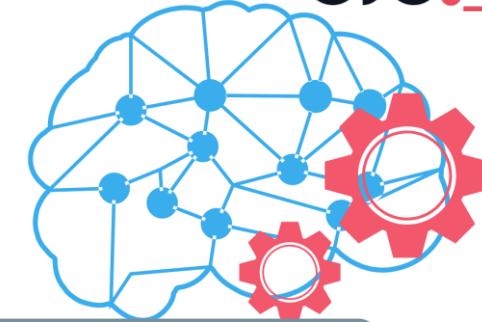
Referência



Modelagem



Modelagem



Software

Dados

Computacional

Conceitual

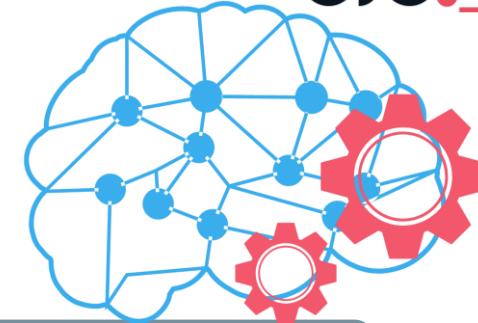
Processo de negócios

Matemática

Modelagem



Modelagem



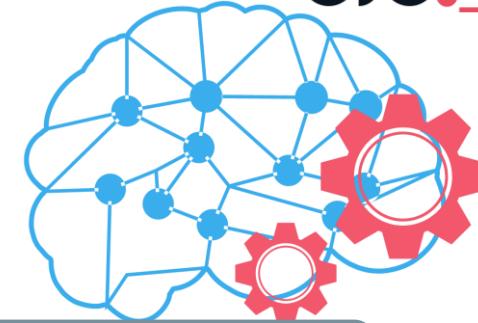
Possui foco na descrição e relacionamento dos elementos que compõem a representação do contexto (mini-mundo)



Modelagem



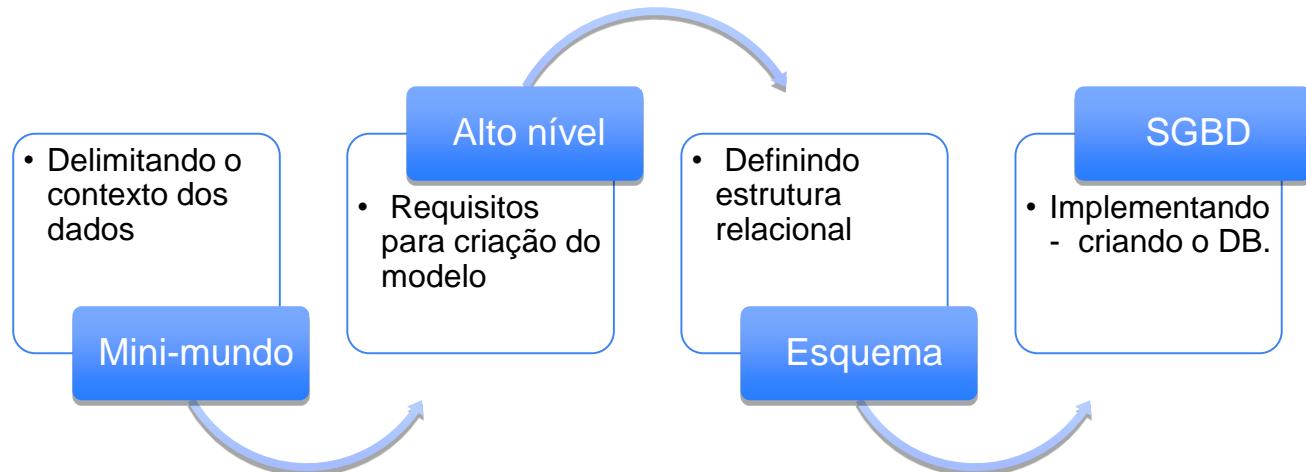
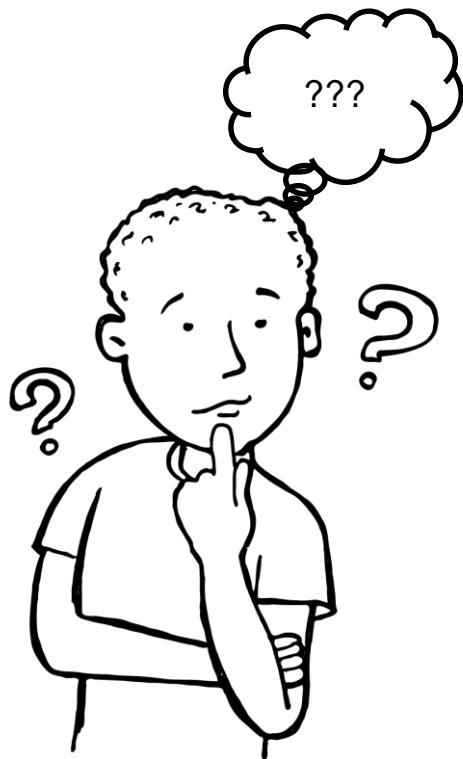
Modelagem



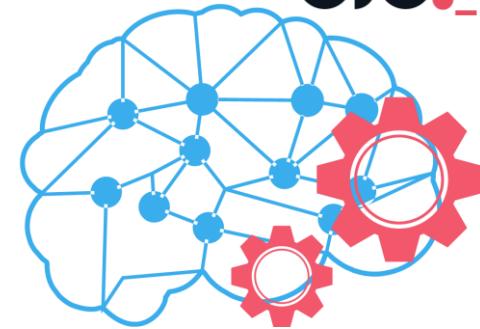
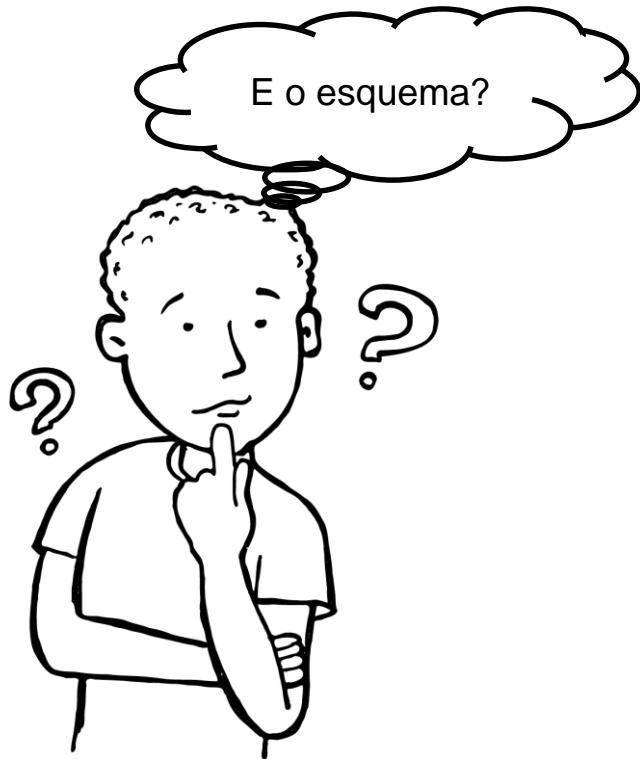
Possui foco na descrição e relacionamento dos elementos que compõem a representação do contexto (mini-mundo)



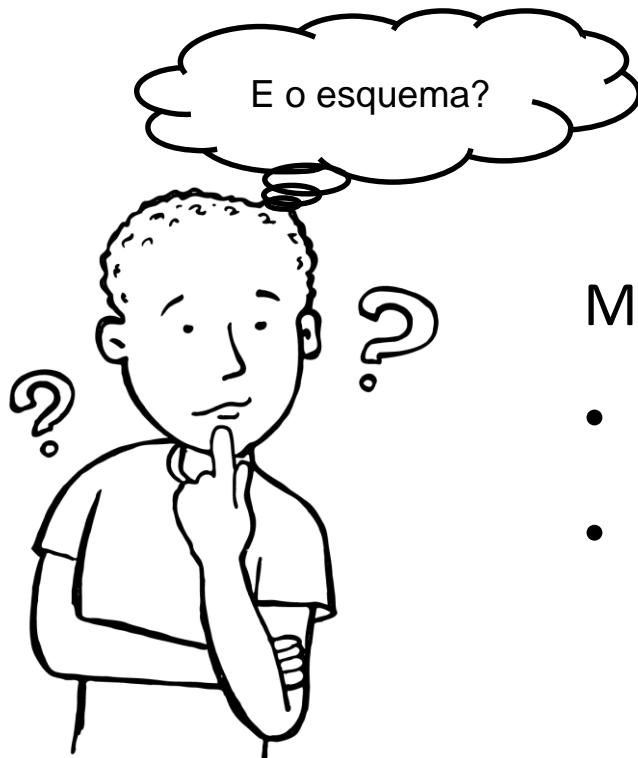
Modelagem



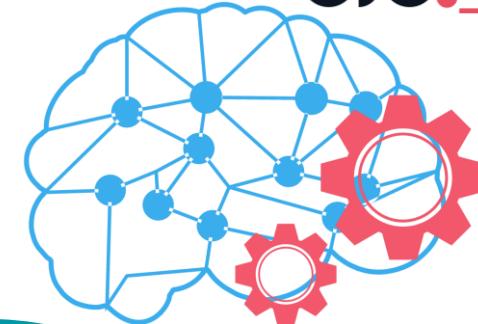
Modelagem



Modelagem



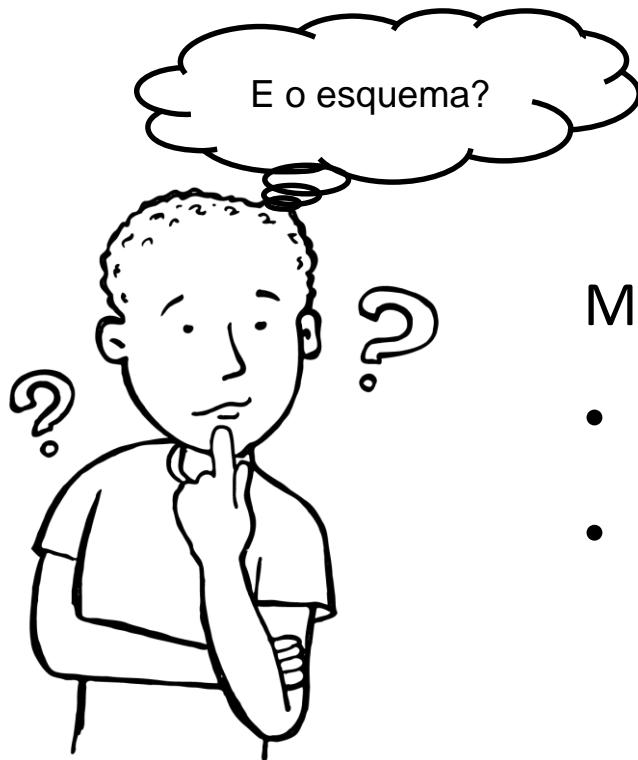
Facilita a compreensão do contexto dos dados



Modelos de alto nível:

- Entidade-Relacionamento
- UML (Unified Modeling Language)

Modelagem

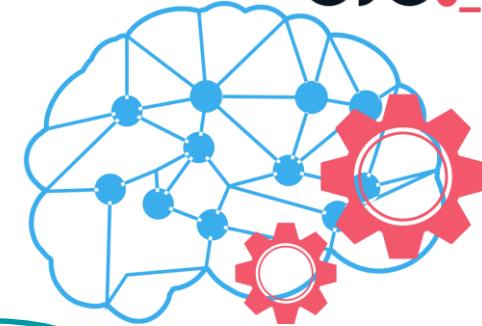


Modelos de alto nível:

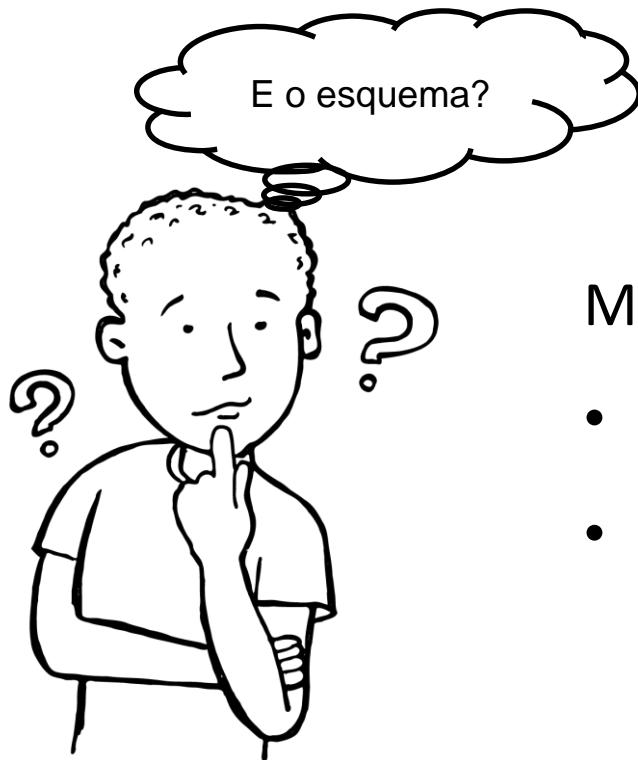
- Entidade-Relacionamento
- UML



Facilita a compreensão do contexto dos dados



Modelagem

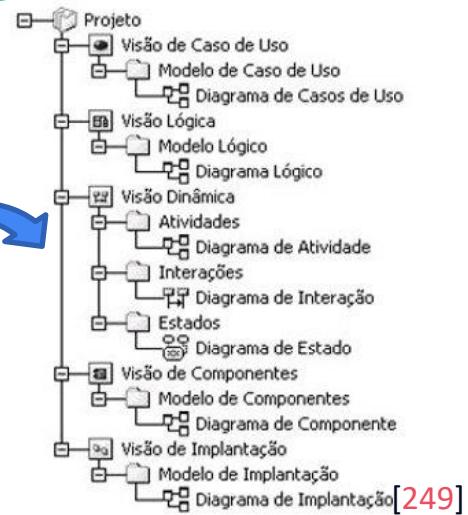
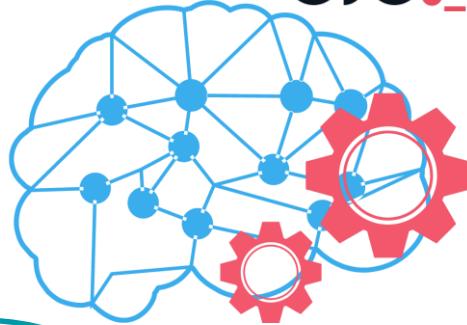


Modelos de alto nível:

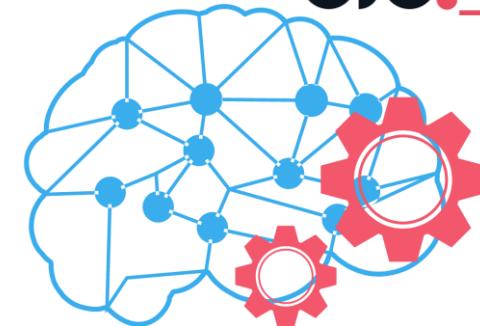
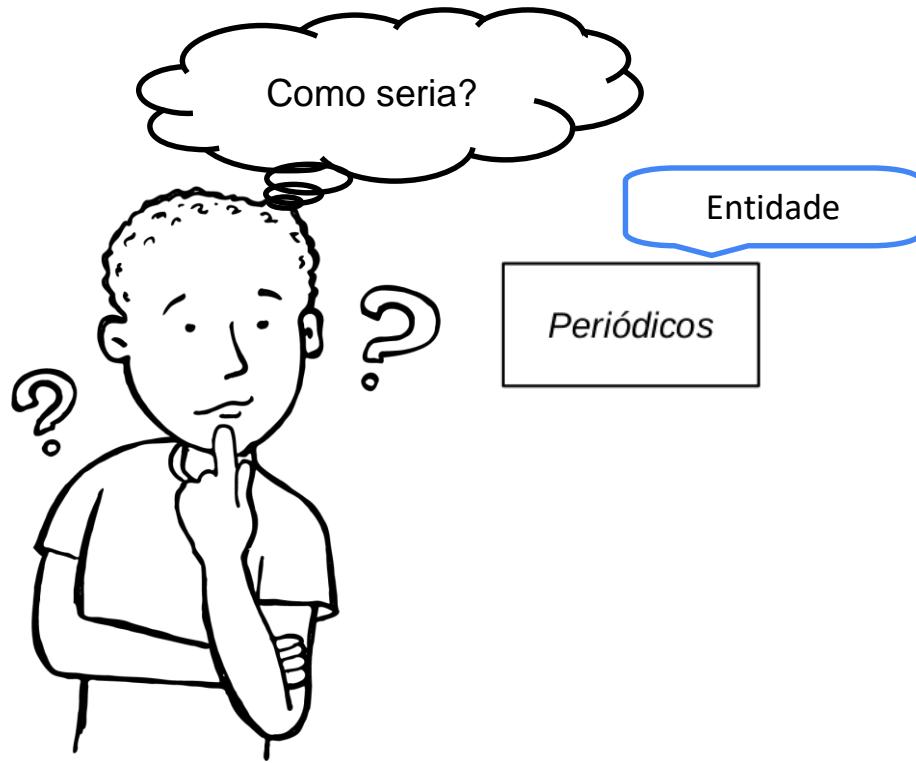
- **Entidade-Relacionamento**
- **UML**



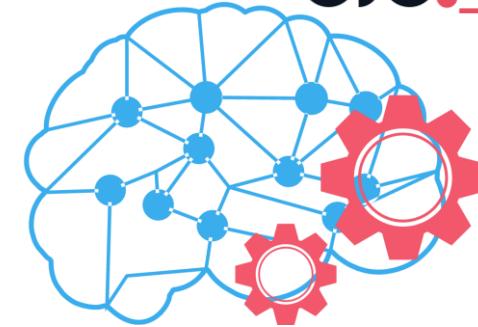
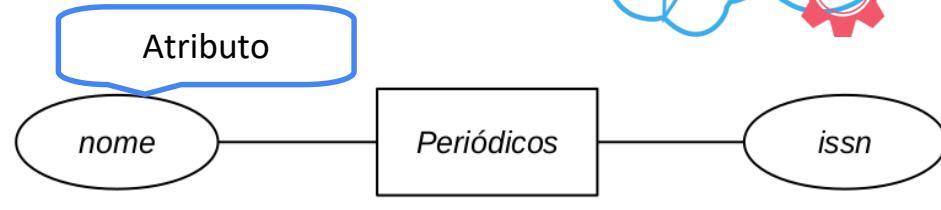
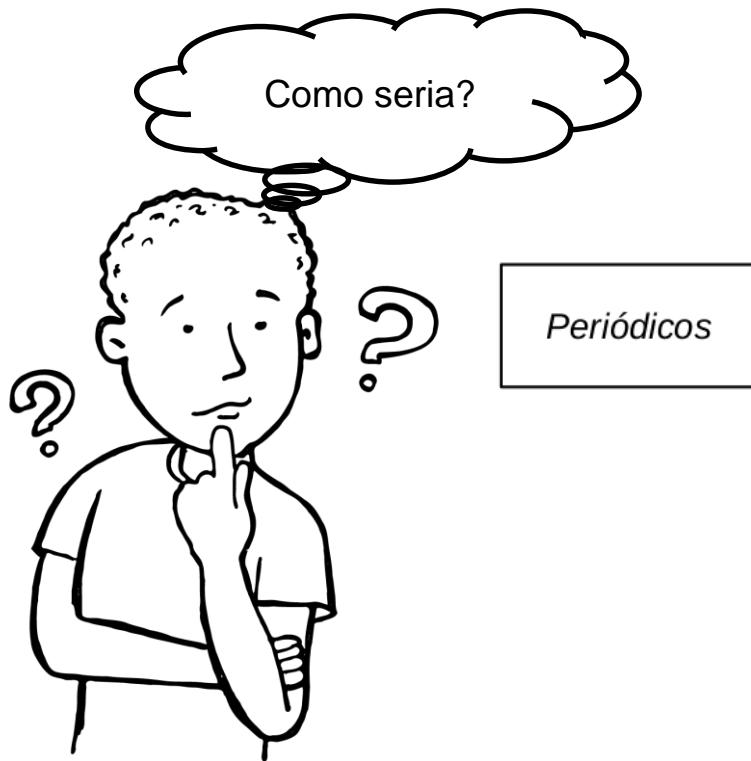
Facilita a compreensão do contexto dos dados



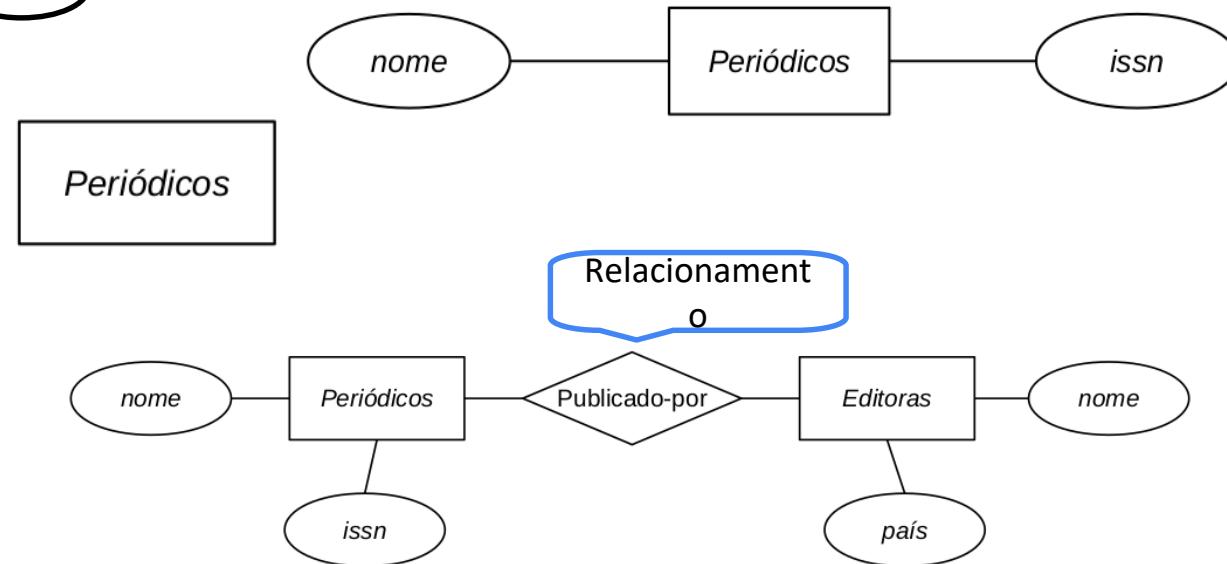
Modelagem



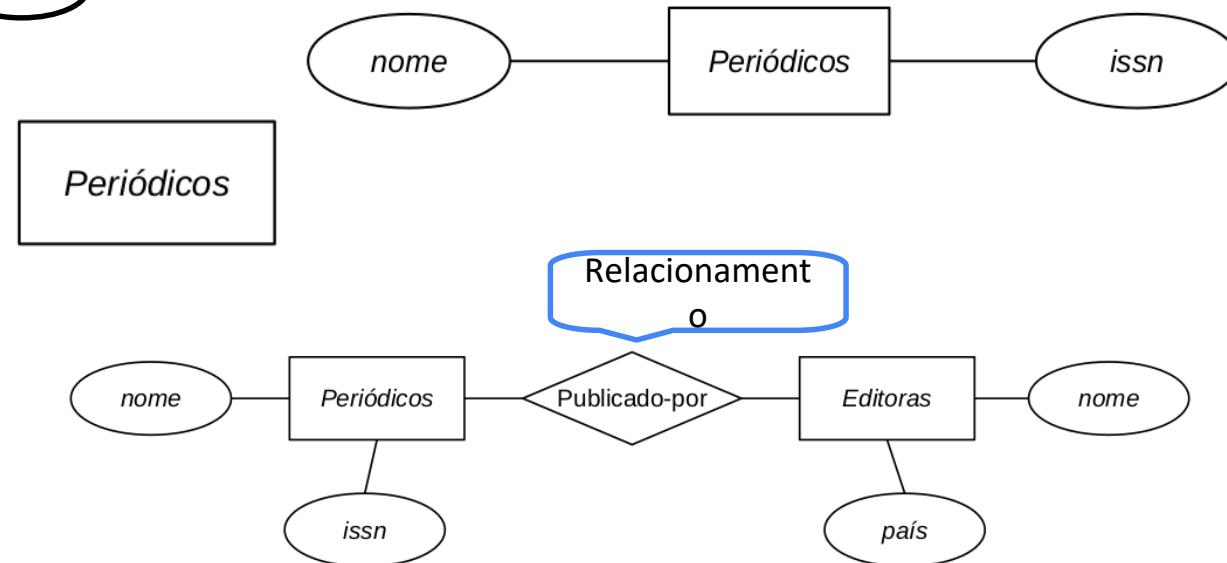
Modelagem



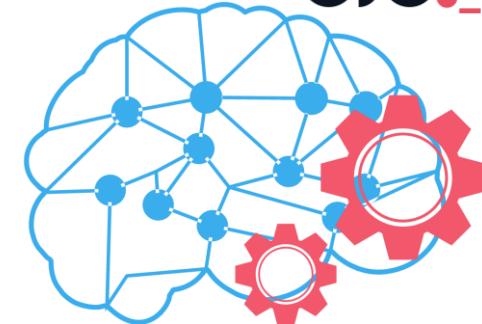
Modelagem



Modelagem



Modelagem



Instâncias

Multiplicidade

Chaves e constraints

Integridade de dados ...

Modelagem



Facilita a compreensão do contexto dos dados

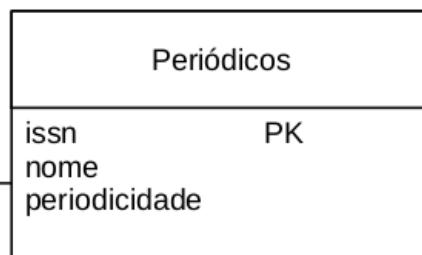
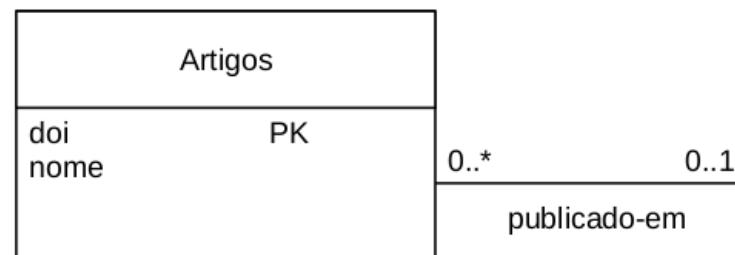
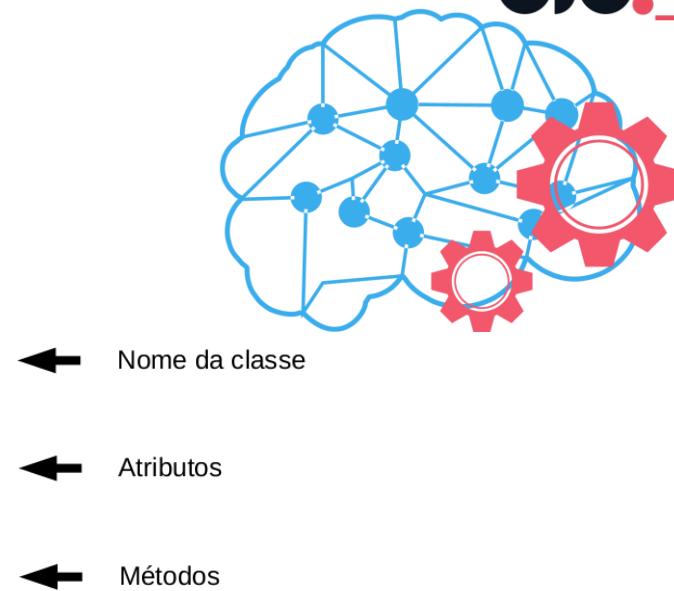
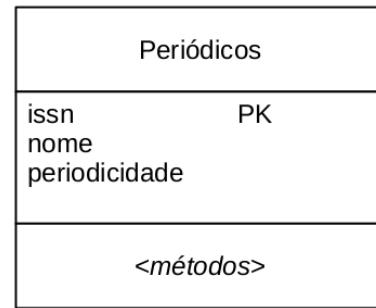
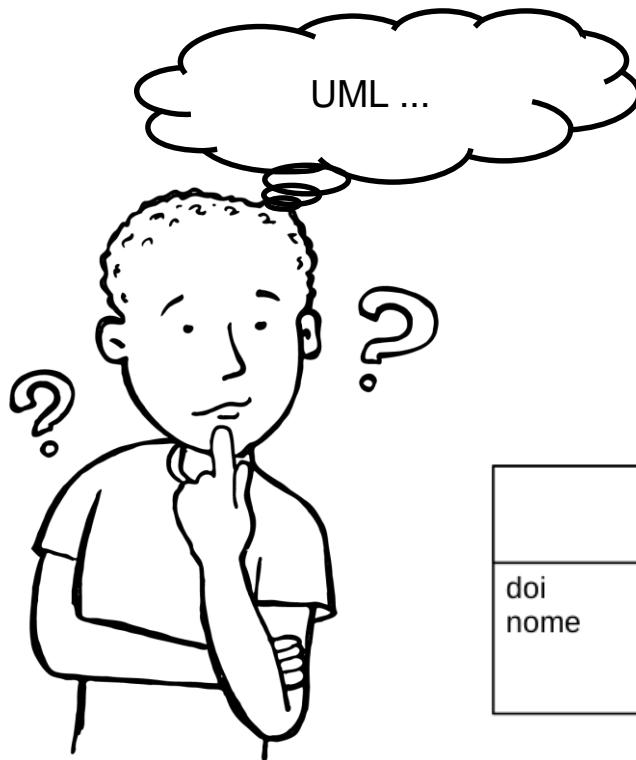
Modelos de alto nível:

- Entidade-Relacionamento
- UML

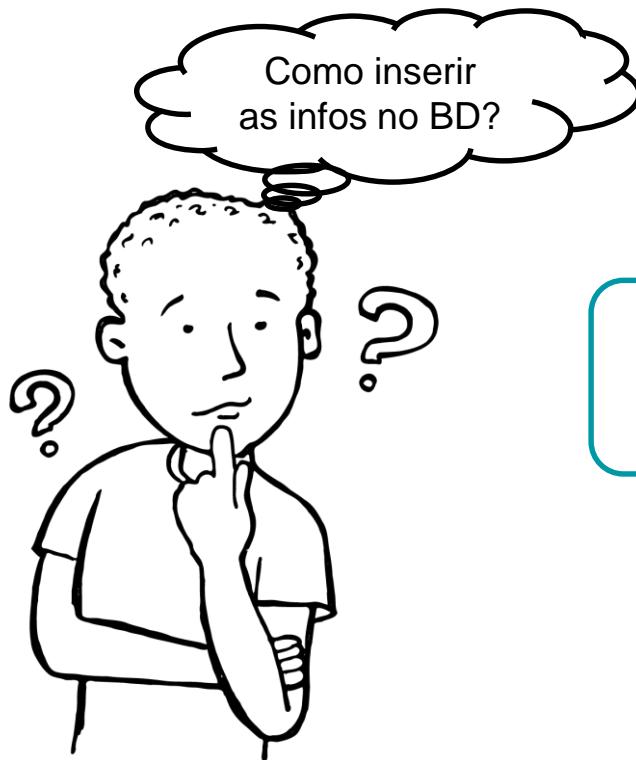
Modelos



Modelagem



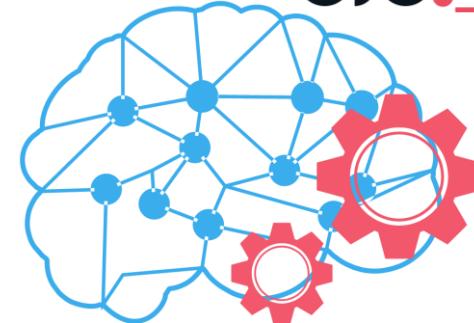
Modelagem



CREATE, ALTER, DROP ...

SELECT, INSERT, UPDATE ...

Linguagem declarativa



SQL – como acessar?

The screenshot shows the phpMyAdmin interface with the title "General Settings". It includes sections for "Change password", "MySQL connection settings" (set to "utf8_general_ci"), "App configuration" (language: English), and "MySQL connection" (server: localhost, port: 3306). The bottom section lists "MySQL & PHP" links.

```
jm@jm-HP-G42-Notebook-PC:~$ sudo mysql
[sudo] password for jm:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.29-0ubuntu0.20.04.3 (Ubuntu)

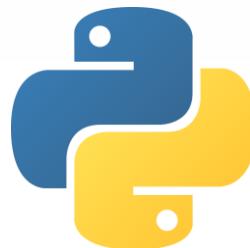
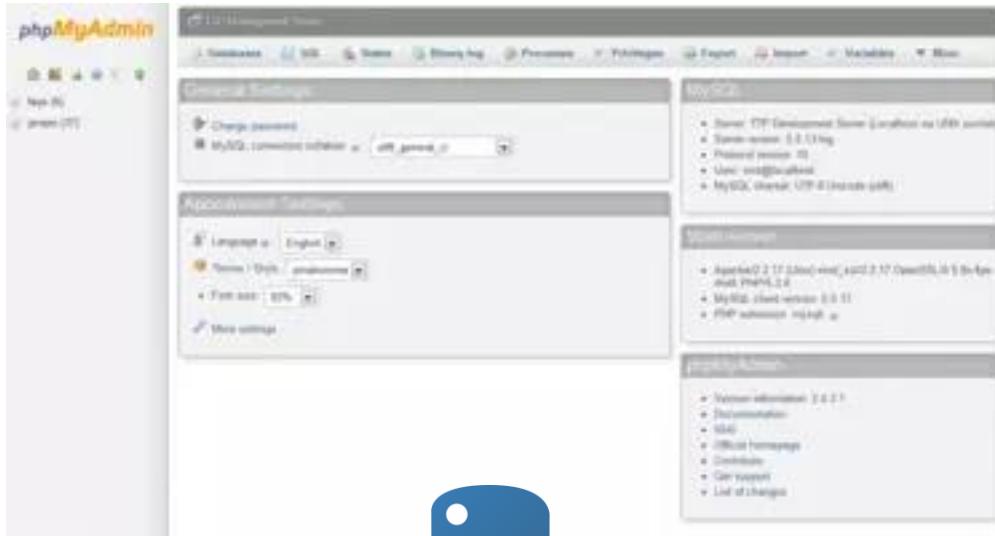
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Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> 
```

SQL – como acessar?



```
jm@jm-HP-G42-Notebook-PC:~$ sudo mysql
[sudo] password for jm:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.29-0ubuntu0.20.04.3 (Ubuntu)

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> 
```

SQL – 1º exemplo

```
CREATE DATABASE firstexample;
```

```
CREATE TABLE periodicos(
```

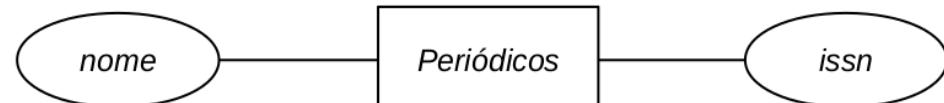
```
    id integer,
```

```
    nome varchar(120),
```

```
    issn integer
```

```
);
```

Criando a tabela periódicos



SQL – 1º exemplo

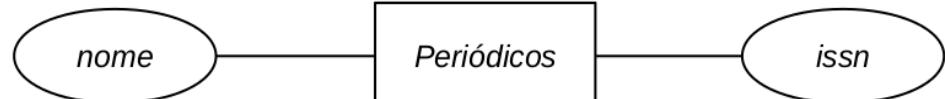
```
CREATE DATABASE firstexample;
```

```
CREATE TABLE periodicos(
```

```
    id integer,  
    nome varchar,  
    issn int  
);
```

Como garantir unicidade?

Criando a tabela periódicos



Primary Key

SQL – 1º exemplo

```
CREATE DATABASE firstexample;
```

```
CREATE TABLE periodicos(
```

```
    id integer,
```

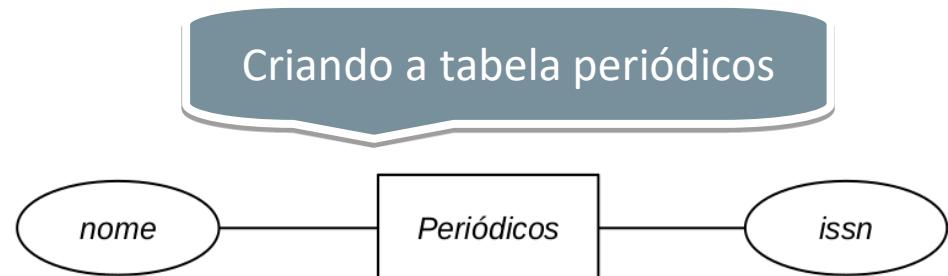
```
    nome varchar(120),
```

```
    issn integer,
```

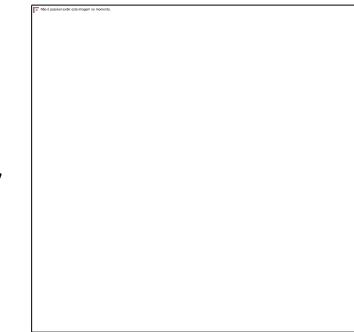
```
    PRIMARY KEY (id)
```

```
);
```

Criando a tabela periódicos



Primary Key



SQL – 1º exemplo

```
CREATE TABLE editora(
```

```
    id integer,
```

```
    nome_editora varchar(120),
```

```
    País integer,
```

```
PRIMARY KEY (id)
```

```
);
```

Criando a tabela editoras



SQL – 1º exemplo

```
CREATE TABLE periodicos(
```

```
    id integer,
```

```
    nome varchar(120),
```

```
    issn integer,
```

```
    PRIMARY KEY (id),
```

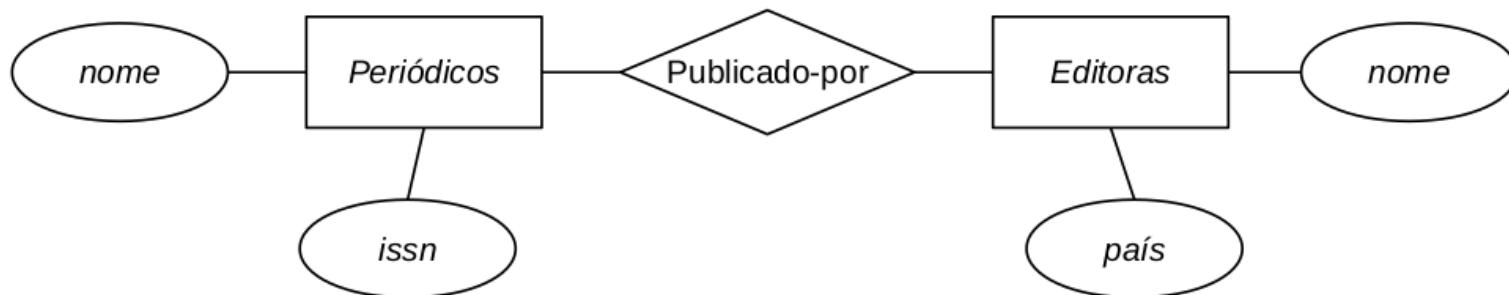
```
    FOREIGN KEY (id) REFERENCES editora(id)
```

```
);
```

Definindo relacionamento



Desafio



Etapa 8

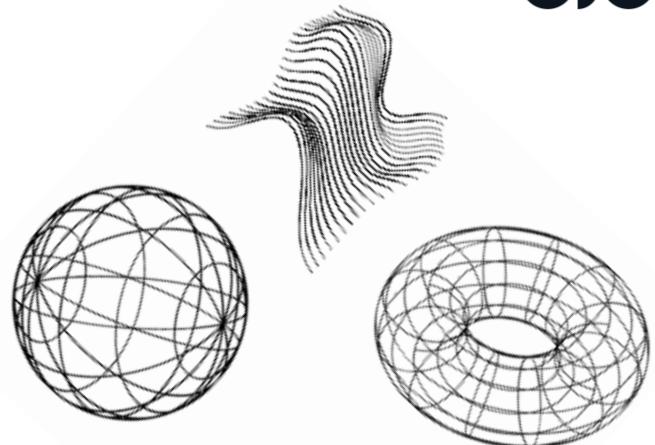
Arquitetura: Modelos, Esquemas e Instâncias

// Introdução à Banco de dados

Conversa



Modelo

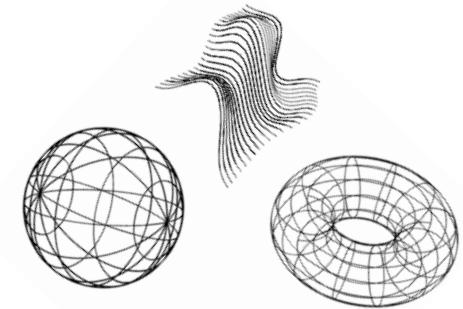
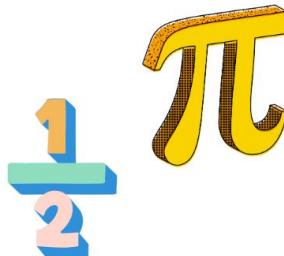


Abstração



essencial

Modelo



Data model

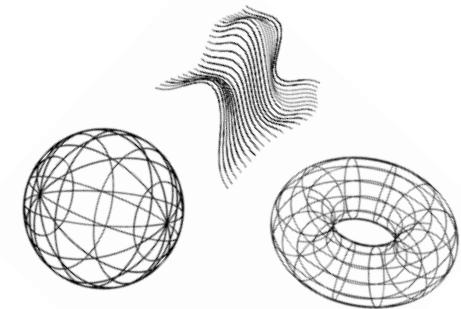
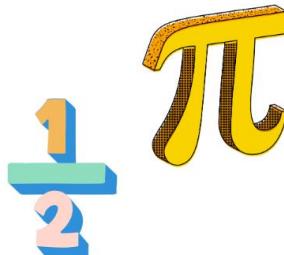


Abstração

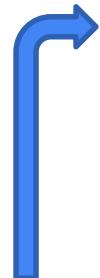


essencial

Modelo



Operações



Data model

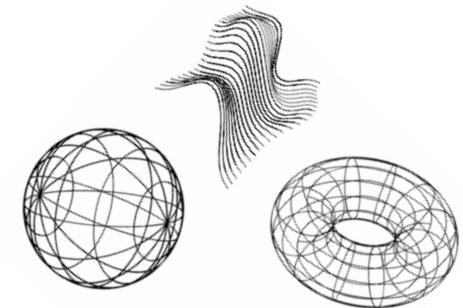


Abstração



essencial

Modelo



Operações



Data model



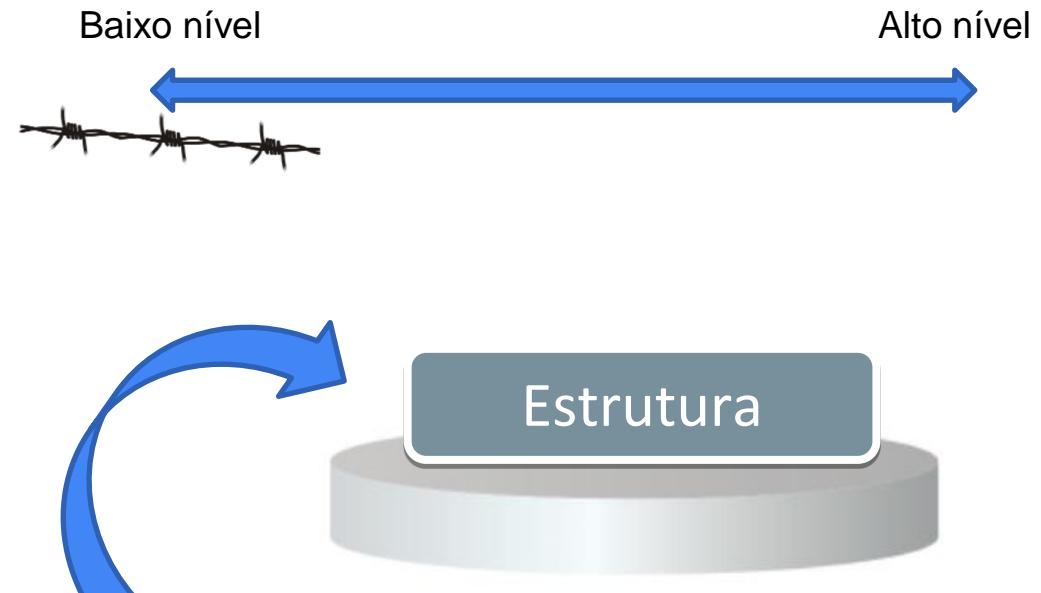
Classificação

Abstração



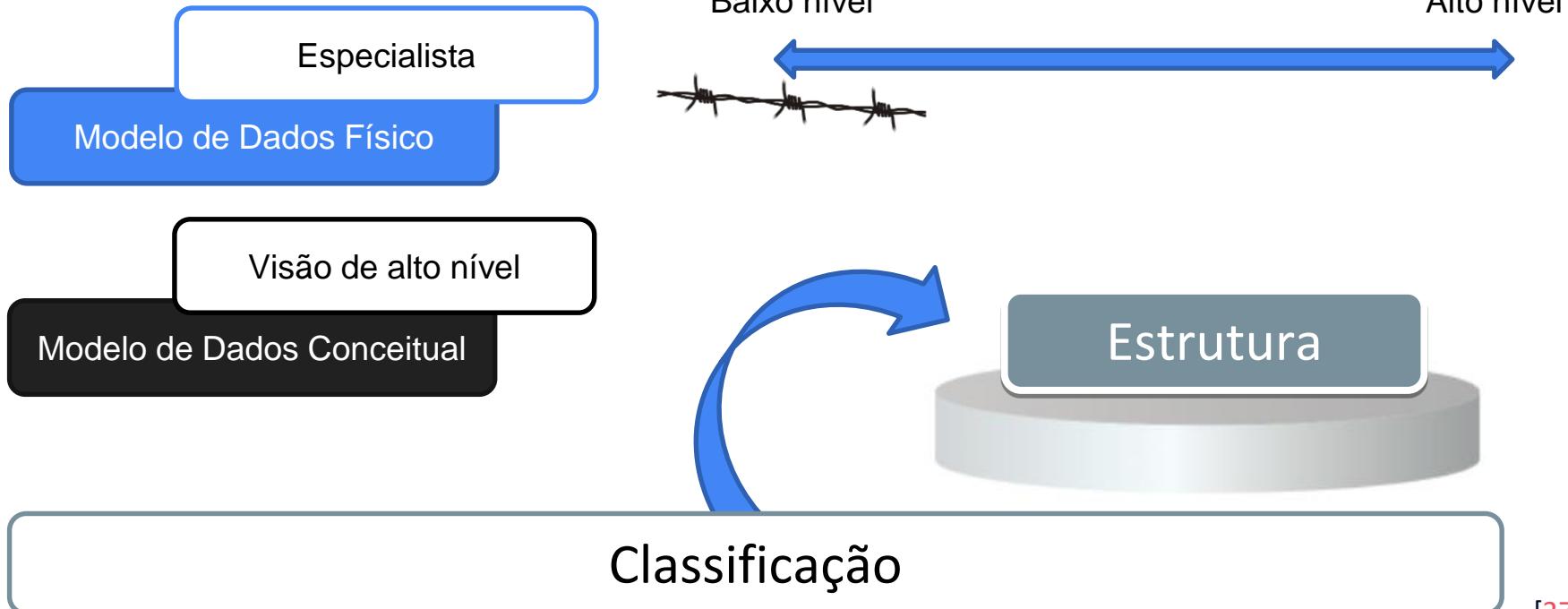
essencial

Modelo



Classificação

Modelo



Modelo

Especialista
Modelo de Dados Físico

Visão de alto nível
Modelo de Dados Conceitual

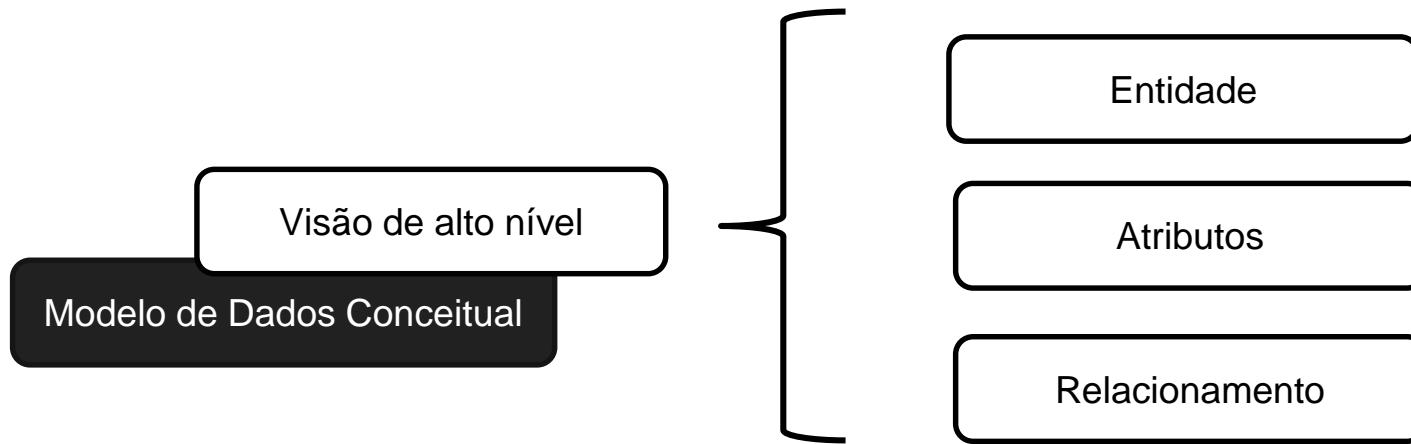
Classificação



Representacional
Modelo de Dados de implementação

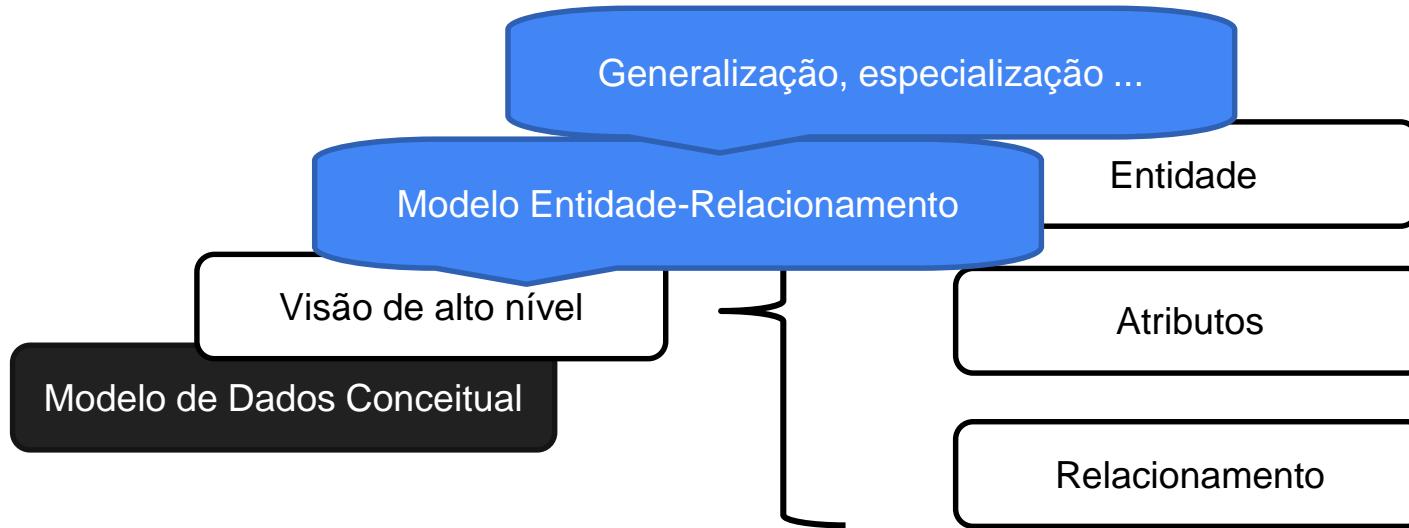


Modelo



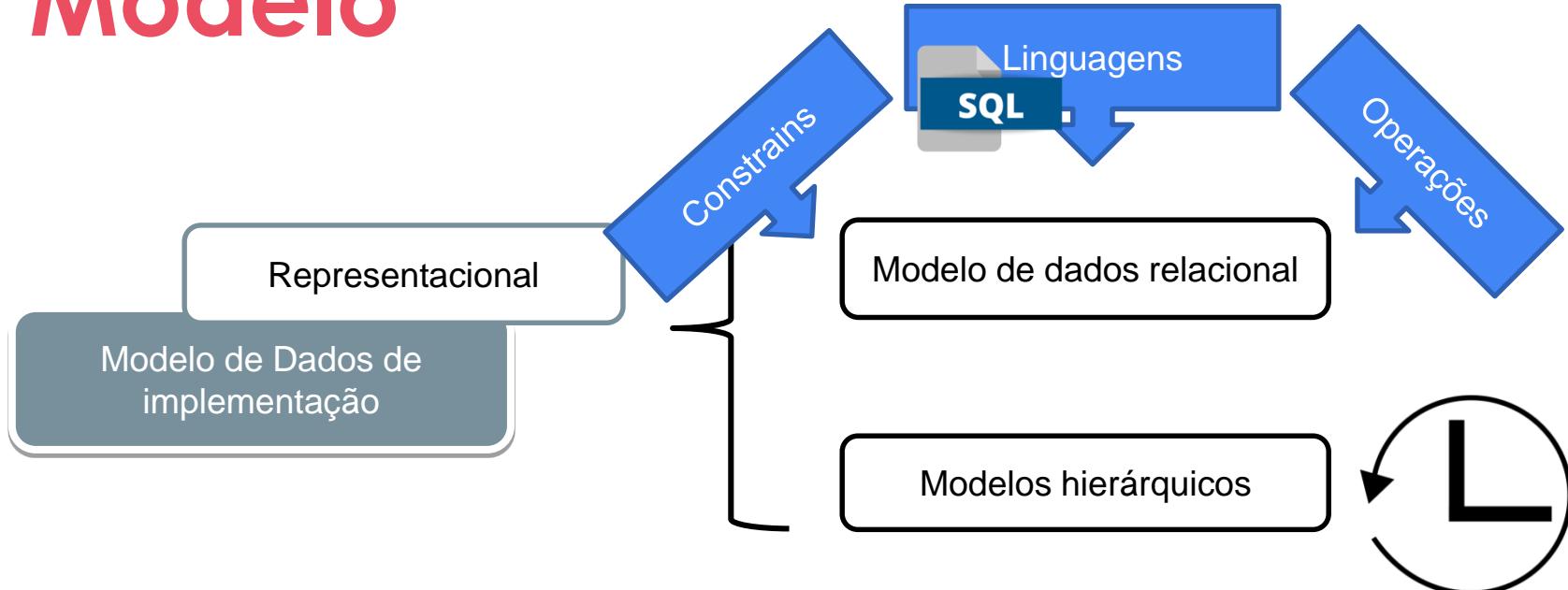
Classificação

Modelo



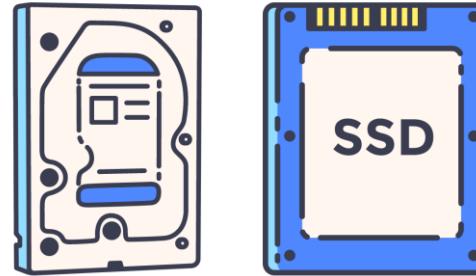
Classificação

Modelo



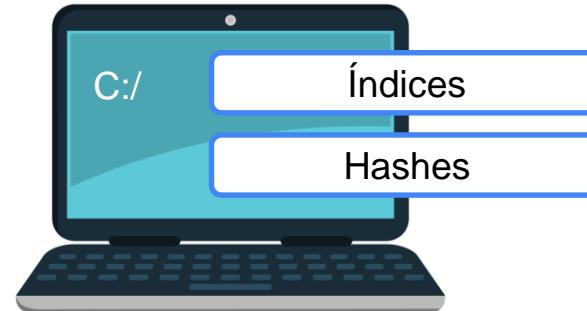
Classificação

Modelo



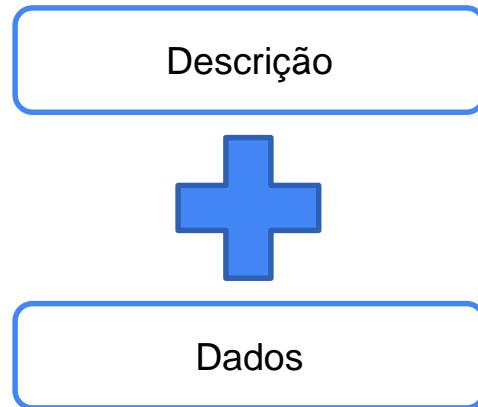
Especialista

Modelo de Dados Físico



Classificação

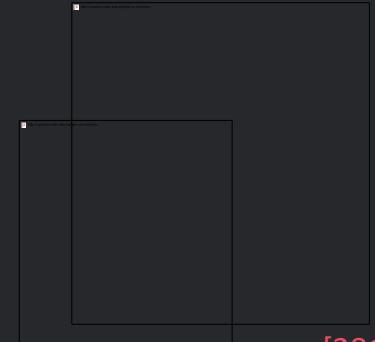
Modelo



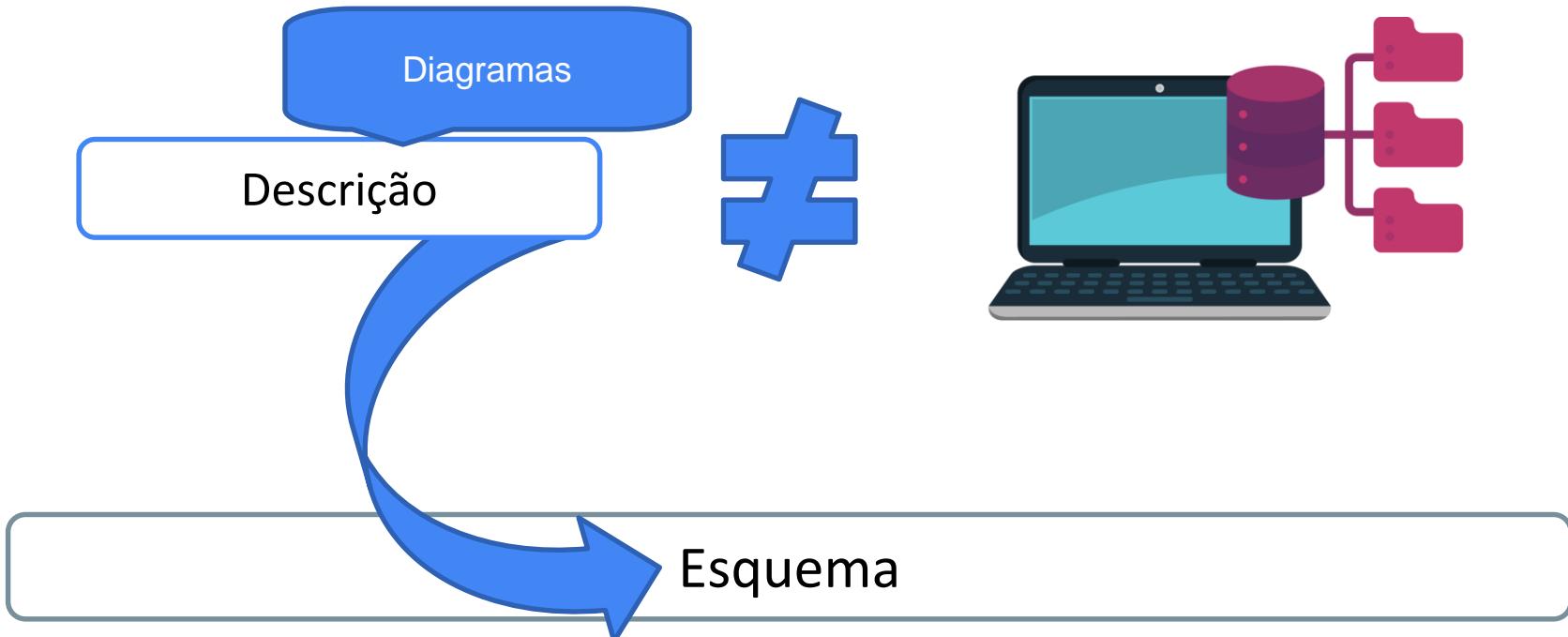
KEY-VALUE

Classificação

Esquemas, Instâncias e Estados do BD



Esquema



Esquema

Diagramas

Descrição

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_number	Credit_hours	Department
-------------	---------------	--------------	------------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

GRADE_REPORT

Student_number	Section_identifier	Grade
----------------	--------------------	-------

Esquema

Esquema

Diagrams

Descrição

Construct

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_number	Credit_hours	Department
-------------	---------------	--------------	------------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

GRADE_REPORT

Student_number	Section_identifier	Grade
----------------	--------------------	-------

Esquema

Esquema

Diagramas

Descrição

Tipos de dados & Itens

Construct

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_number	Credit_hours	Department
-------------	---------------	--------------	------------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

GRADE_REPORT

Student_number	Section_identifier	Grade
----------------	--------------------	-------

Esquema

Snapshot



Dados mudam

Instância | Ocorrência

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_number	Credit_hours	Department
-------------	---------------	--------------	------------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

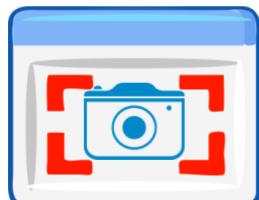
Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

GRADE_REPORT

Student_number	Section_identifier	Grade
----------------	--------------------	-------

Esquema

Snapshot



Dados mudam

Instância | Ocorrência

Esquema

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_code	Course_level	Course_type	Duration
-------------	-------------	--------------	-------------	----------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

GRADE_REPORT

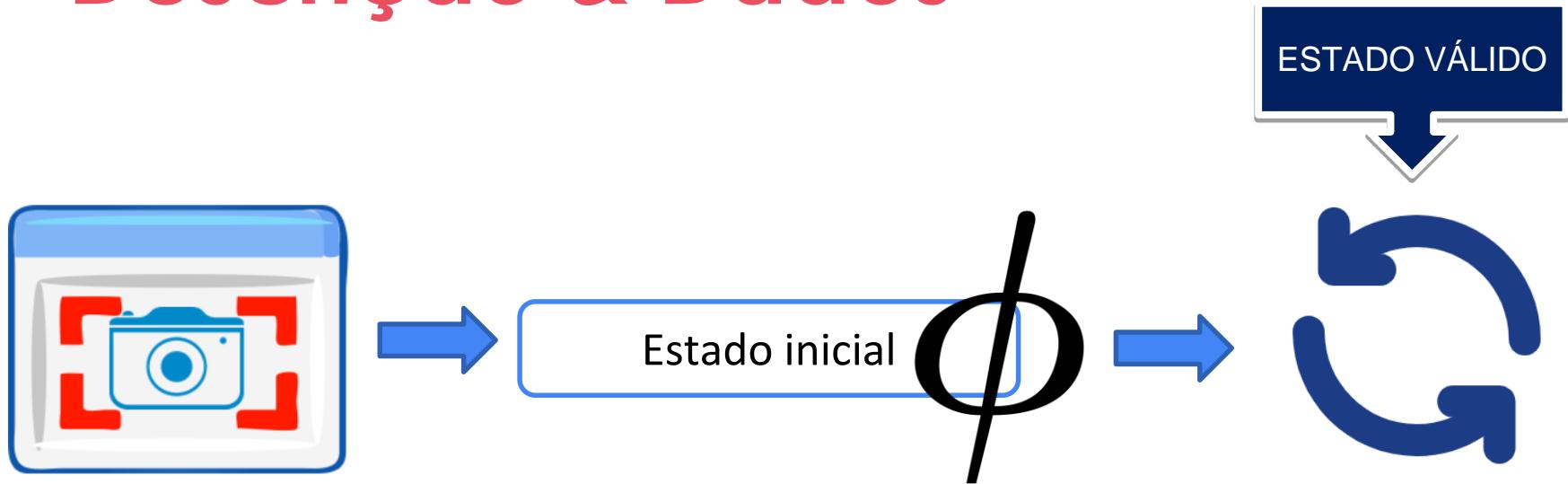
Student_number	Score
----------------	-------

Insert, Delete

Mudança de estado

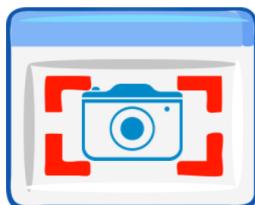
Update

Descrição & Dados



Esquema

Snapshot



Dados mudam

Mudança = evolução

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_number	Credit_hours	Department
-------------	---------------	--------------	------------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

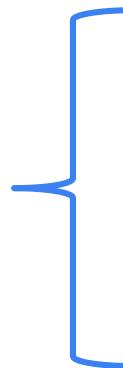
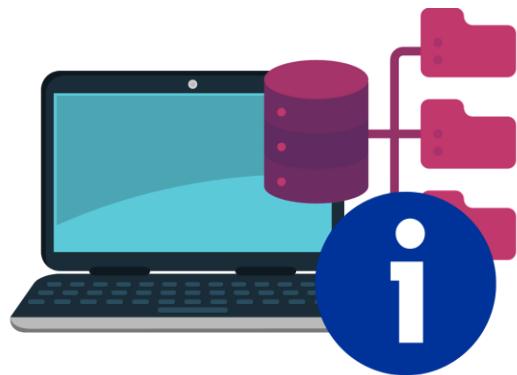
GRADE_REPORT

Student_number	Section_identifier	Grade
----------------	--------------------	-------

Instância | Ocorrência

Esquema

Meta dados



Descrição esquema

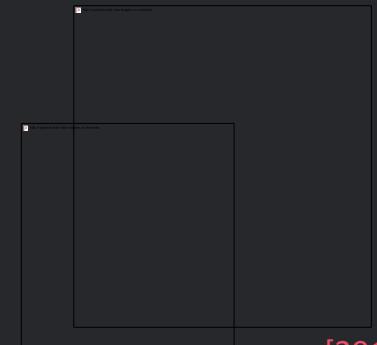
Construtores

Constrains



Esquema

Three-Schema Architecture



Three-Schema

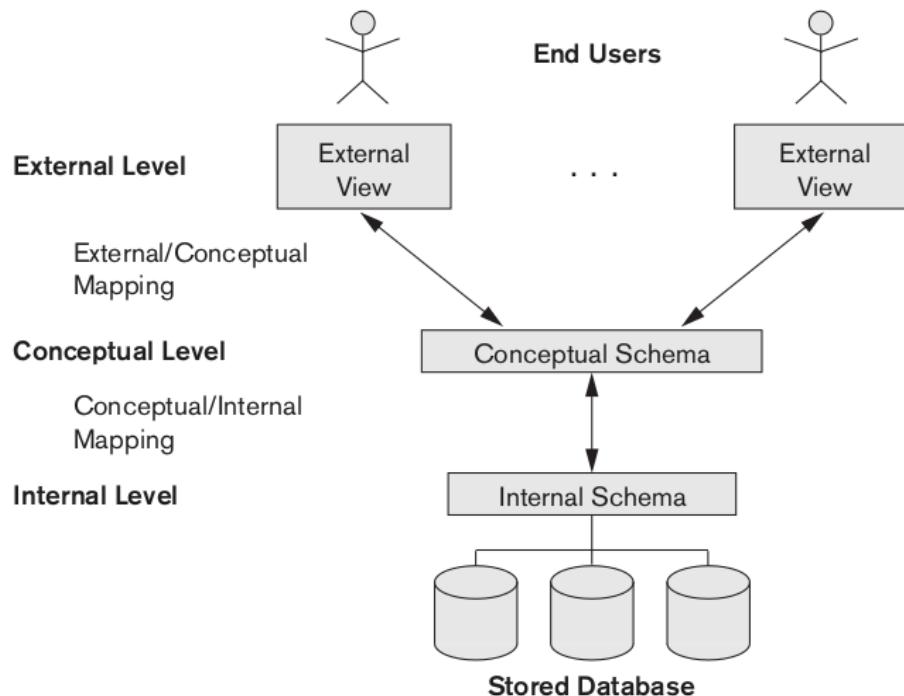
Catálogo

Isolamento
data/program

Views

Esquema

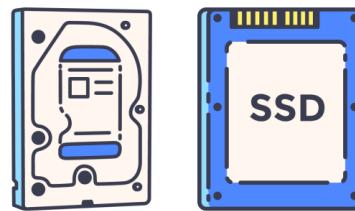
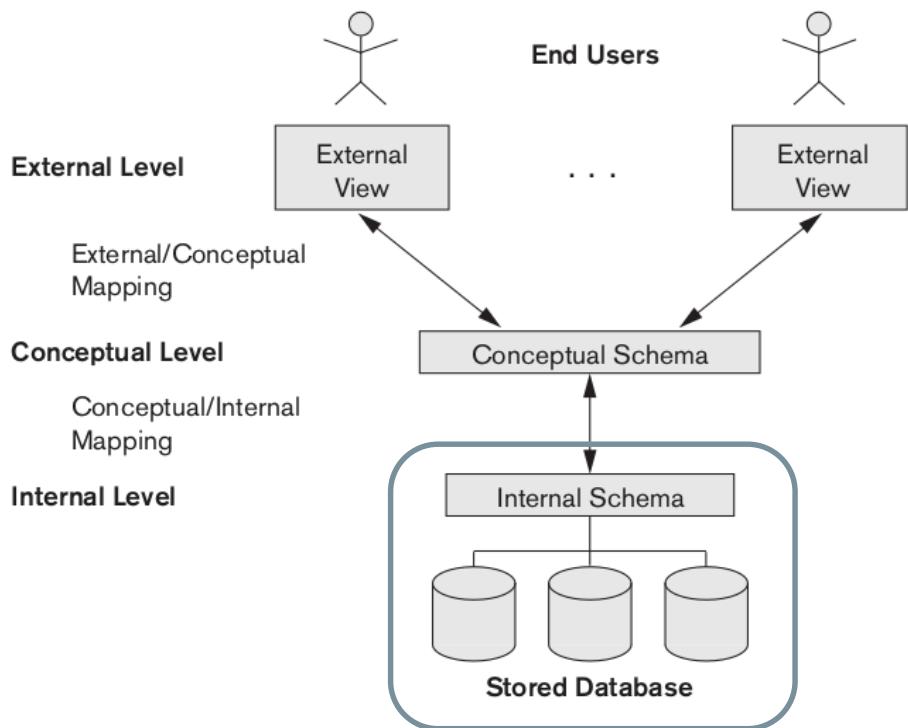
Arquitetura



Aplicações de Usuário

Físico BD

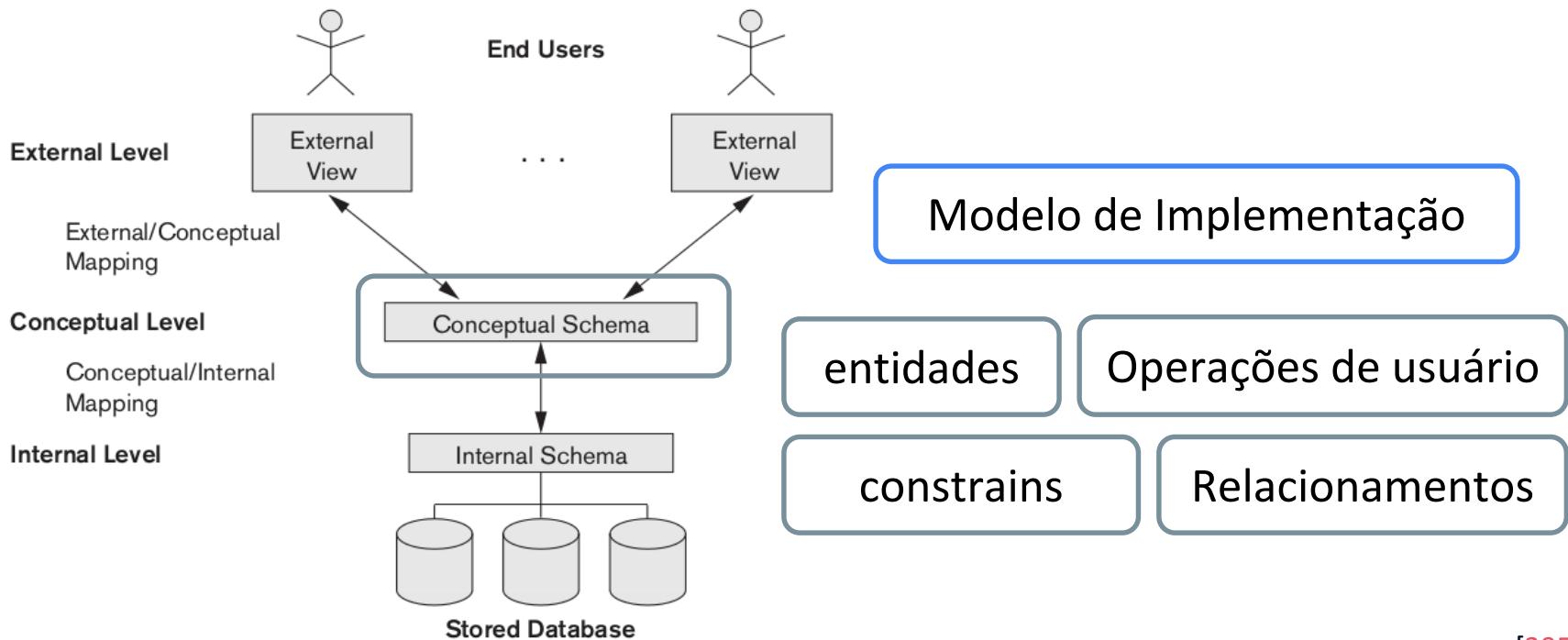
Arquitetura



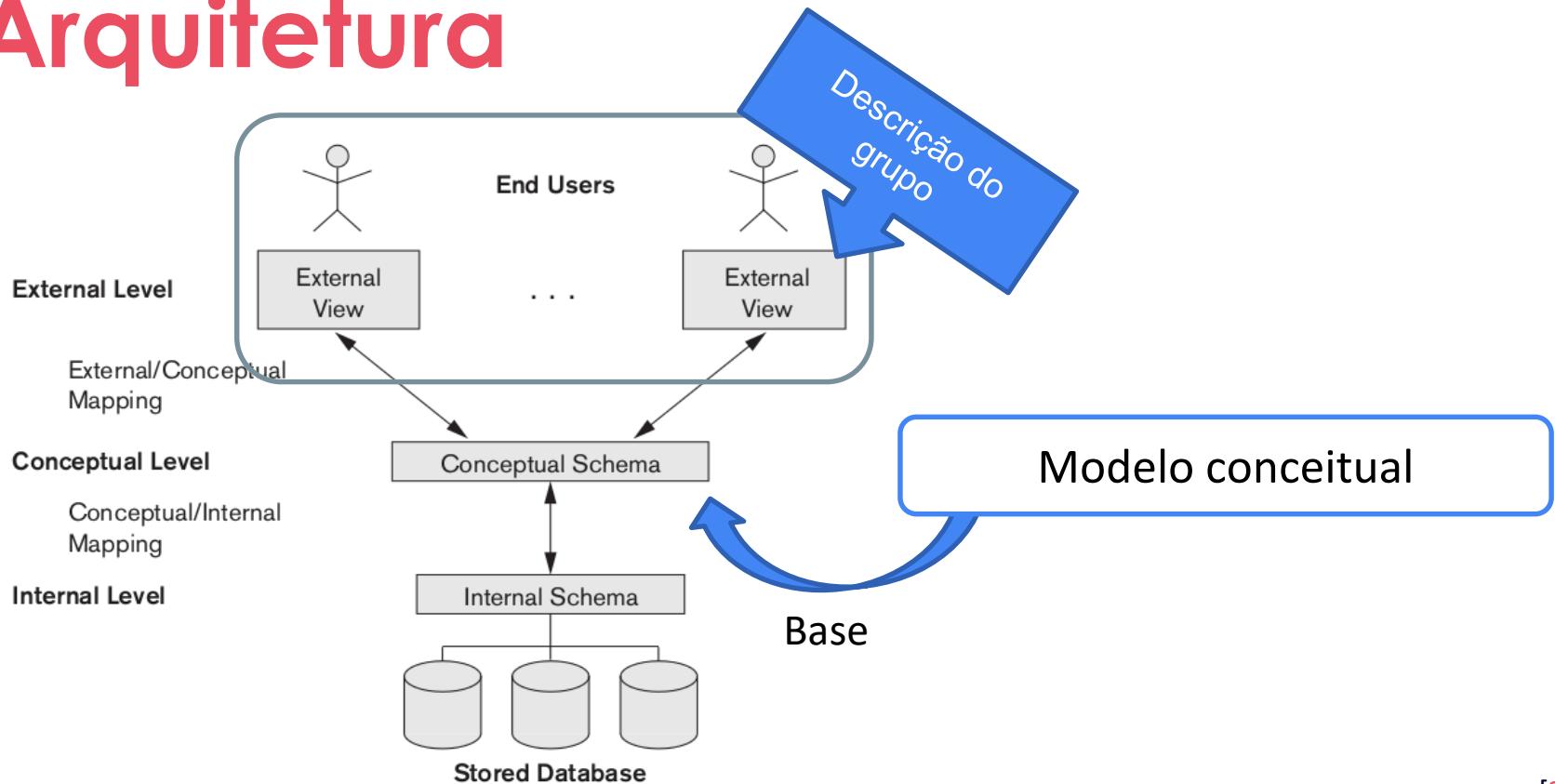
Modelo de dados físico



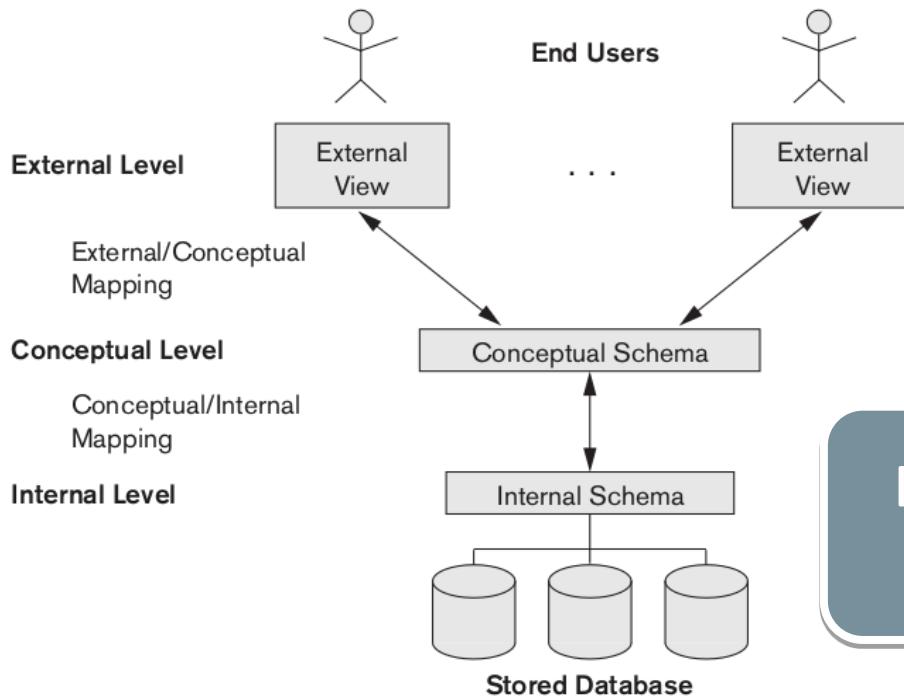
Arquitetura



Arquitetura



Arquitetura



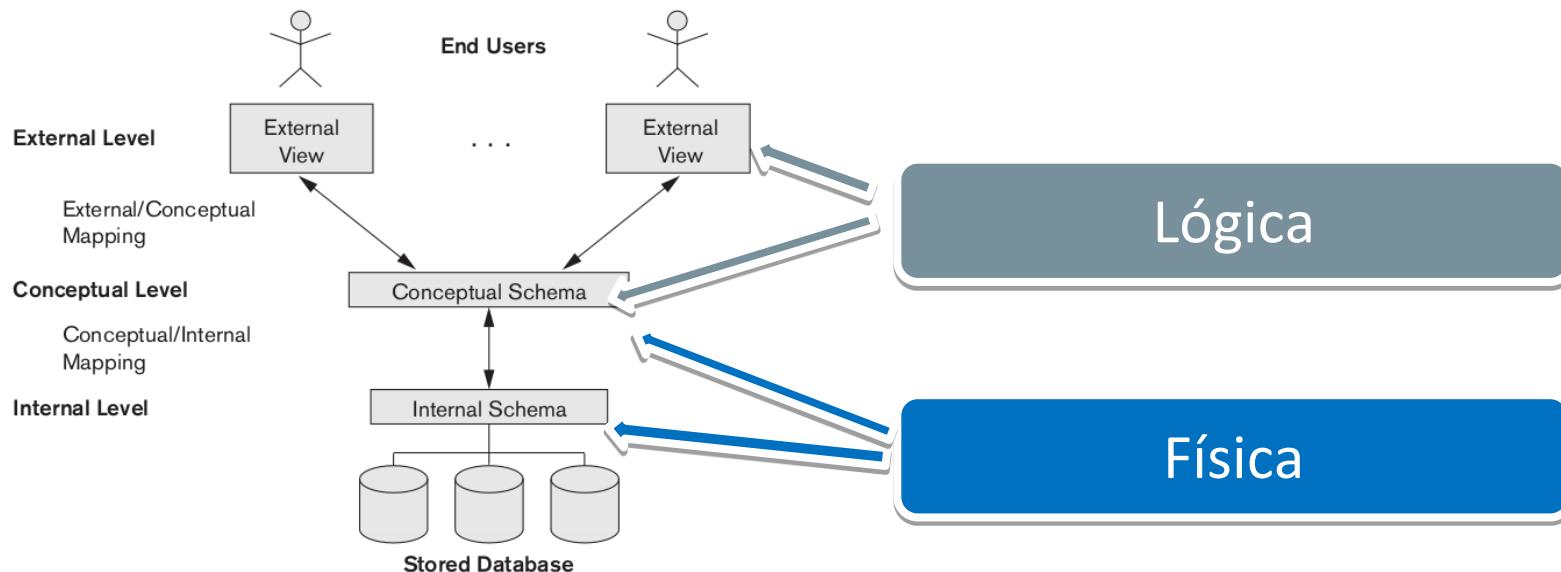
Explicitamente

NOT

Completamente

Desenvolvimento e Design
do sistema

Independência de dados

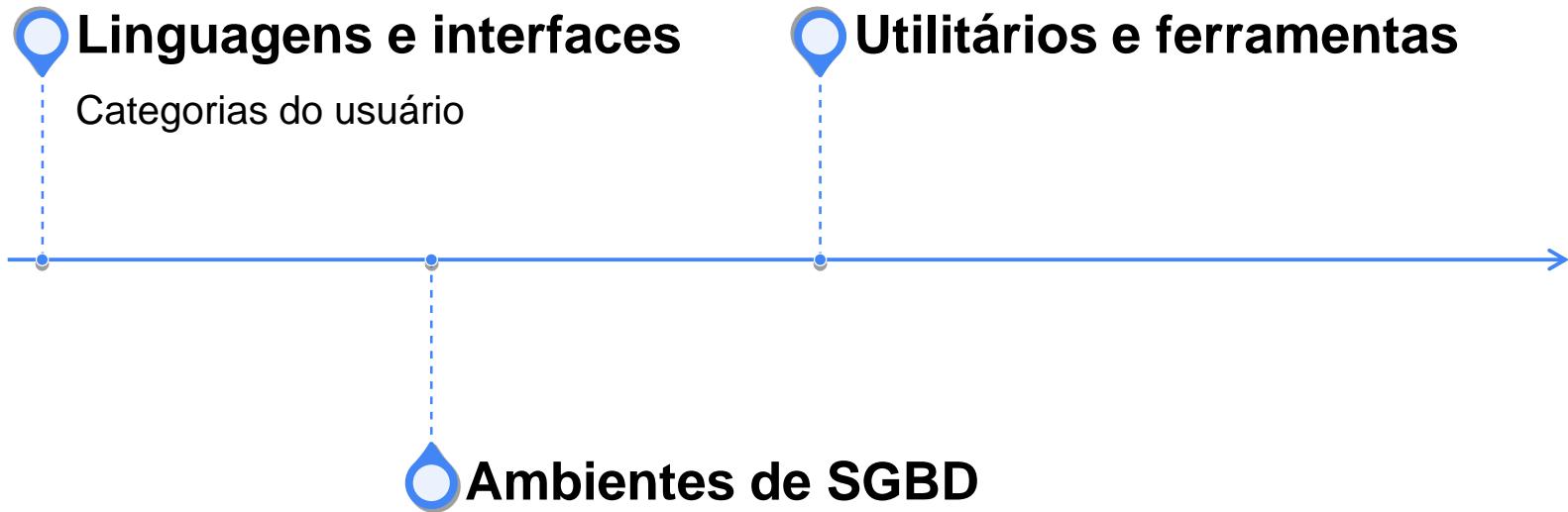


Etapa 9

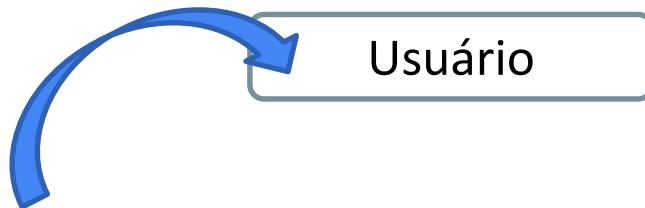
Arquitetura: Linguagem, Interface e Ambiente de SGBDs

// Introdução à Banco de dados

Conversa



Linguagens

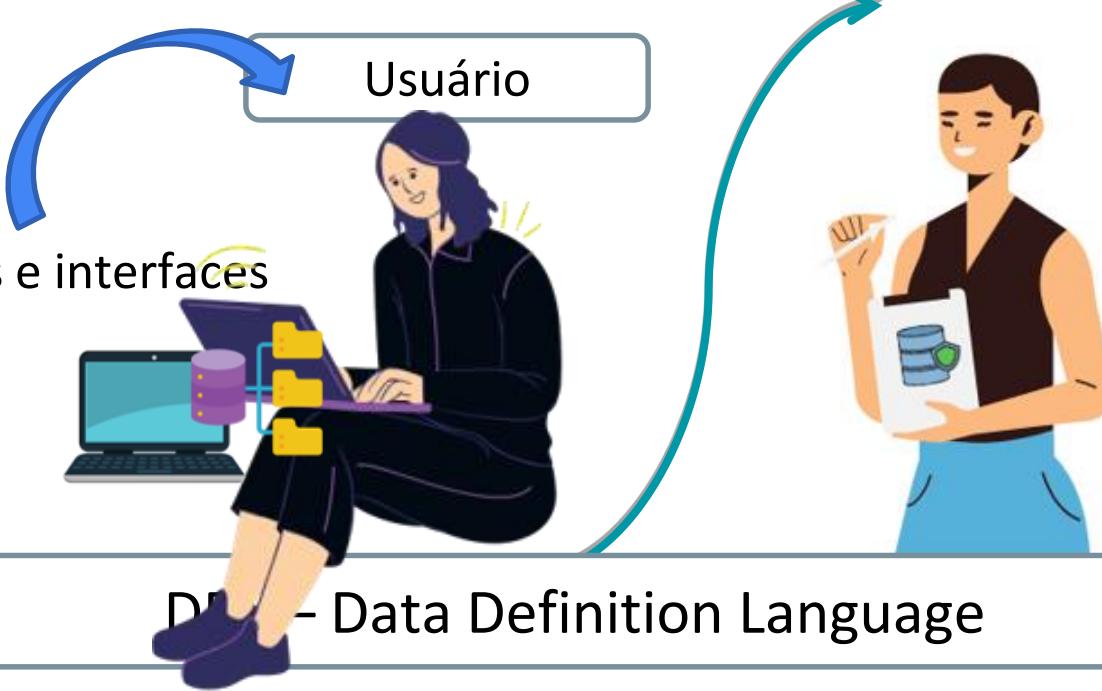


Linguagens e interfaces

DDL – Data Definition Language

Linguagens

Linguagens e interfaces



STUDENT

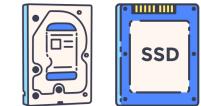
Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE
Course_name Course_number Credit_hours Department

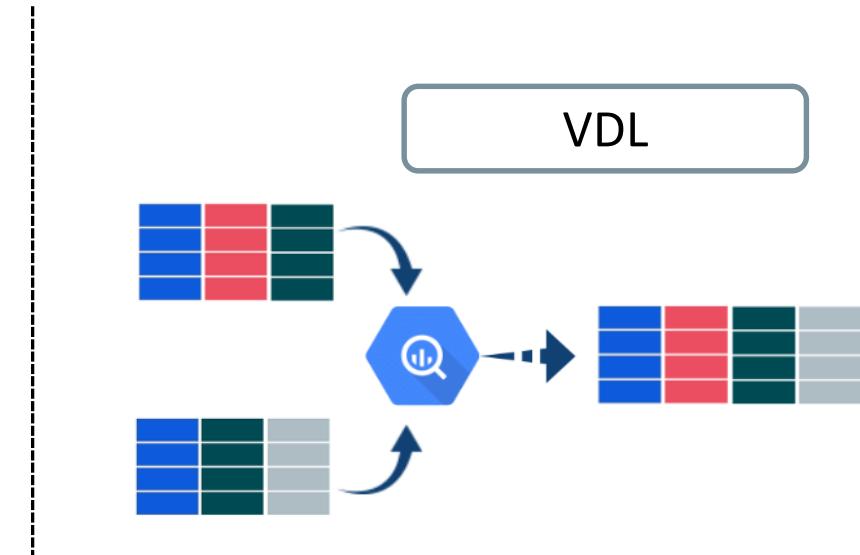
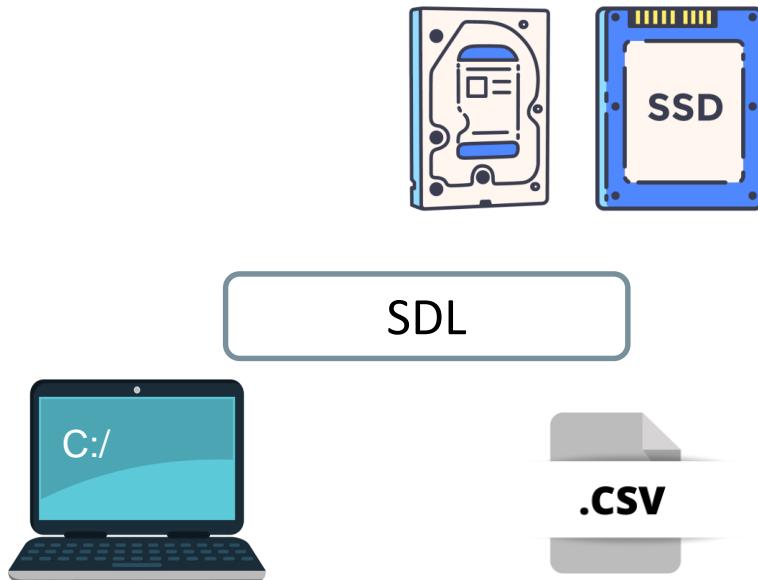
PREREQUISITE

SECTION				
Section_identifier	Course_number	Semester	Year	Instructo

GRADE_REPORT

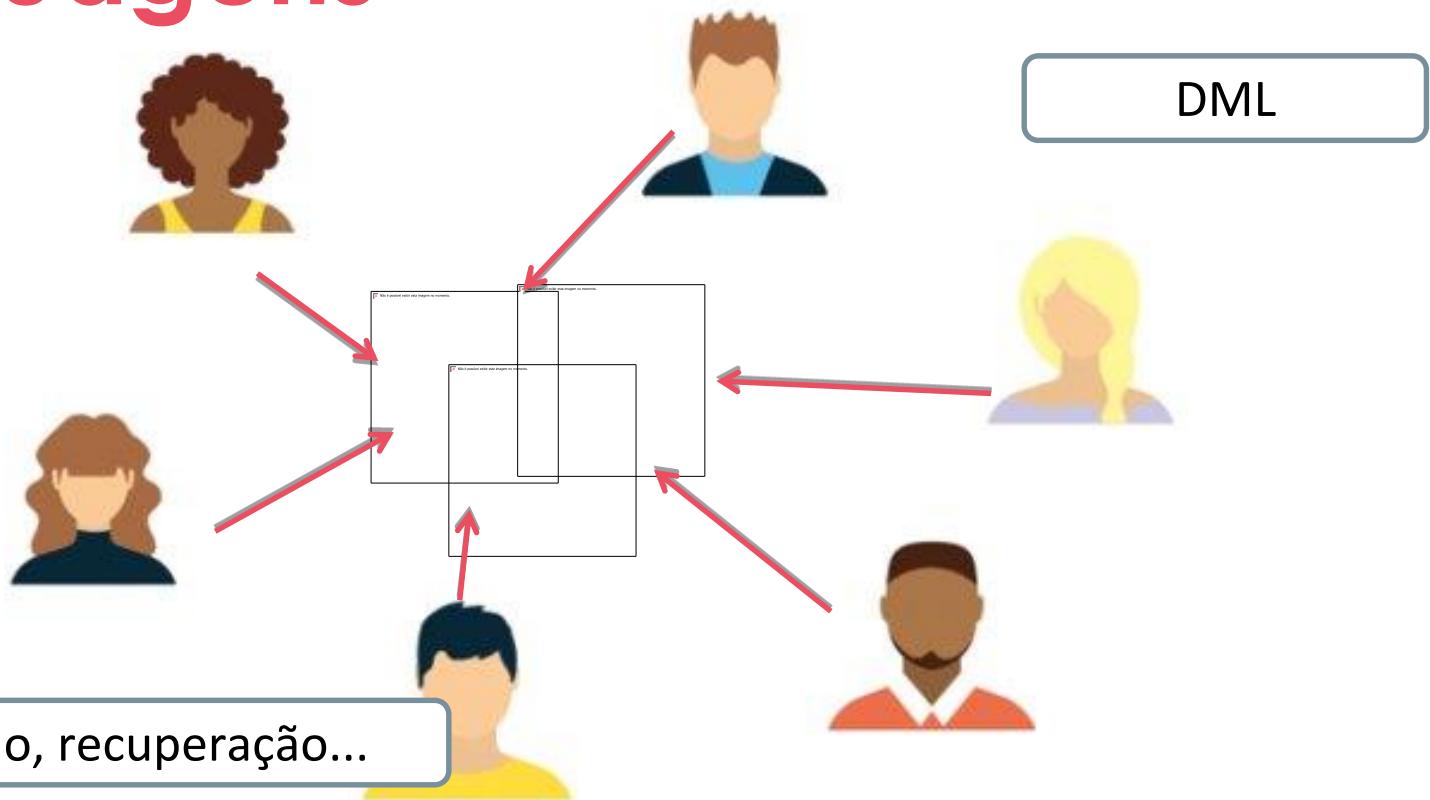


Linguagens

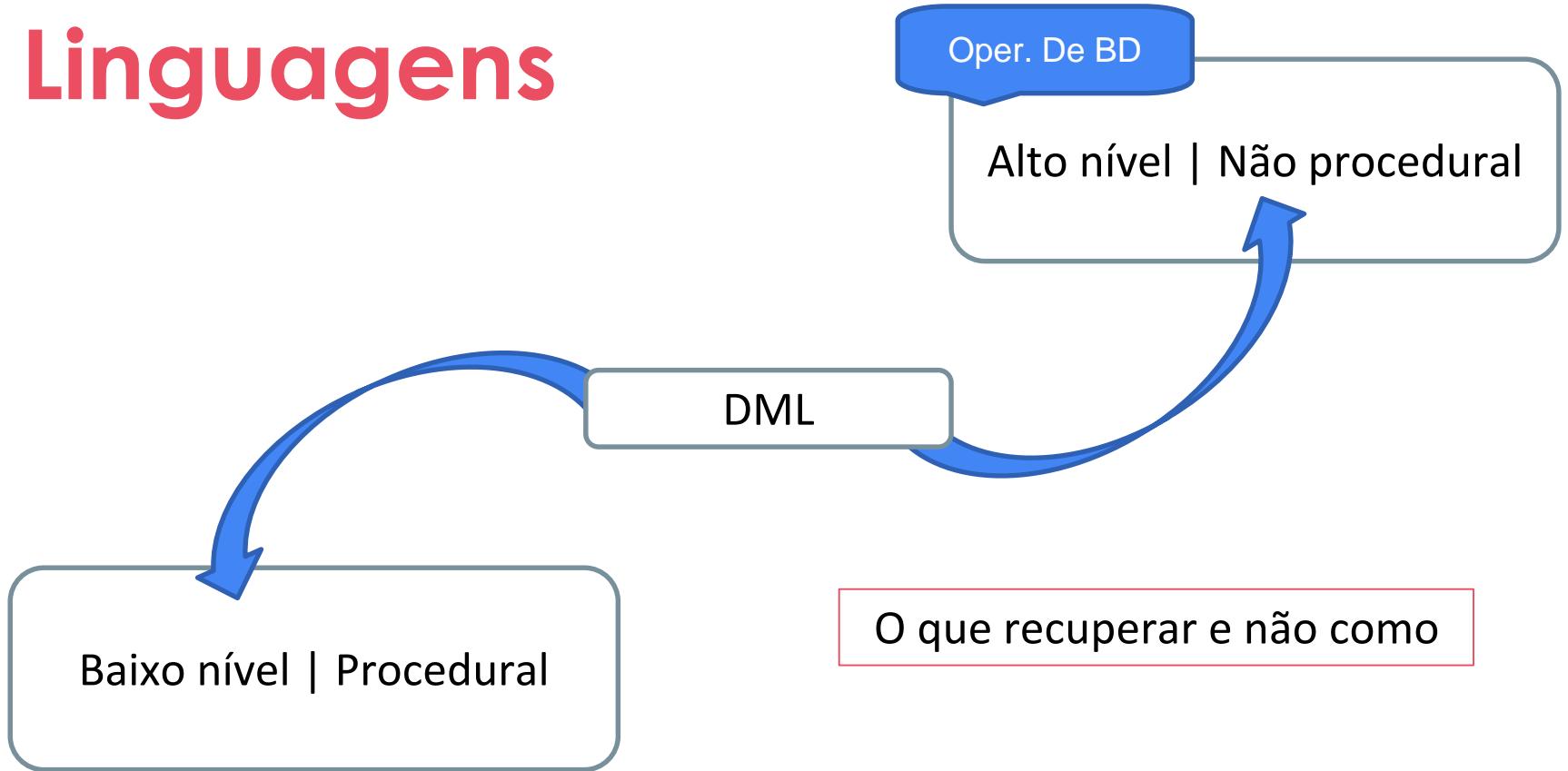


Separação explícita

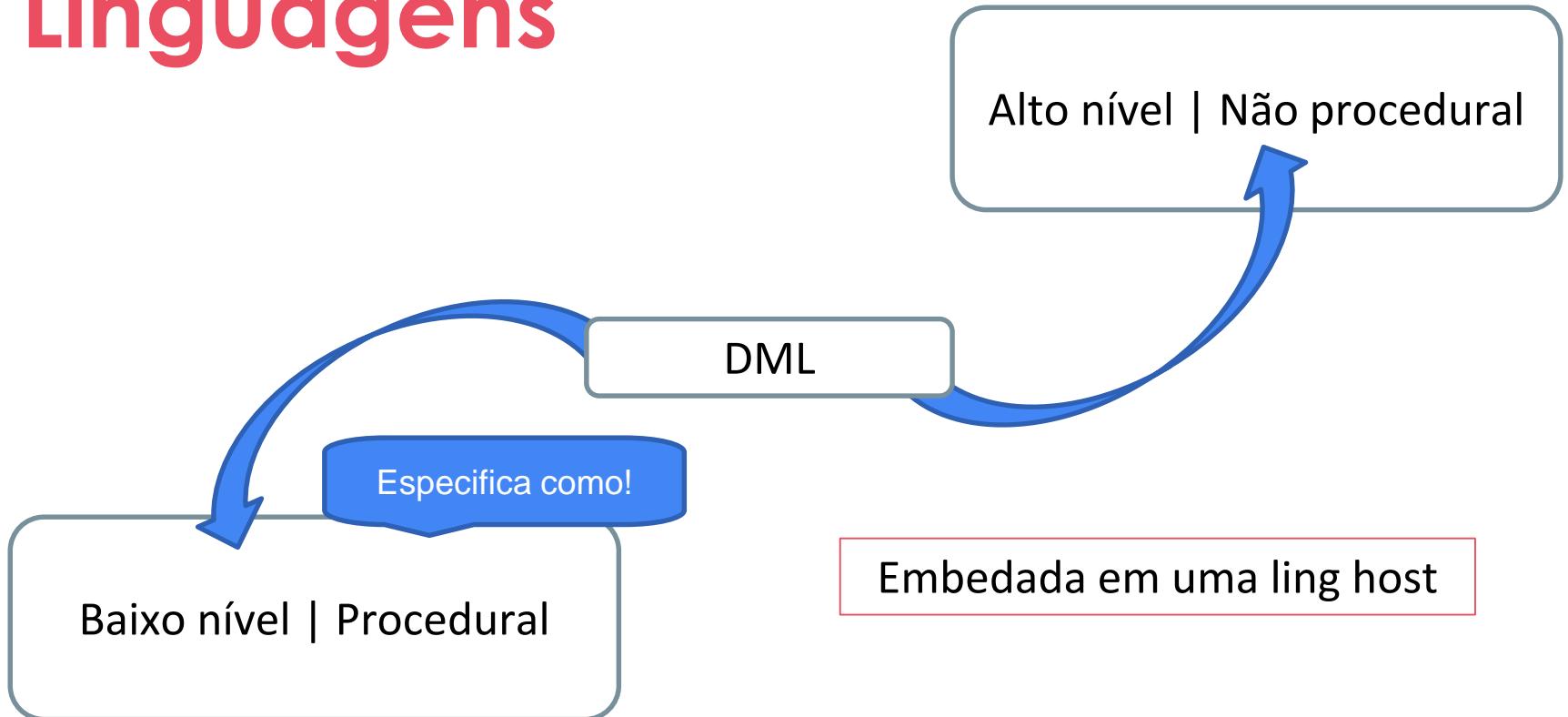
Linguagens



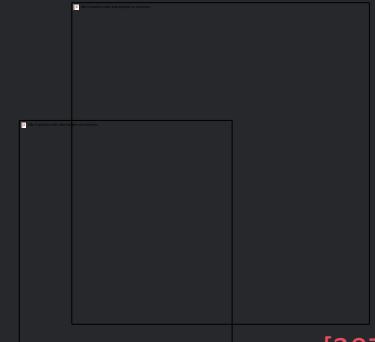
Linguagens



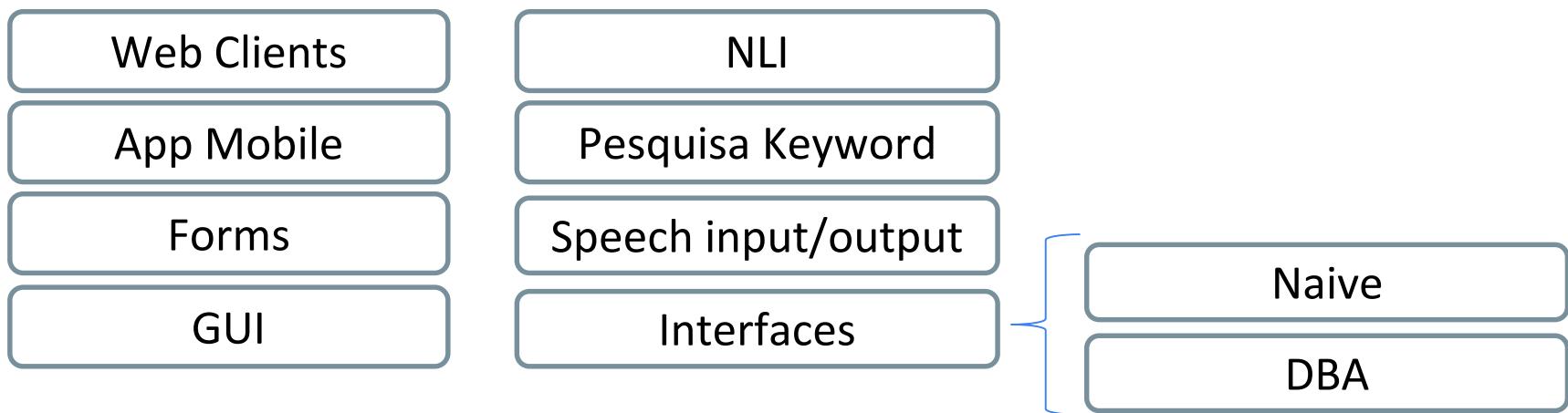
Linguagens



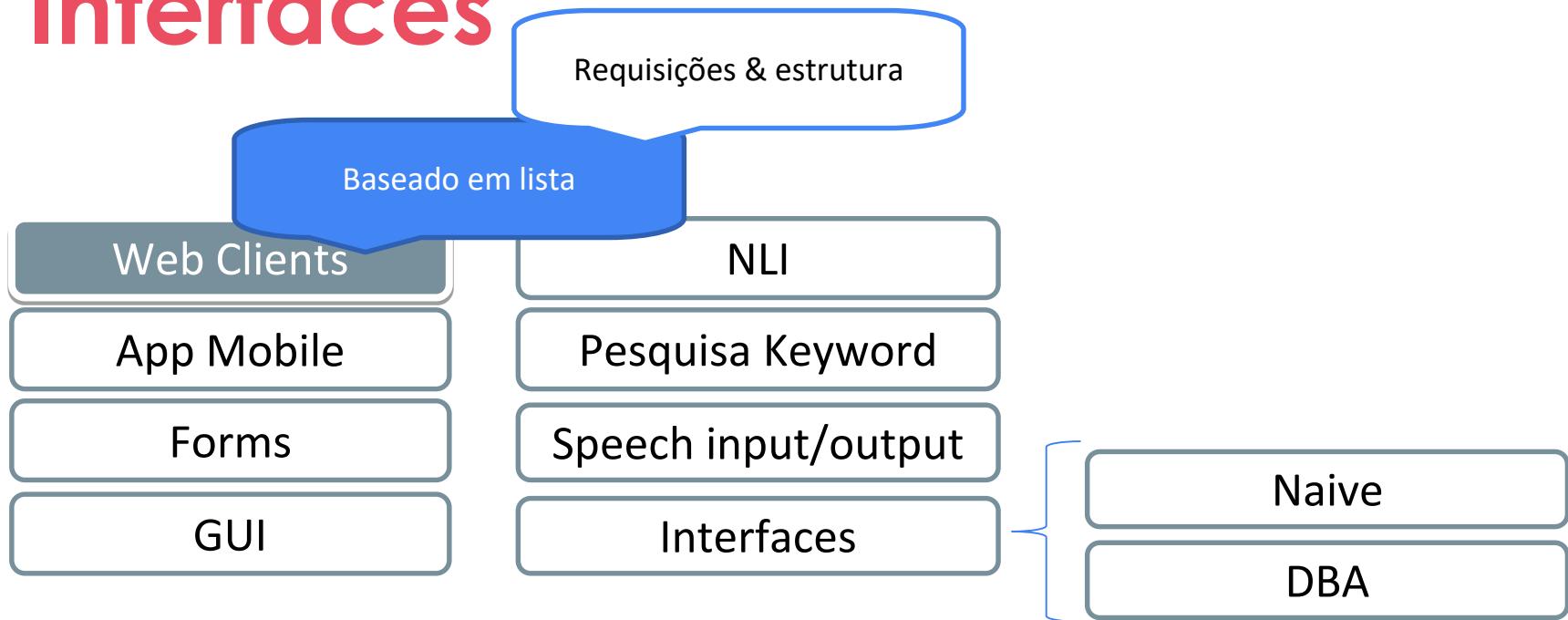
Interfaces



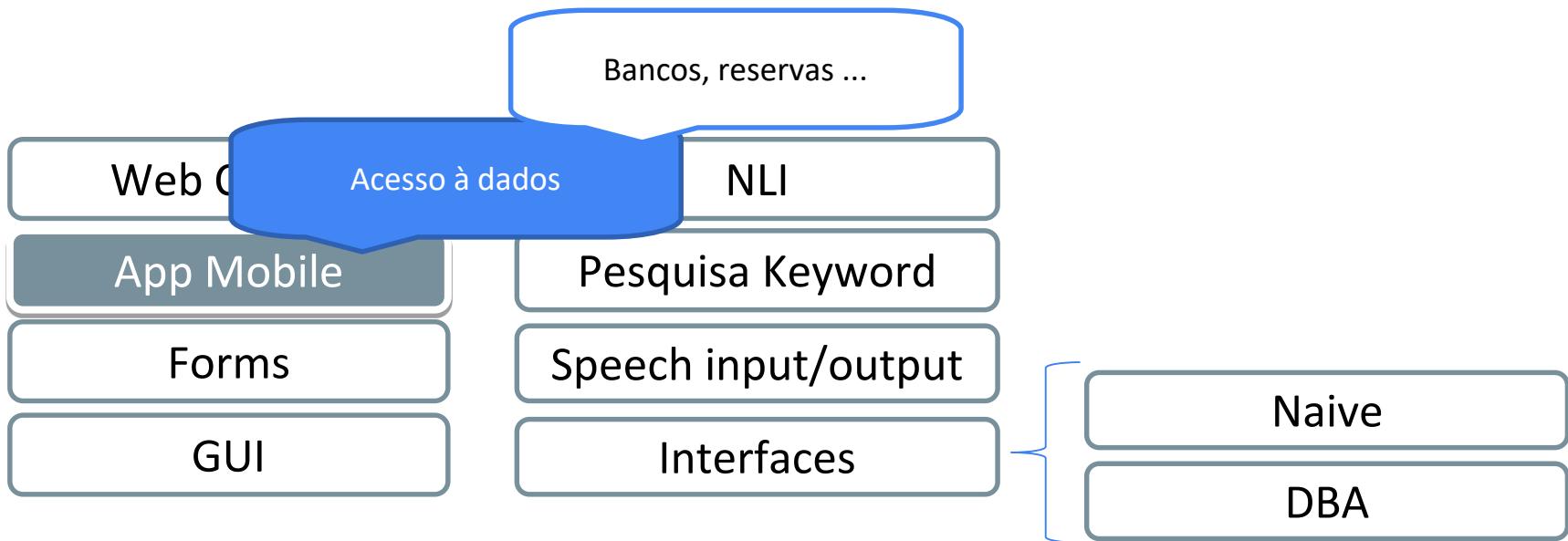
Interfaces



Interfaces

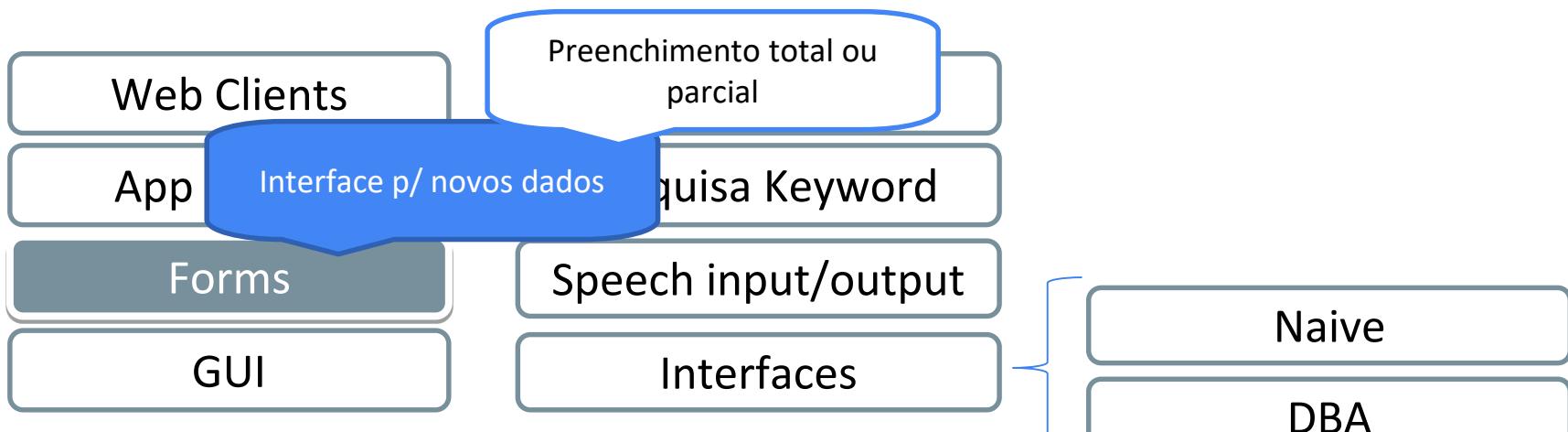


Interfaces



Menu limitado pelo app

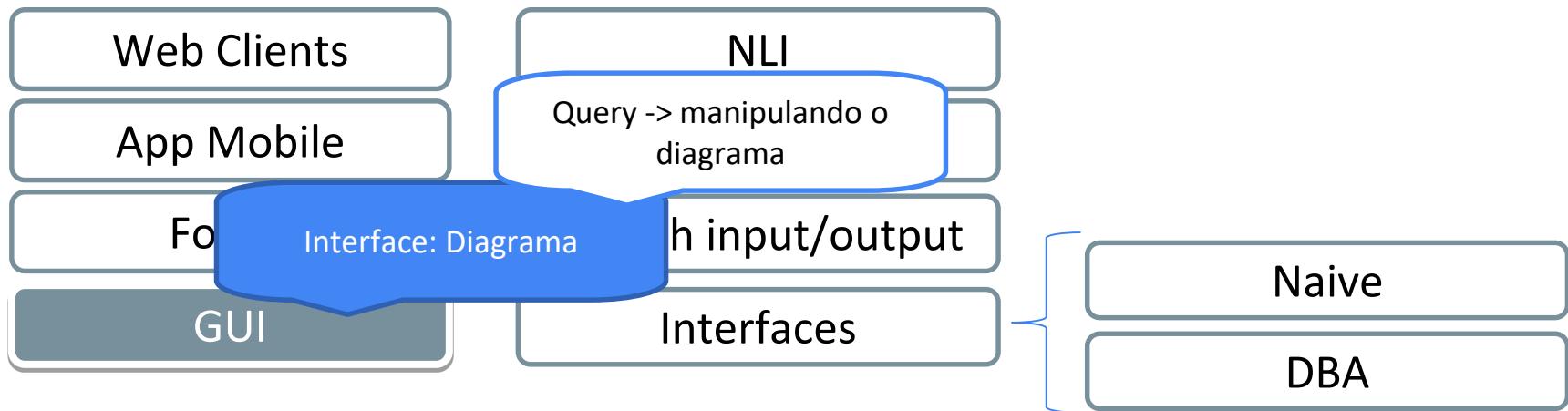
Interfaces



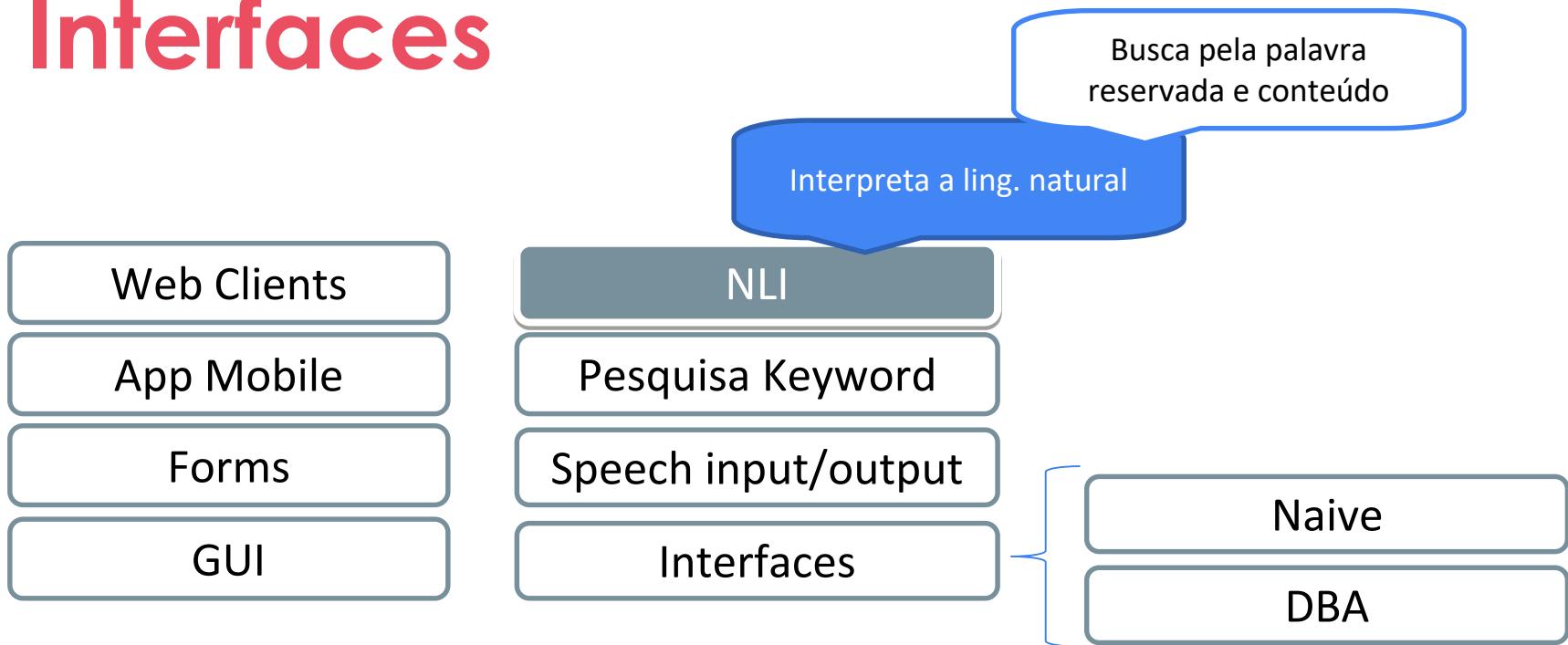
Voltados para Naive com transações canned

SQL*Forms

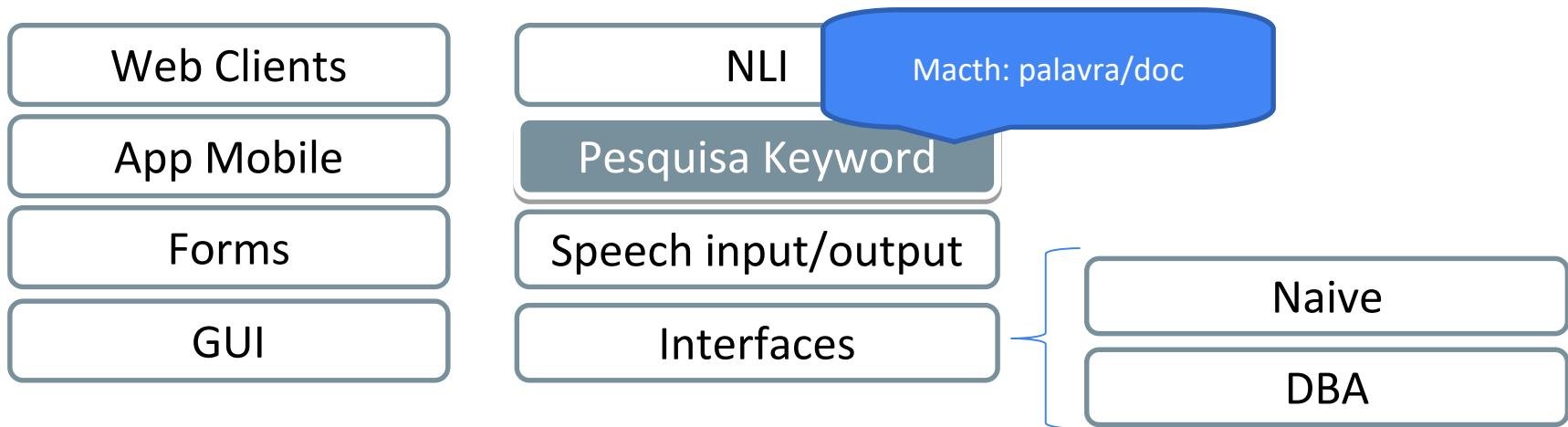
Interfaces



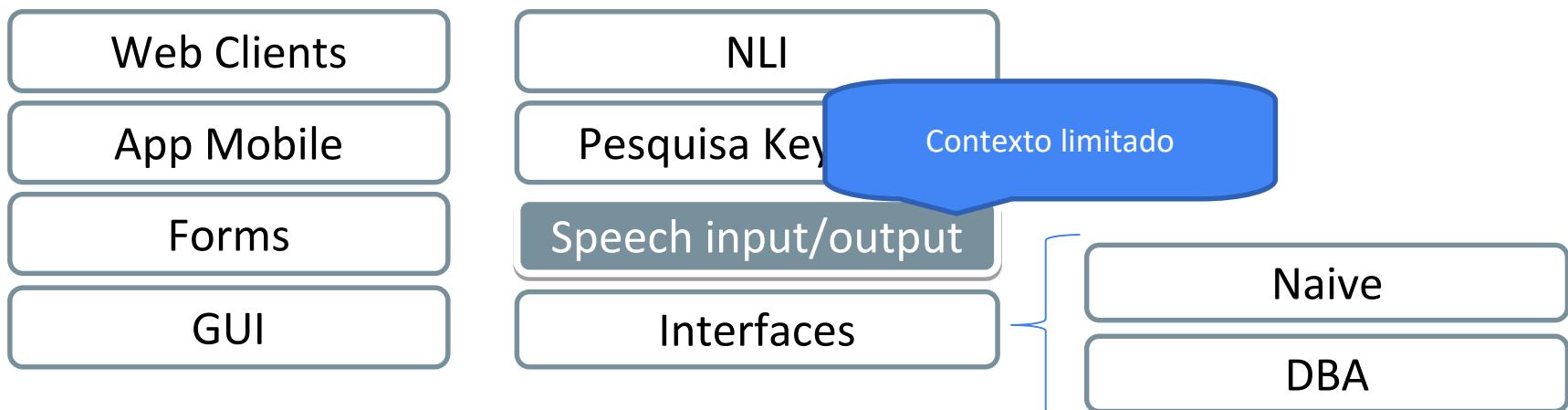
Interfaces



Interfaces

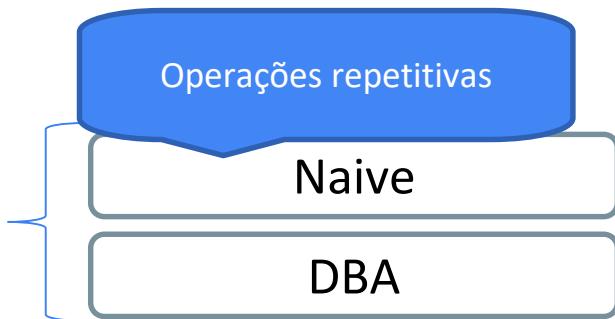
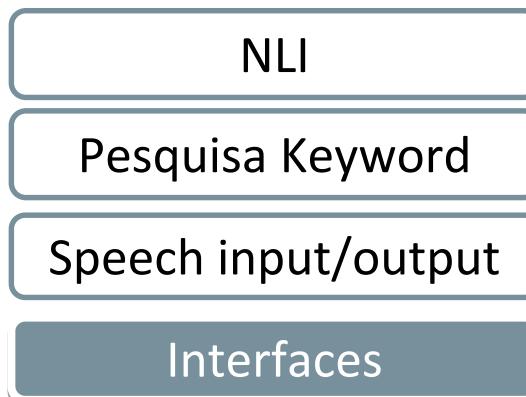


Interfaces



Speech como input e resposta

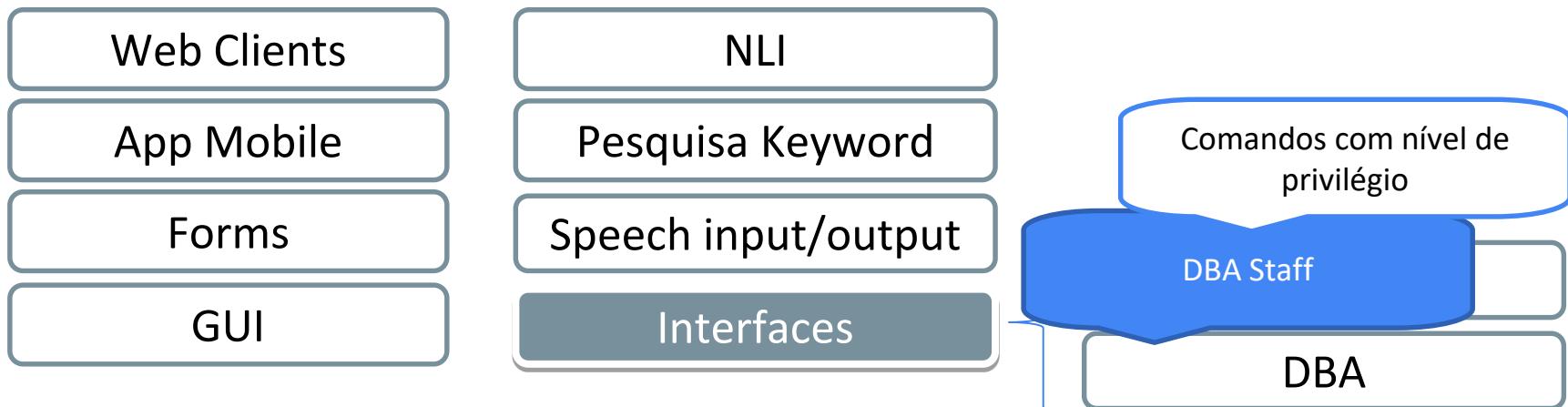
Interfaces



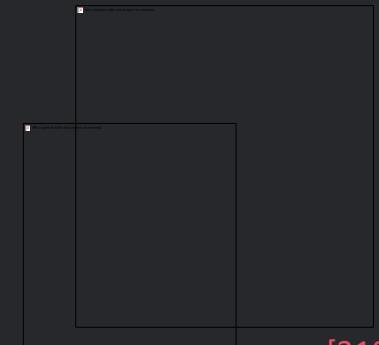
Repeat

Transações de rotina e repetitivas - saldo do banco

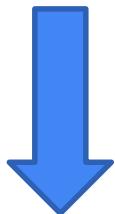
Interfaces



Ambiente



Componentes



Software



Modularizado

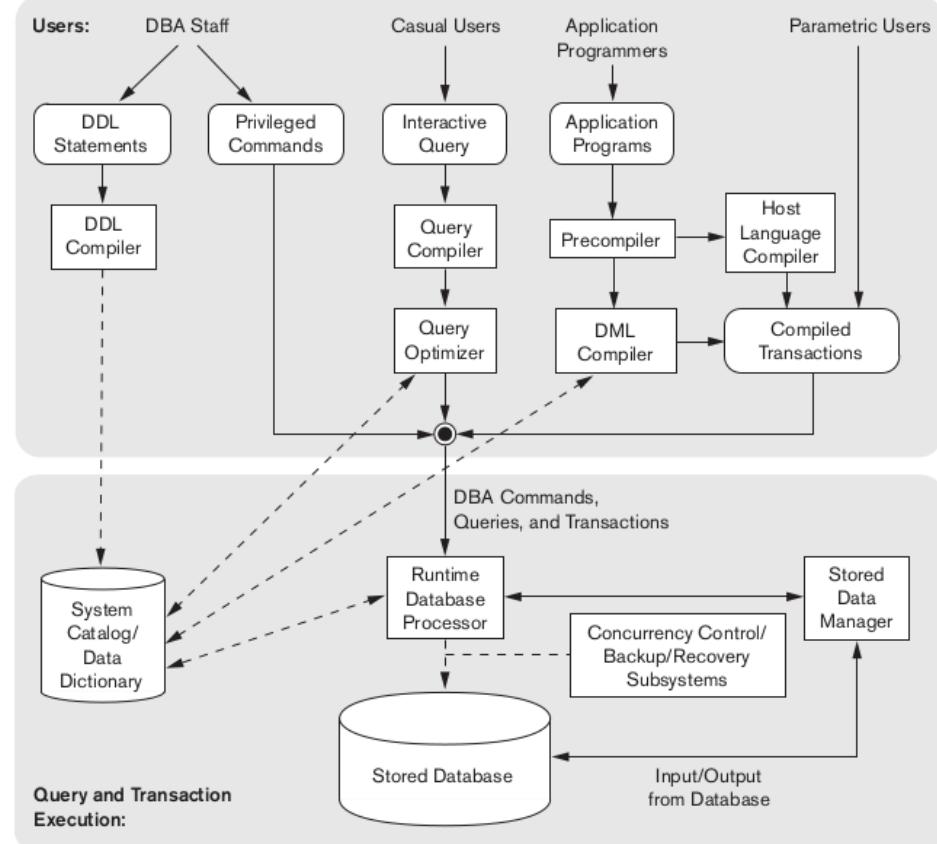


Figure 2.3

Component modules of a DBMS and their interactions.

Componentes

Ambiente de BD

Módulos internos

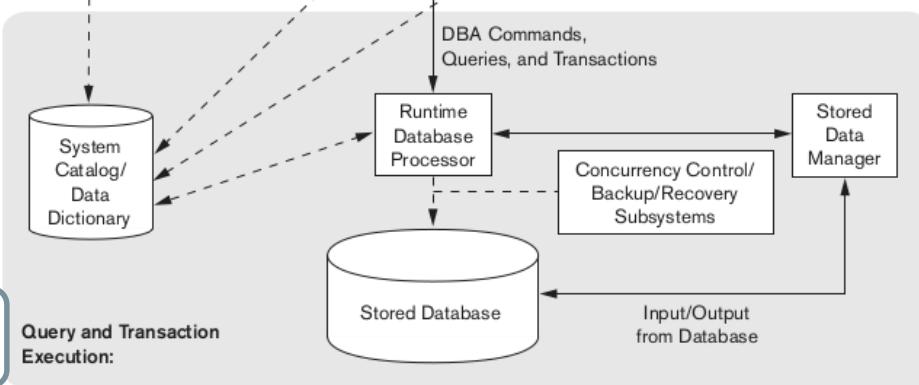
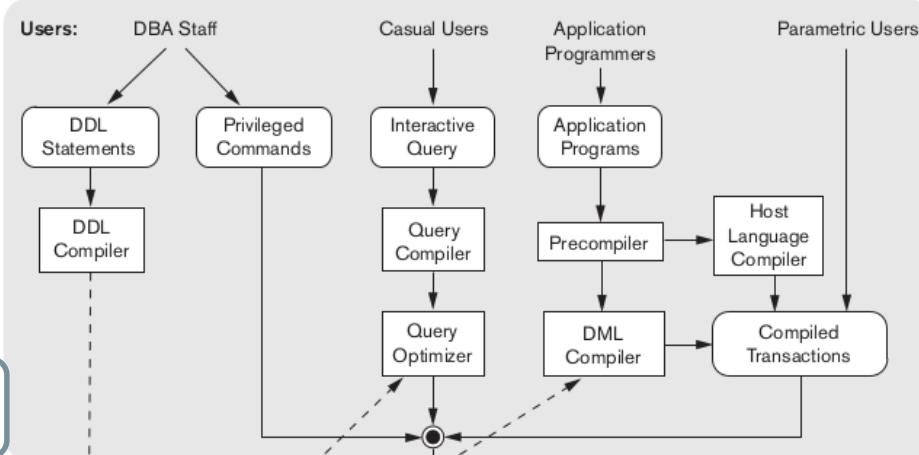


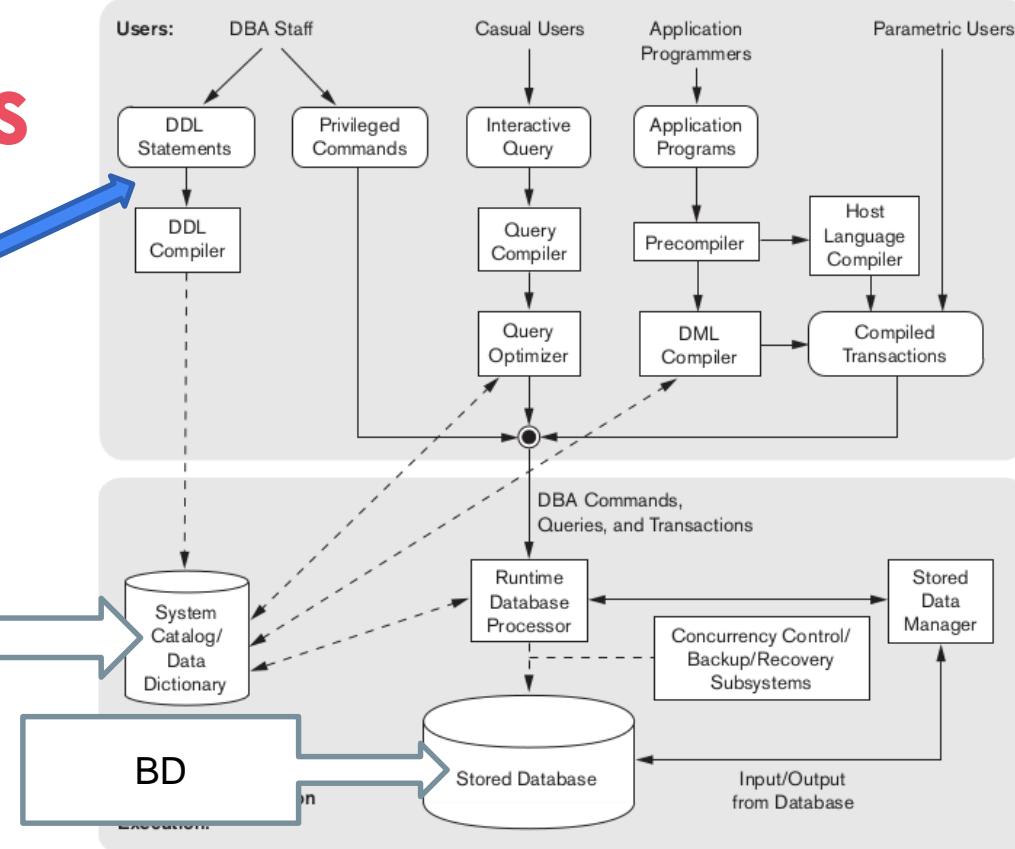
Figure 2.3

Component modules of a DBMS and their interactions.

Componentes

Esquema

Info de módulos



Componentes

Acesso ocasional

Ex: Reordenação de operações

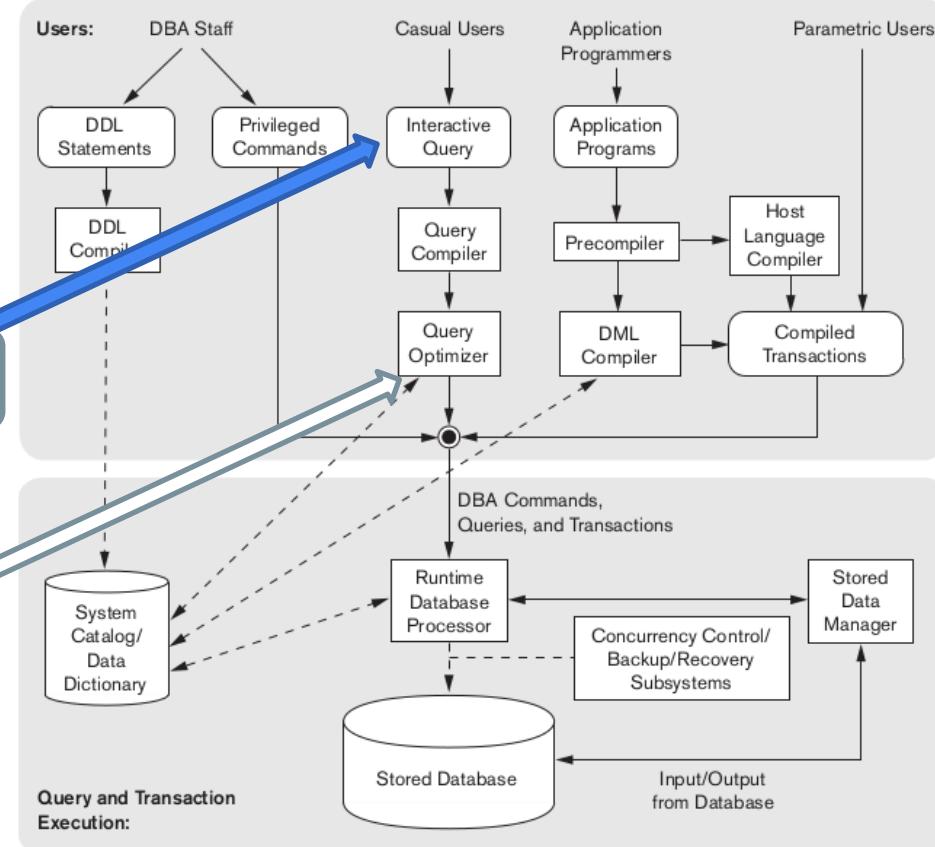
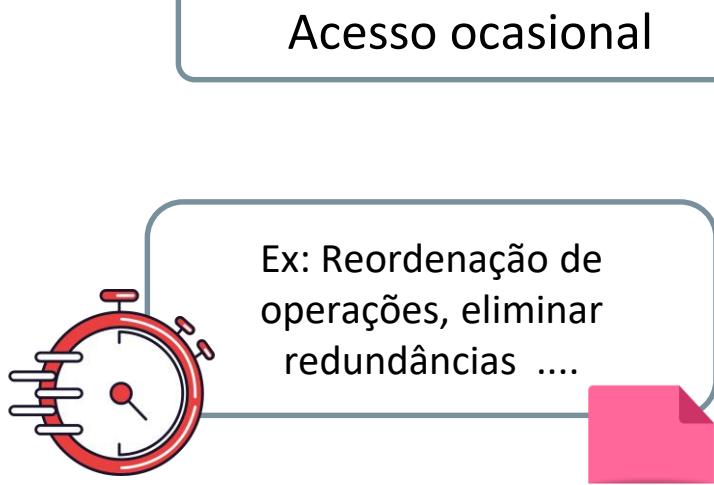


Figure 2.3

Component modules of a DBMS and their interactions.

Componentes



Ex: Reordenação de operações, eliminar redundâncias

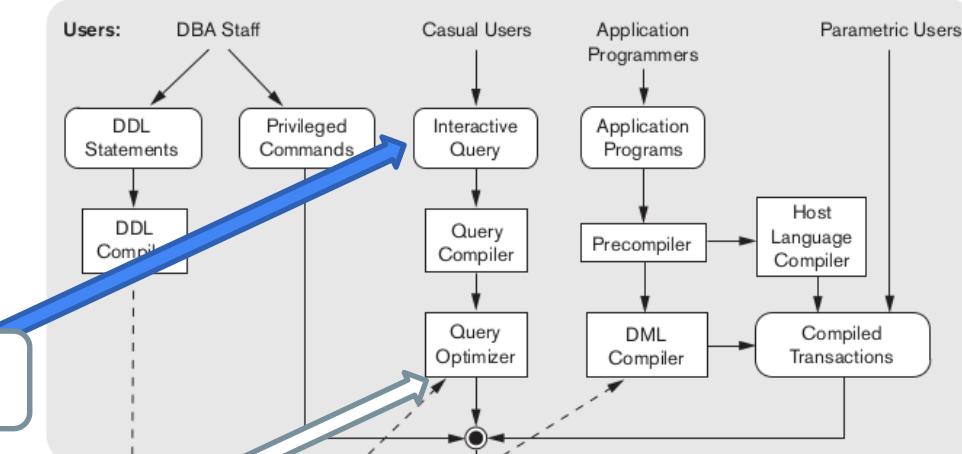


Figure 2.3
Component modules of a DBMS and their interactions.

Componentes



Linguagens de prog.

Extrai DML

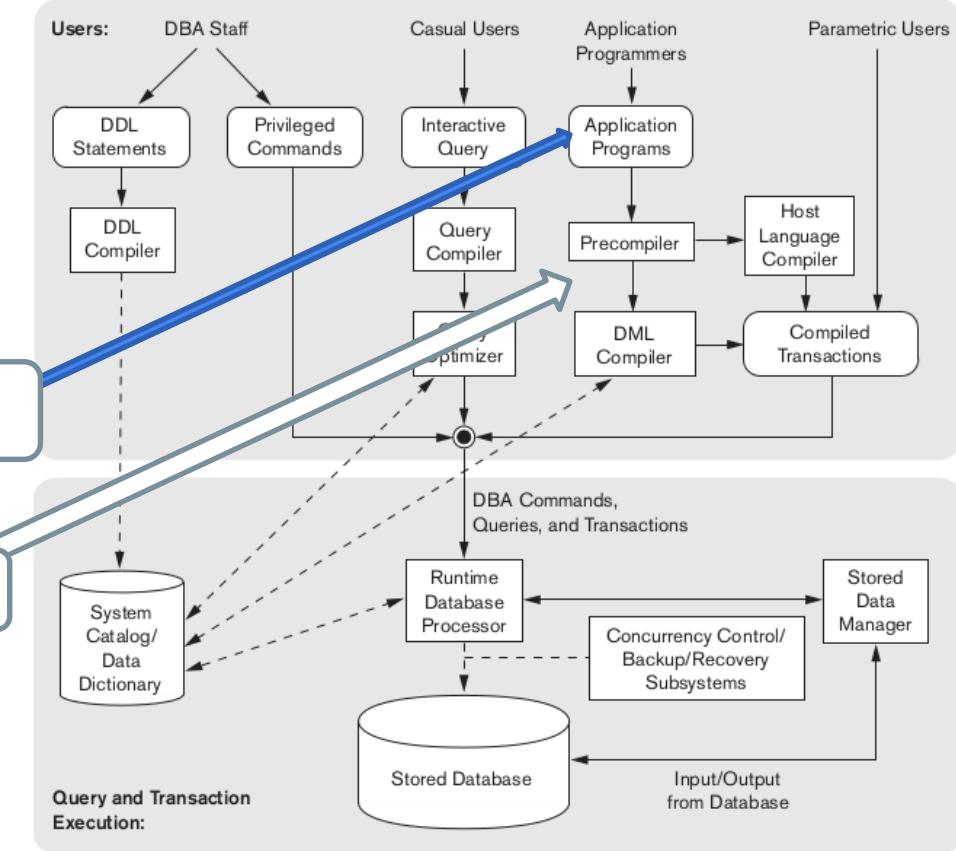


Figure 2.3

Component modules of a DBMS and their interactions.

Componentes

Canned Transaction

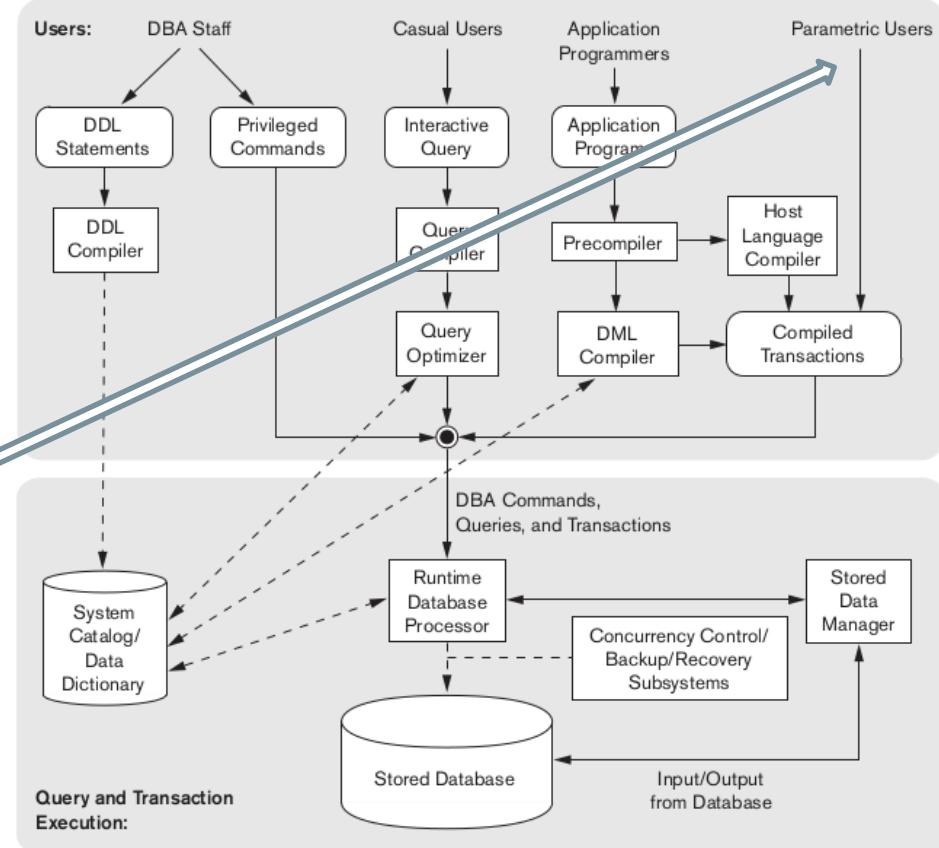


Figure 2.3

Component modules of a DBMS and their interactions.

Componentes

Privileged commands,
Query plans,
Canned transactions ...

Infos de hd/ram

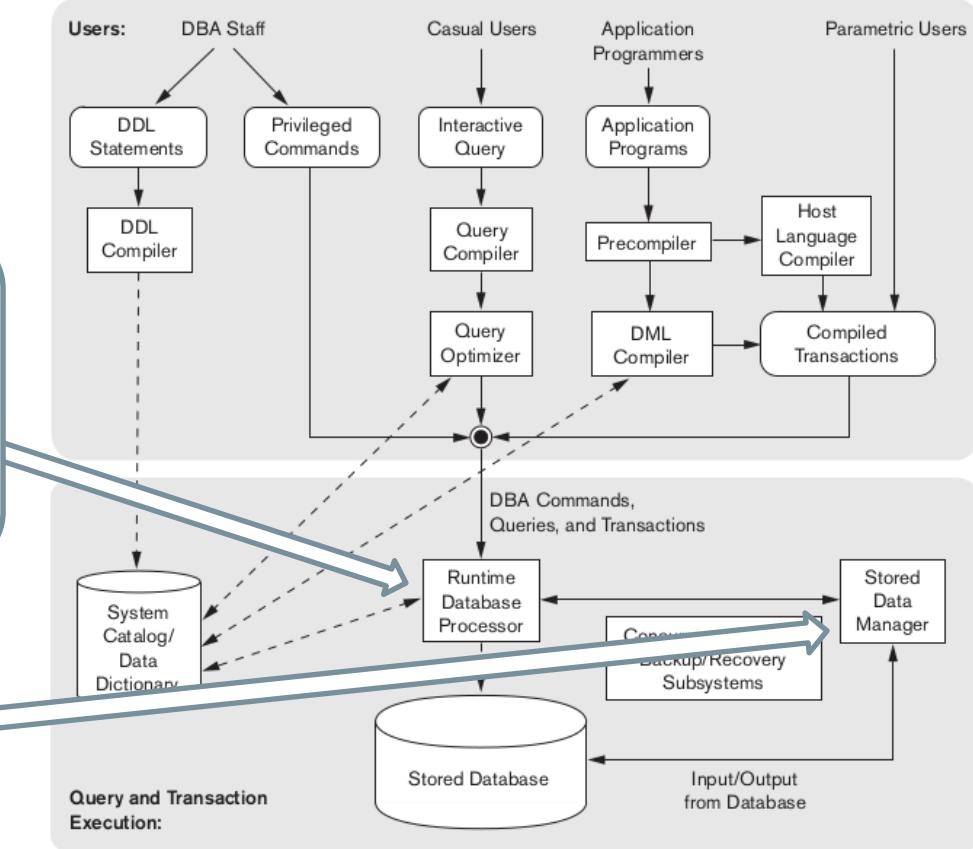


Figure 2.3

Component modules of a DBMS and their interactions.

Componentes

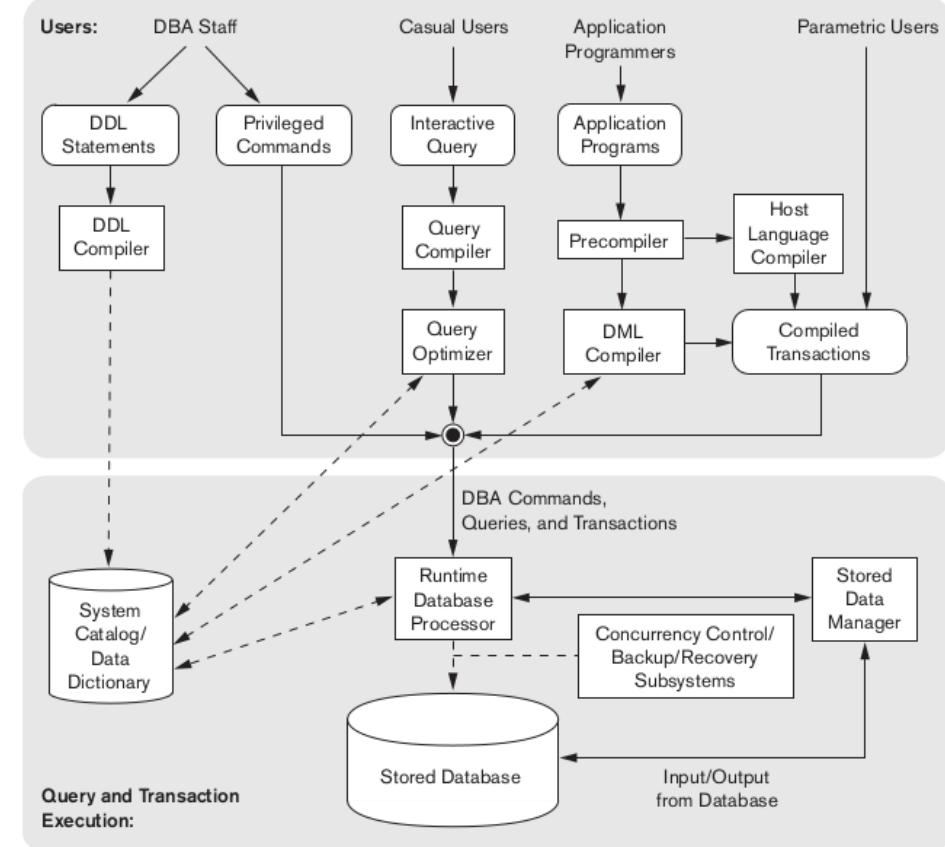
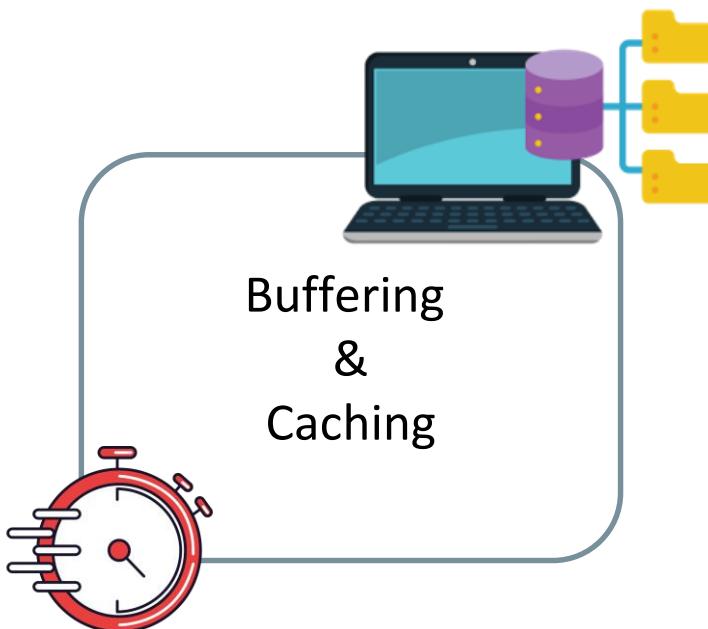
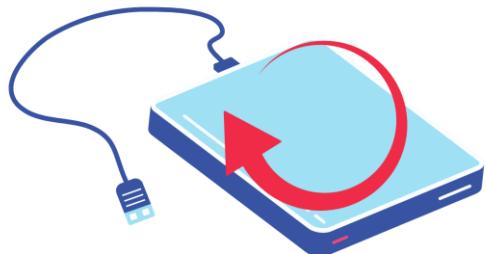


Figure 2.3

Component modules of a DBMS and their interactions.

Utilities – Gerenciamento



Monitoramento

Reorganização do storage

Backup

Loading

Reformatar os dados



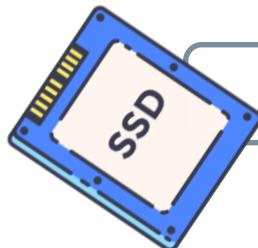
Utilities – Gerenciamento



Monitoramento

Reorganização do storage

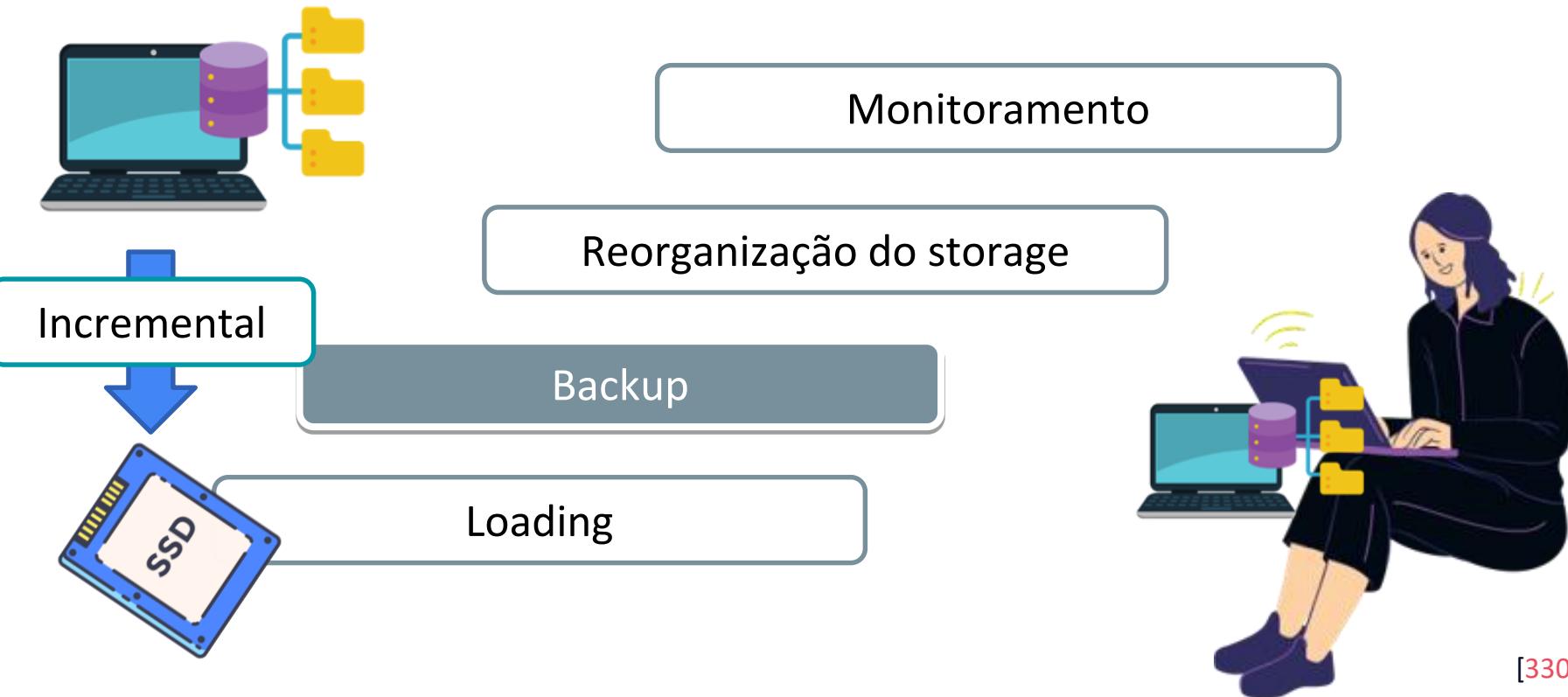
Backup



Loading



Utilities – Gerenciamento



Utilities – Gerenciamento



Monitoramento

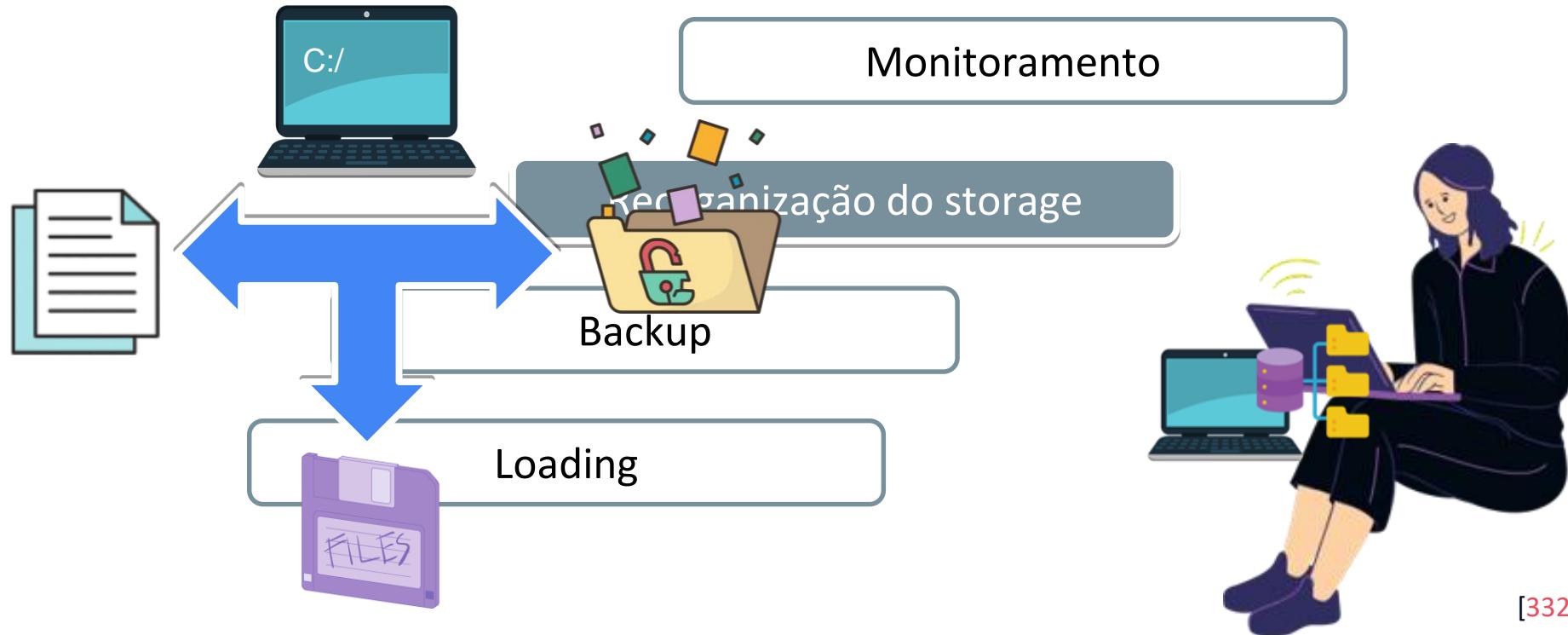
Reorganização do storage

Backup

Loading



Utilities – Gerenciamento



Utilities – Gerenciamento



Monitoramento

Reorganização do storage

Backup

Loading

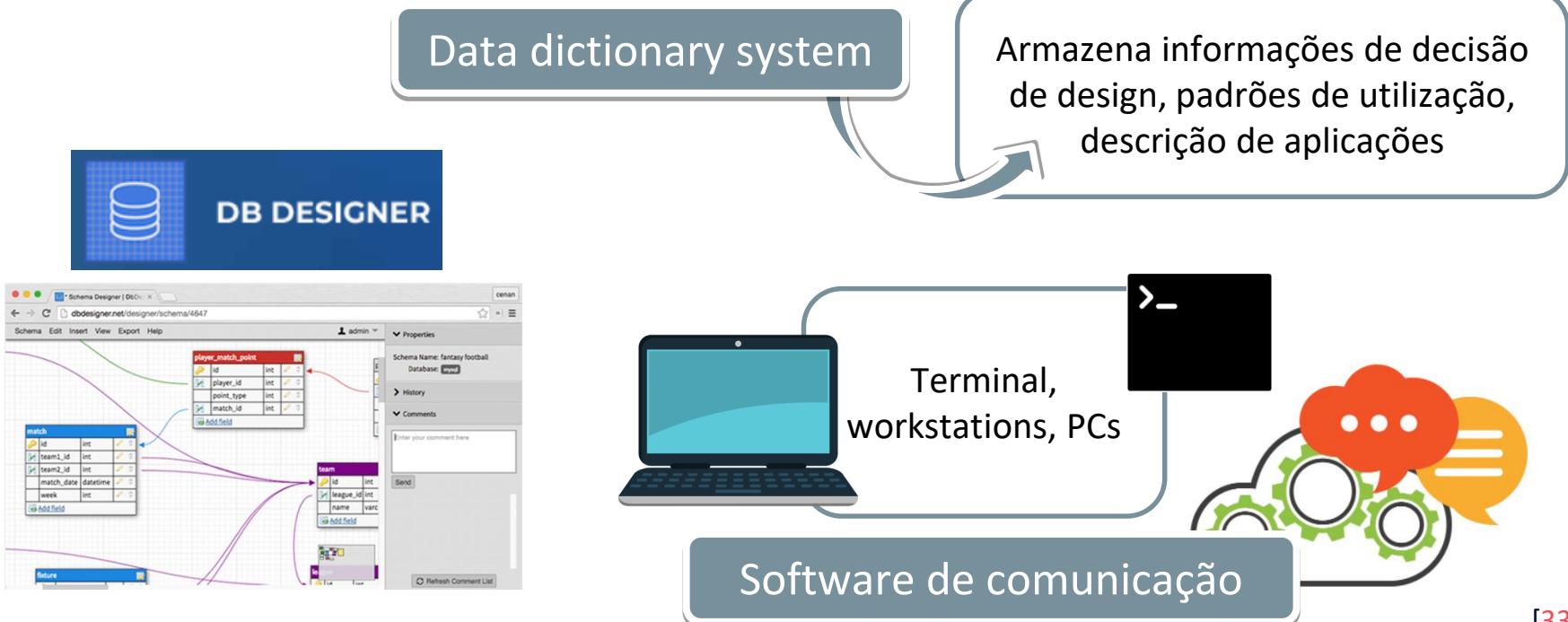
Estatísticas do BD



Decisões



Ferramentas e aplicações

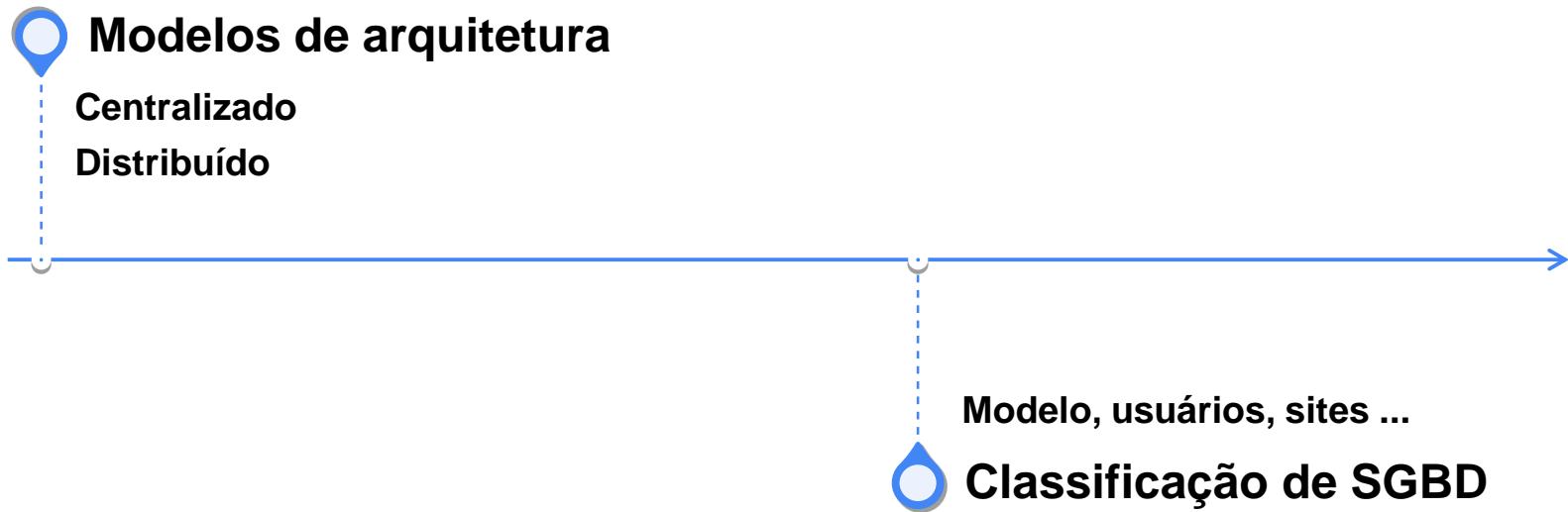


Etapa 10

Arquitetura: Modelo Cliente-servidor e Classificação de SGBDs

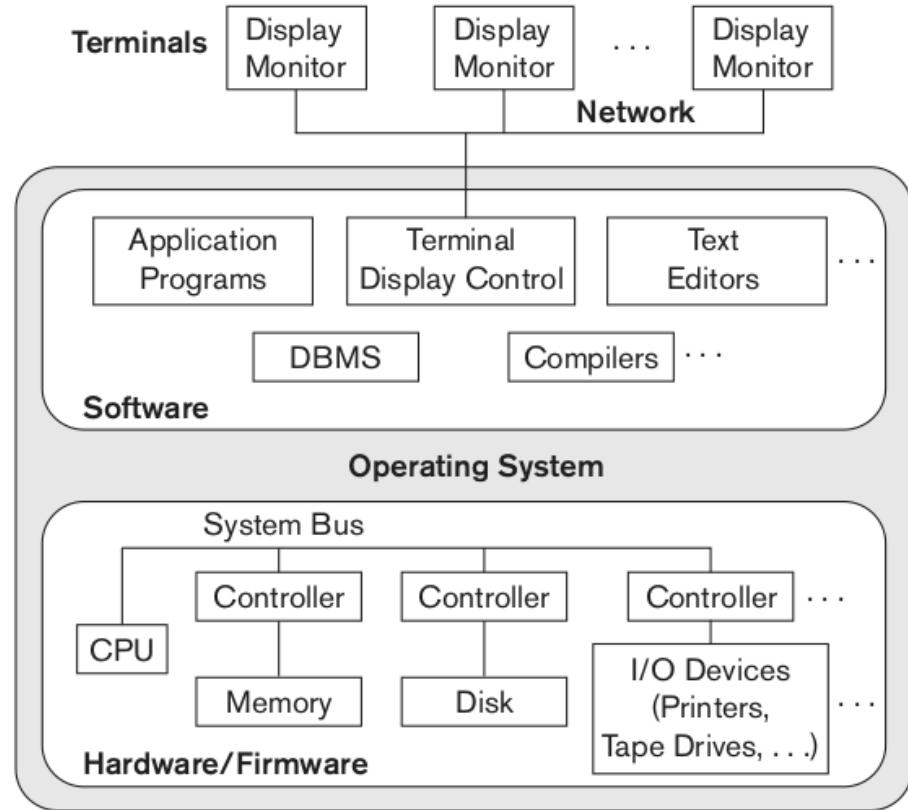
// Introdução à Banco de dados

Conversa

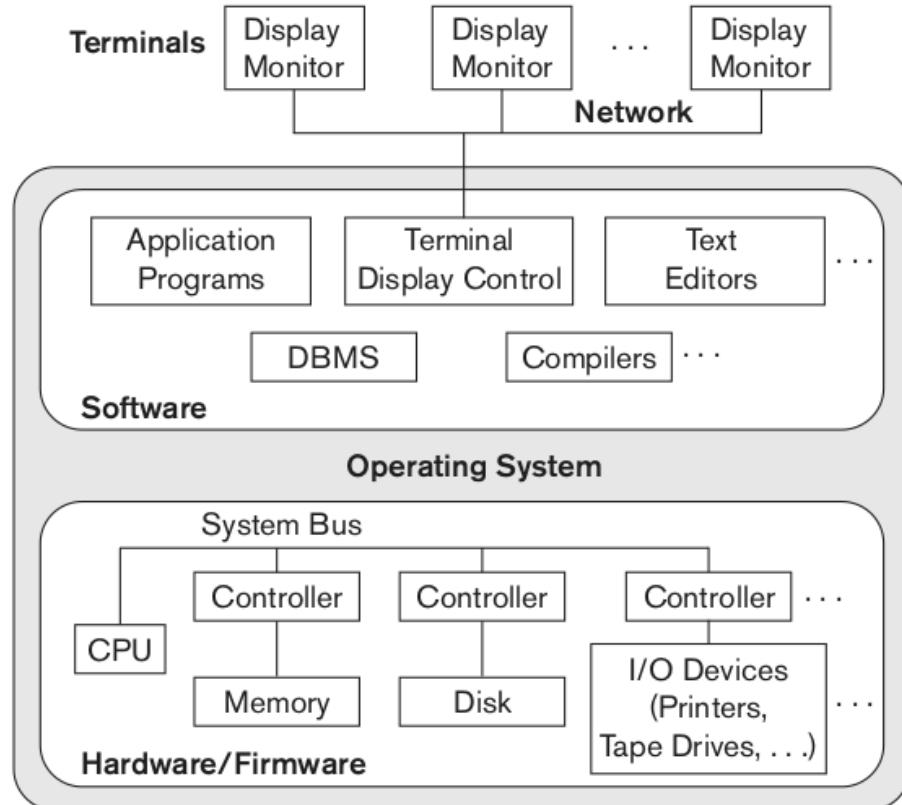
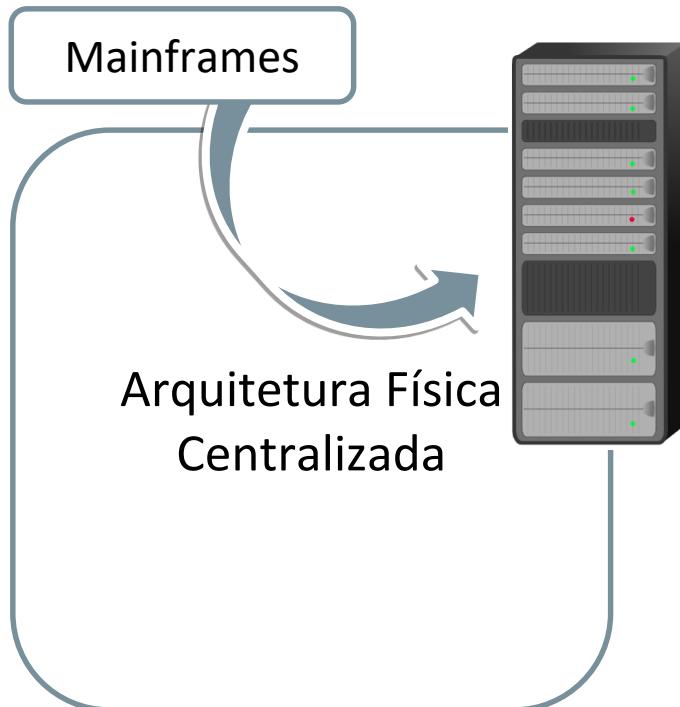


Arquitetura

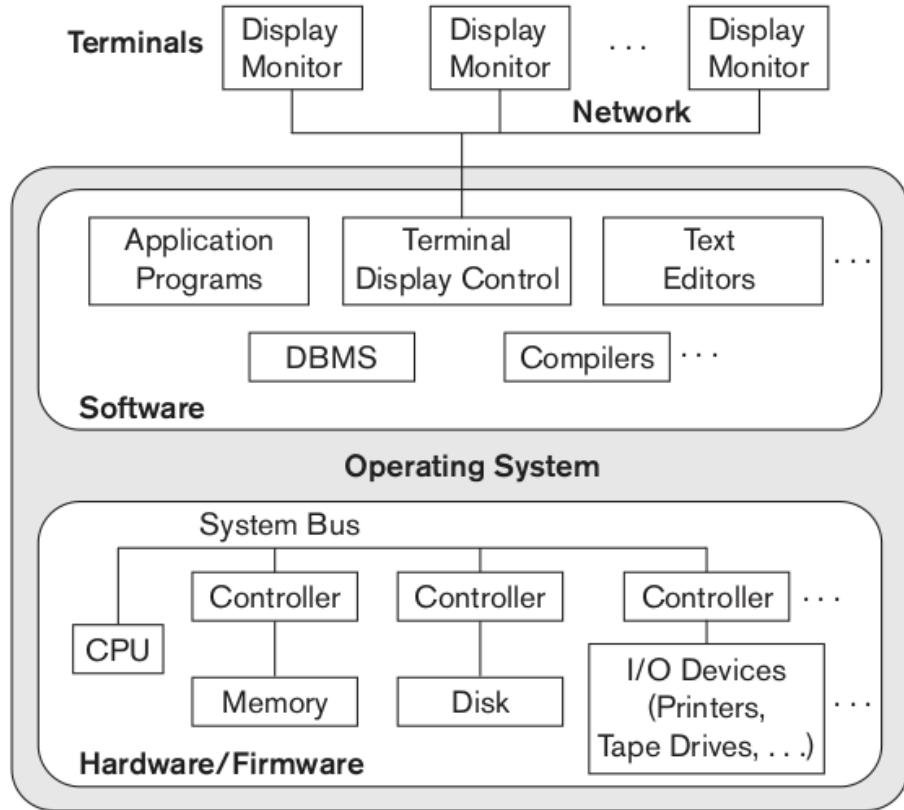
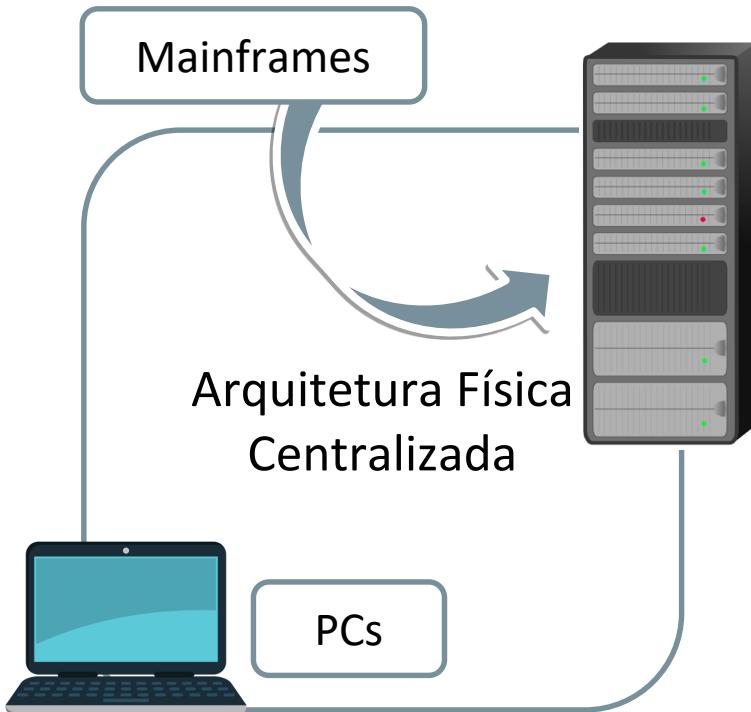
Arquitetura Física
Centralizada



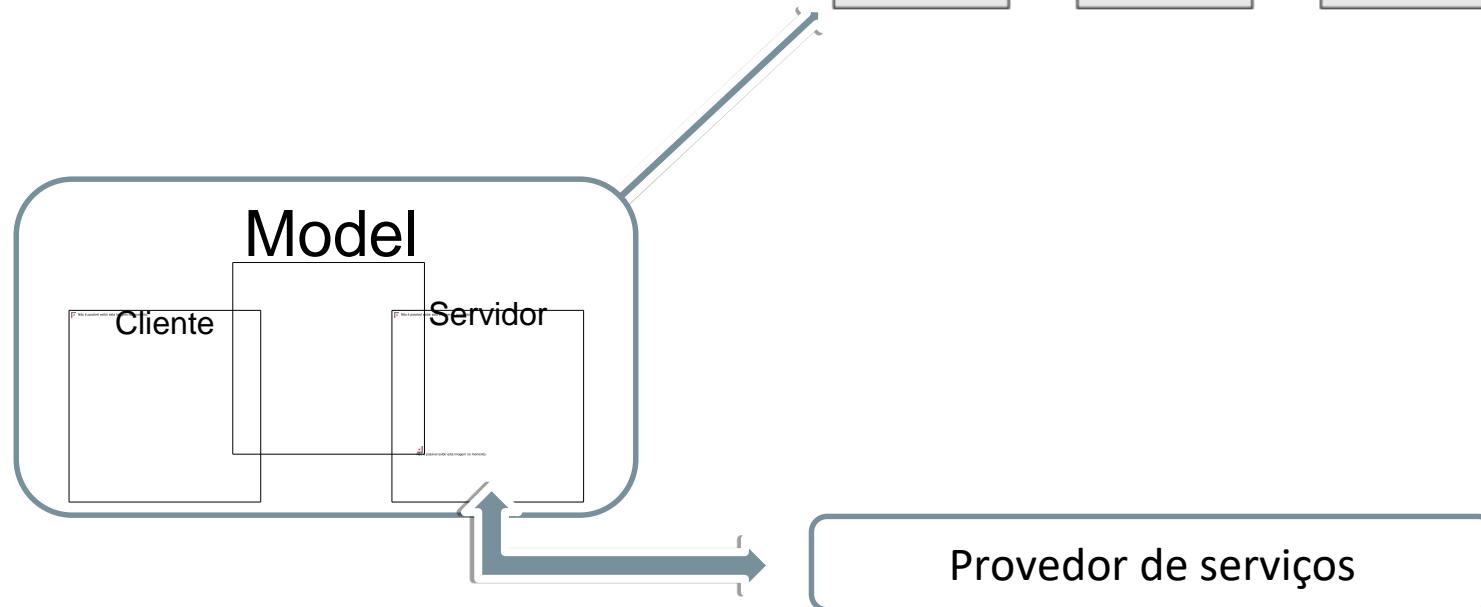
Arquitetura



Arquitetura



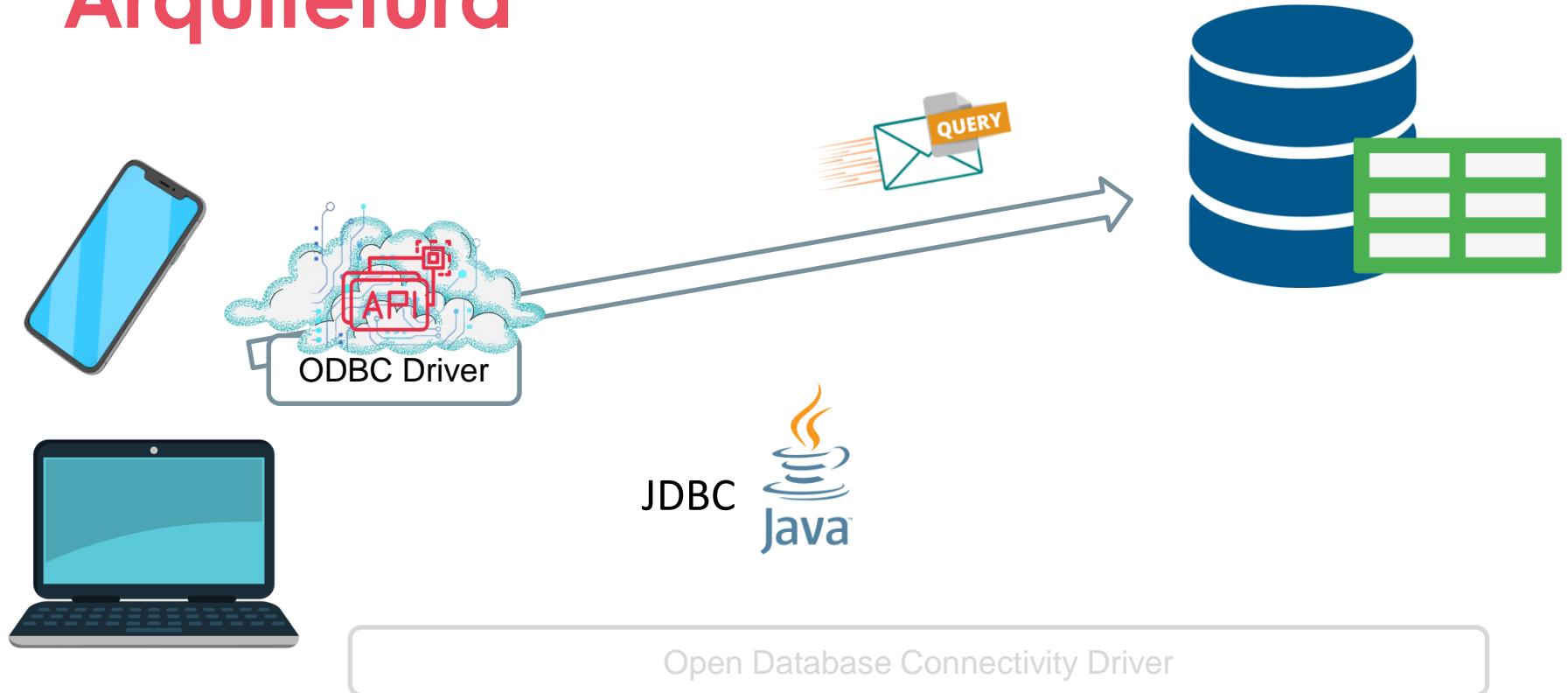
Arquitetura



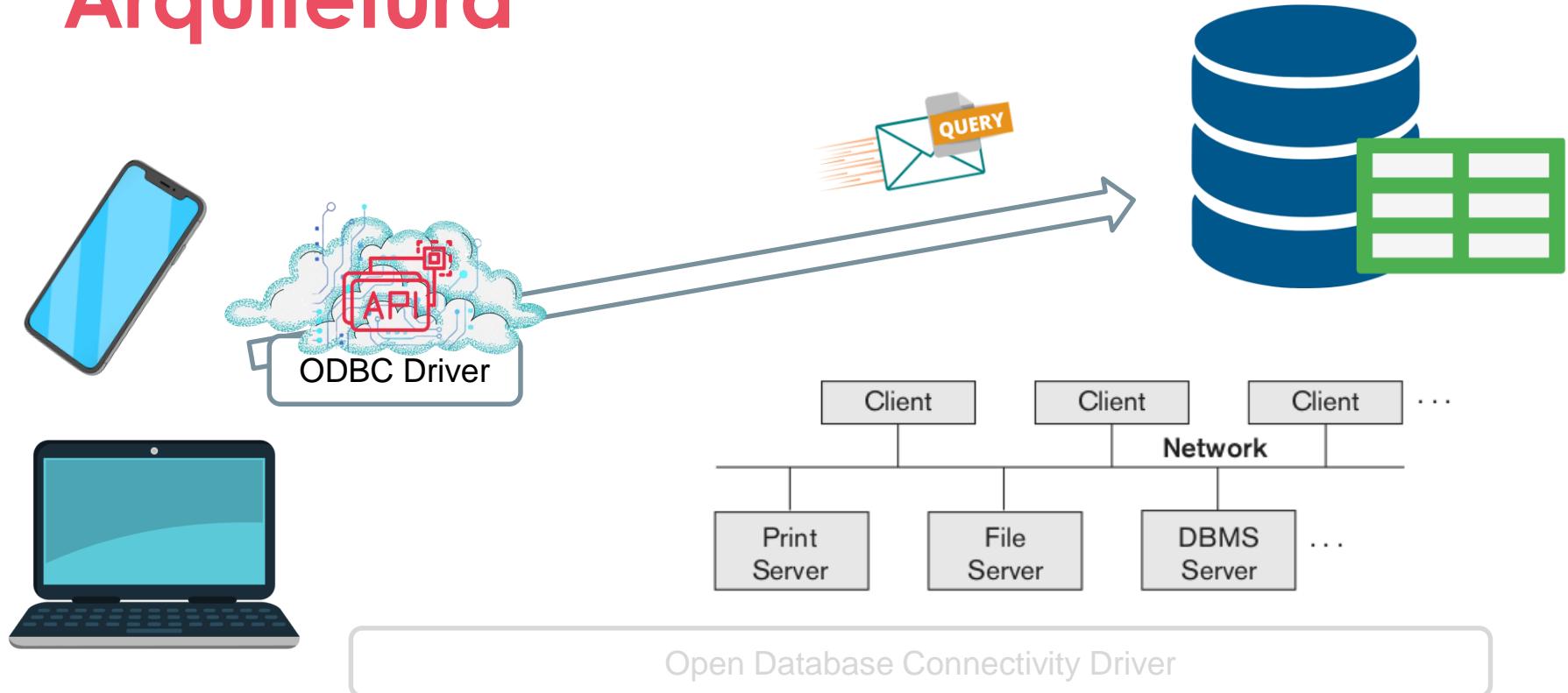
Arquitetura



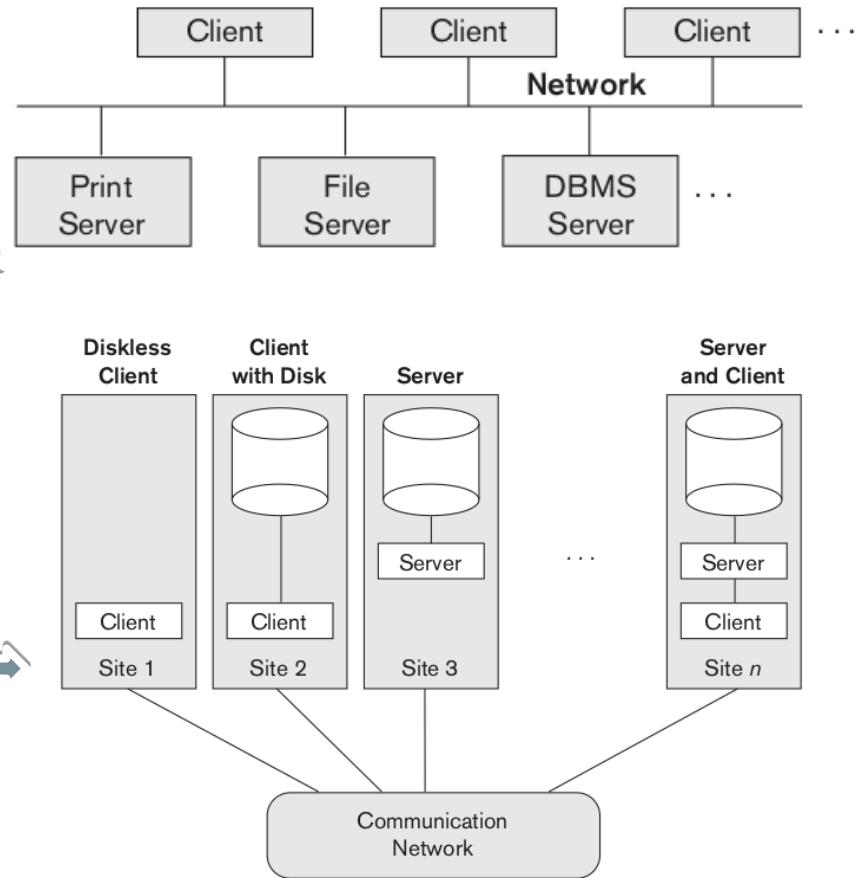
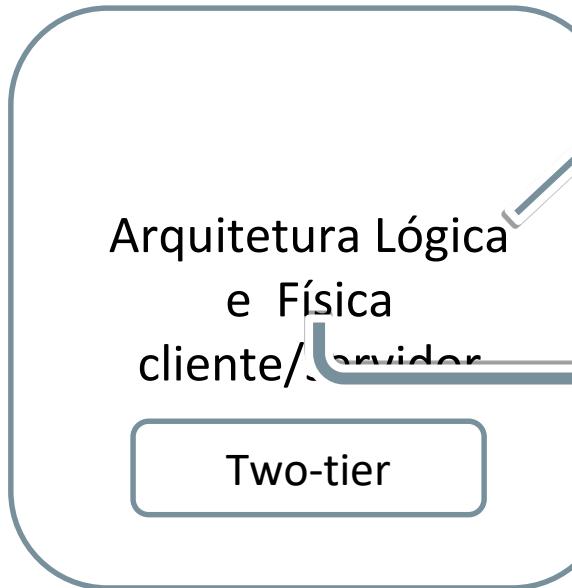
Arquitetura



Arquitetura



Arquitetura

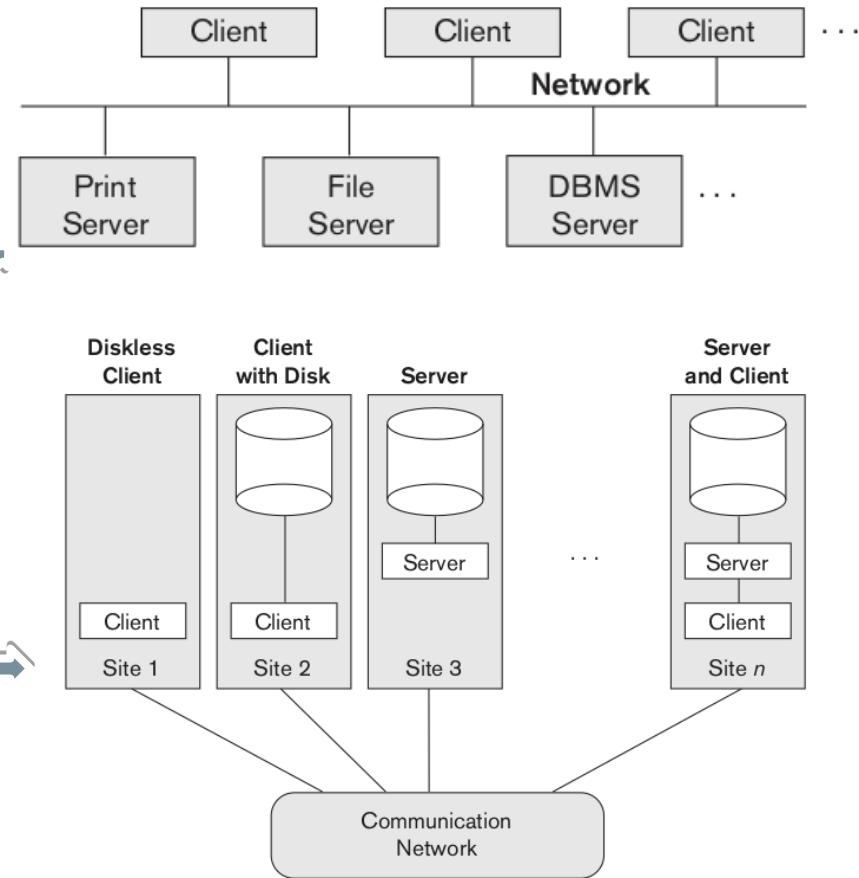


Arquitetura

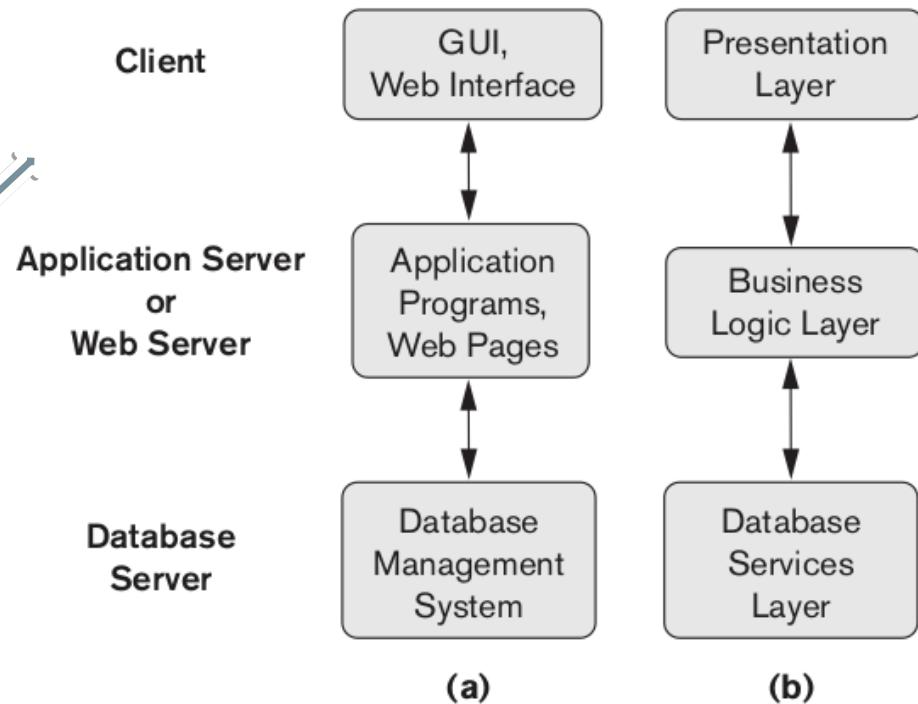
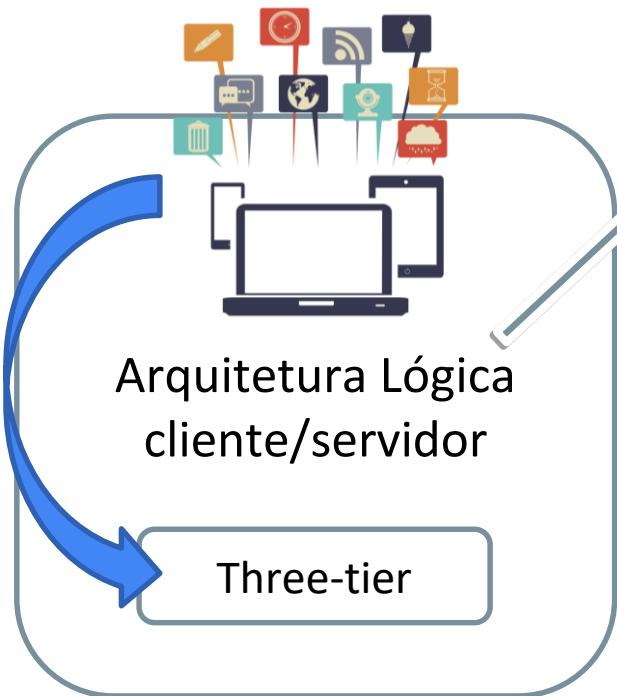
Simplicidade & Compatibilidade

Arquitetura Lógica
e Física
cliente/servidor

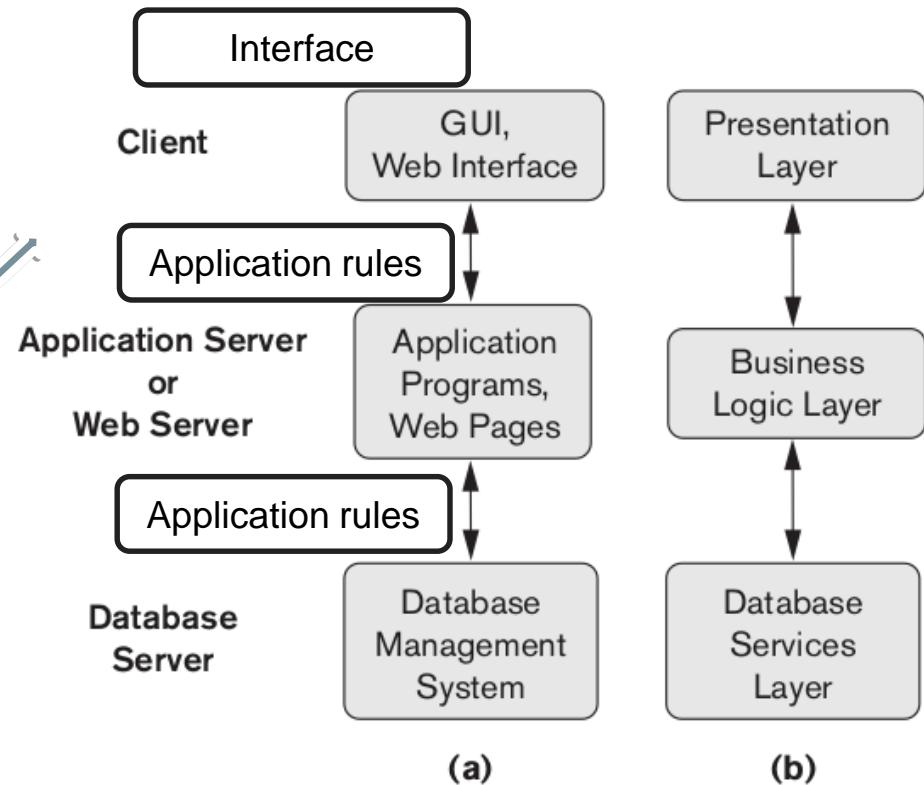
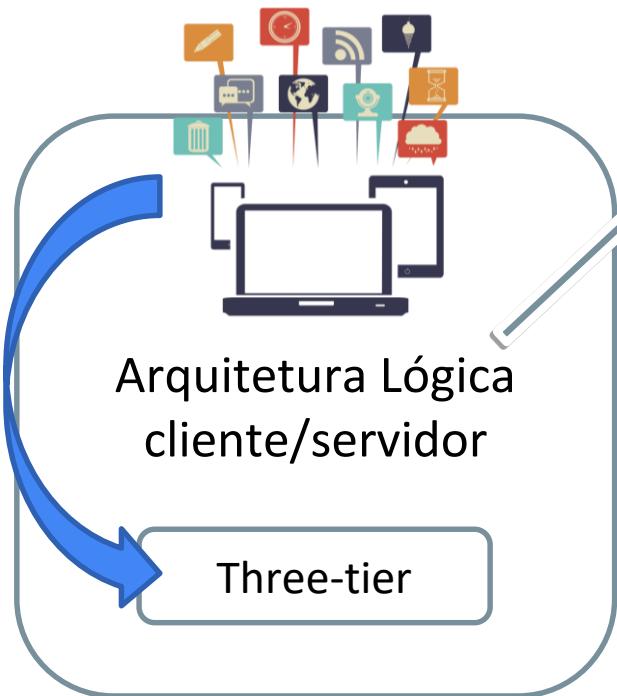
Two-tier



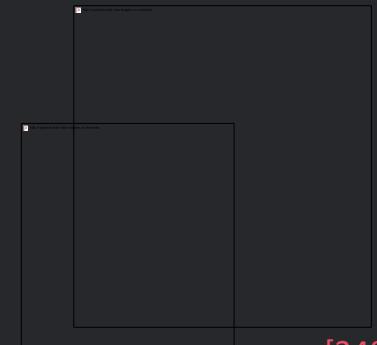
Arquitetura



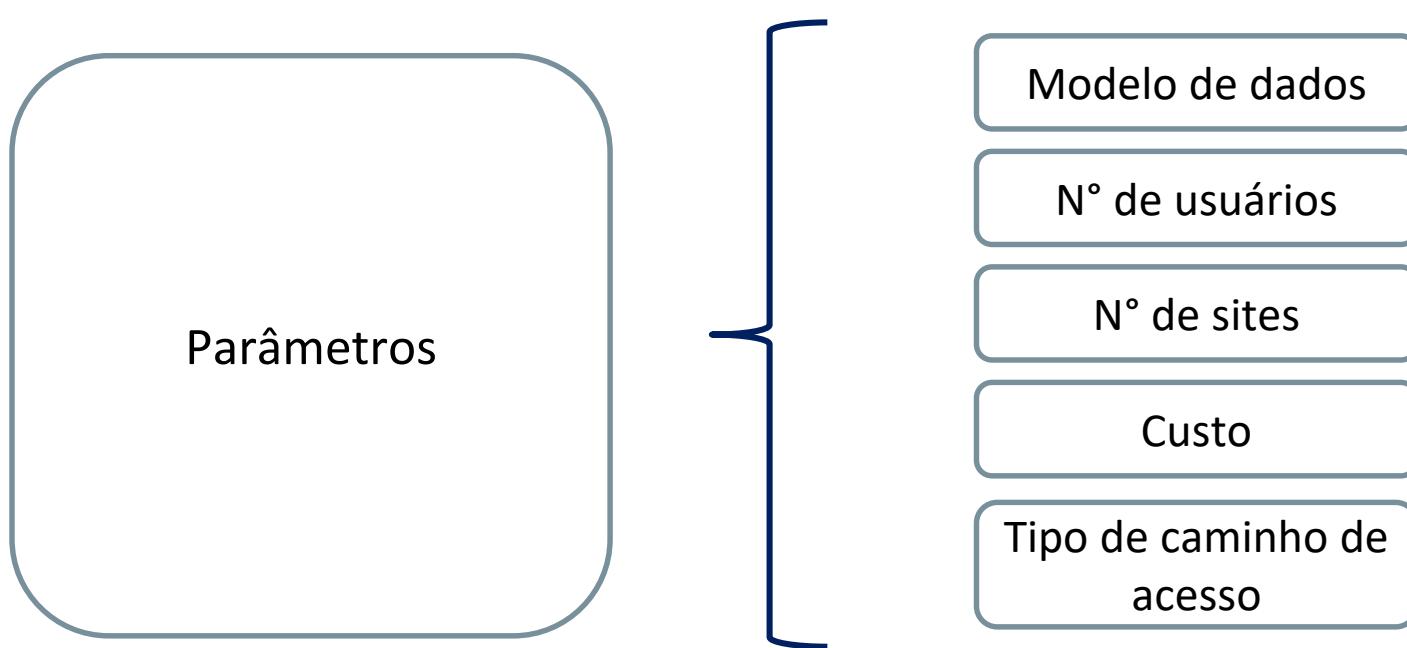
Arquitetura



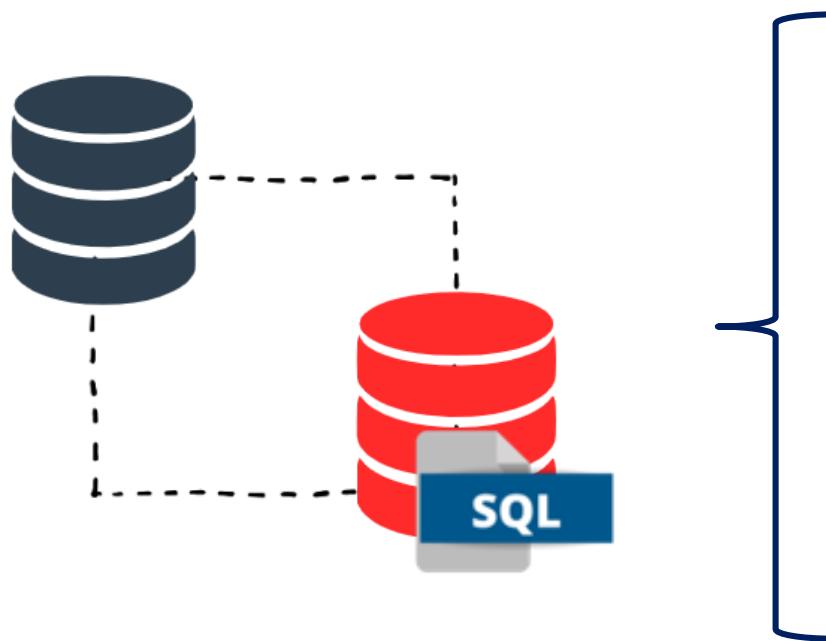
Classificação de SGBDs



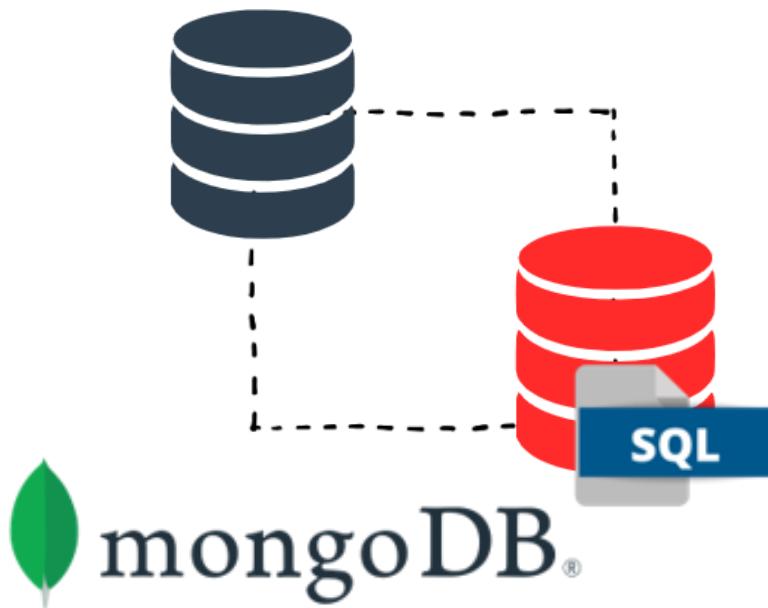
Classificação



Classificação



Classificação



Modelo de dados

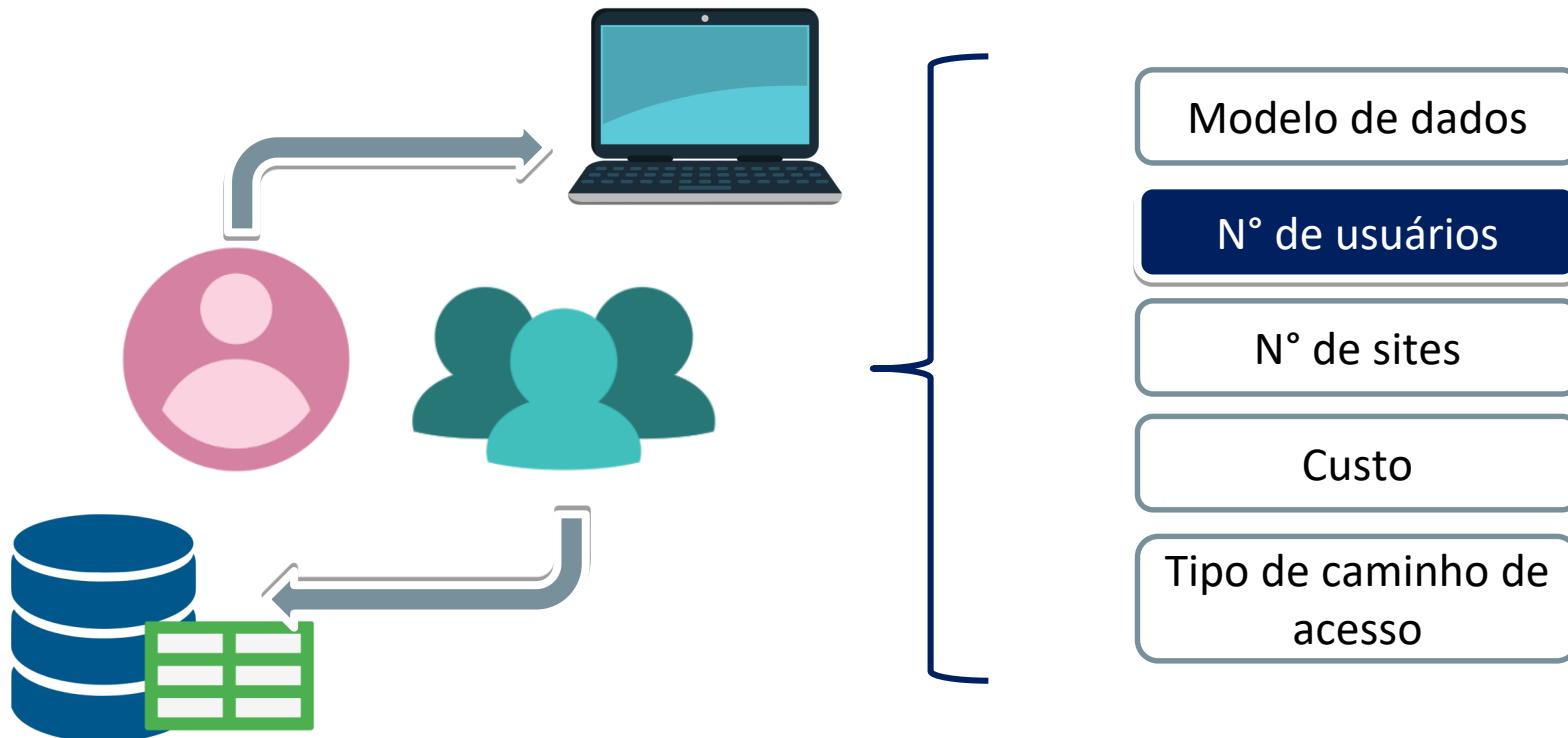
Nº de usuários

Nº de sites

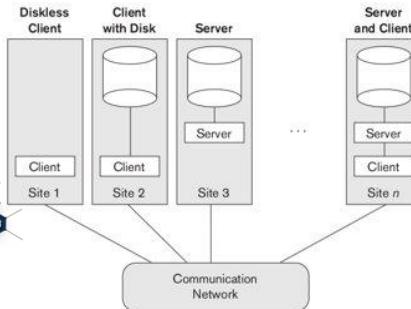
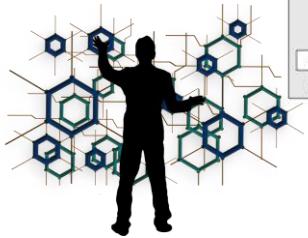
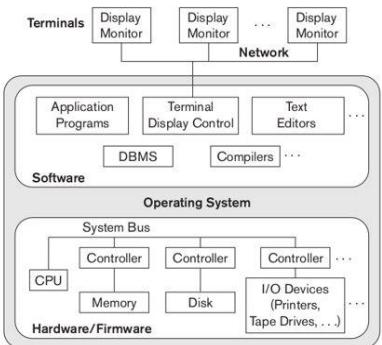
Custo

Tipo de caminho de
acesso

Classificação



Classificação



Modelo de dados

Nº de usuários

Nº de sites

Custo

Tipo de caminho de acesso

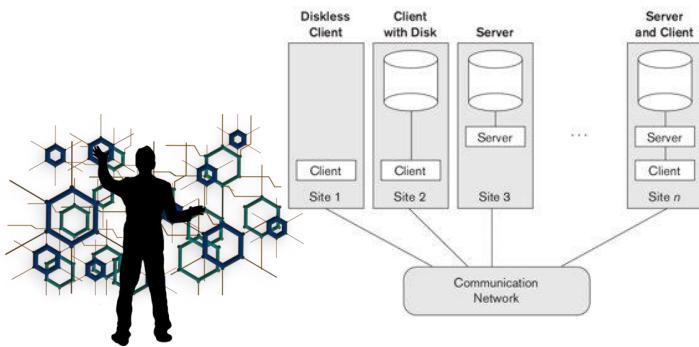
Classificação

Big data

Replicação

DB federado

Heterogeneidade



Modelo de dados

Nº de usuários

Nº de sites

Custo

Tipo de caminho de acesso

Classificação



ORACLE®

User licences

Módulos: replicação, paralelismo



Modelo de dados

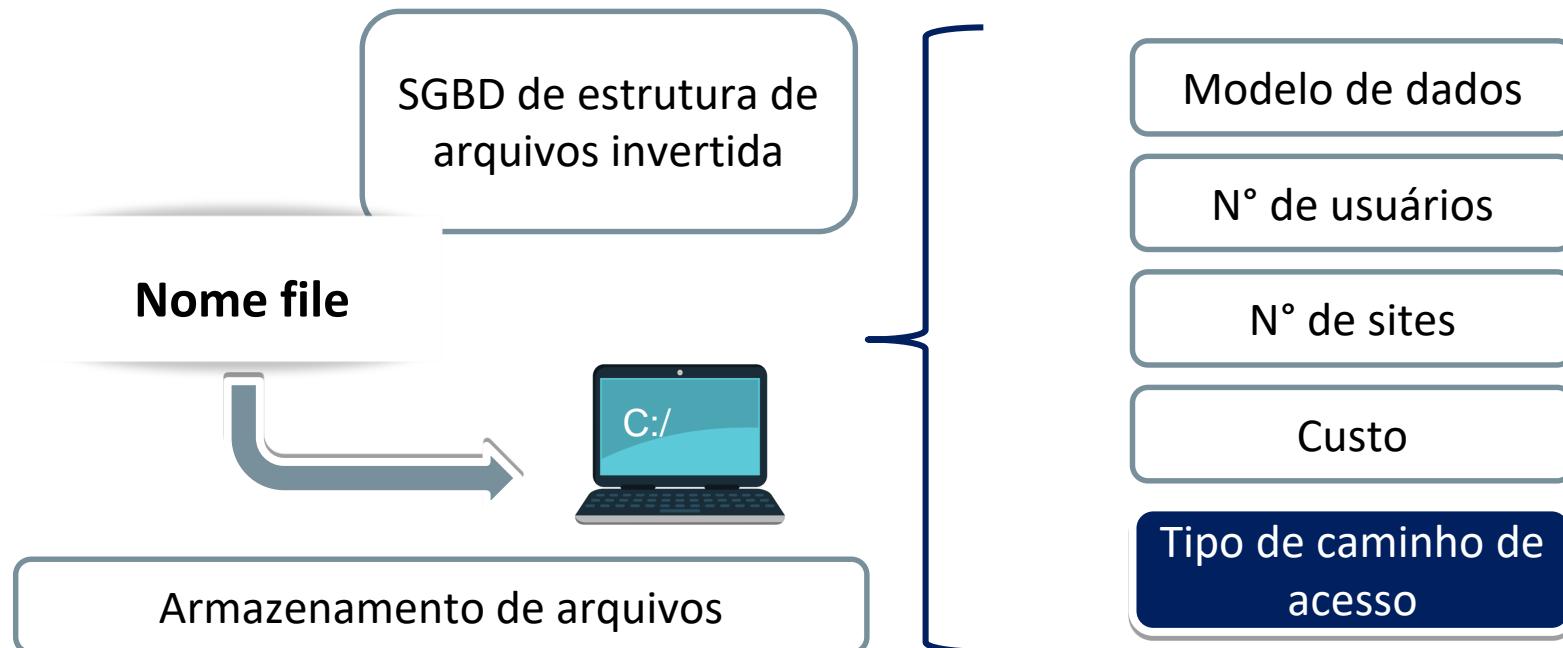
Nº de usuários

Nº de sites

Custo

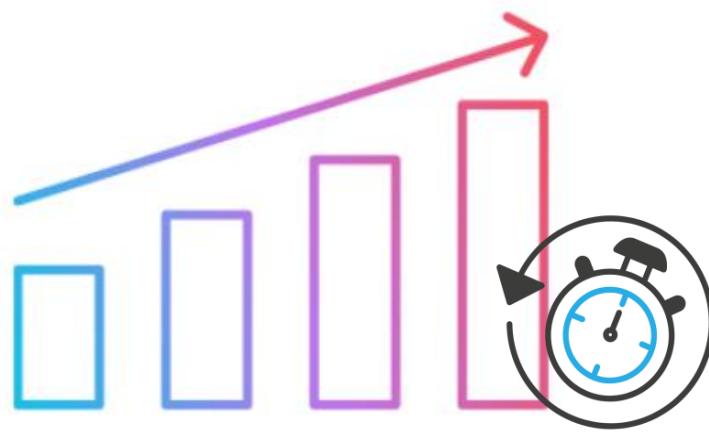
Tipo de caminho de
acesso

Classificação



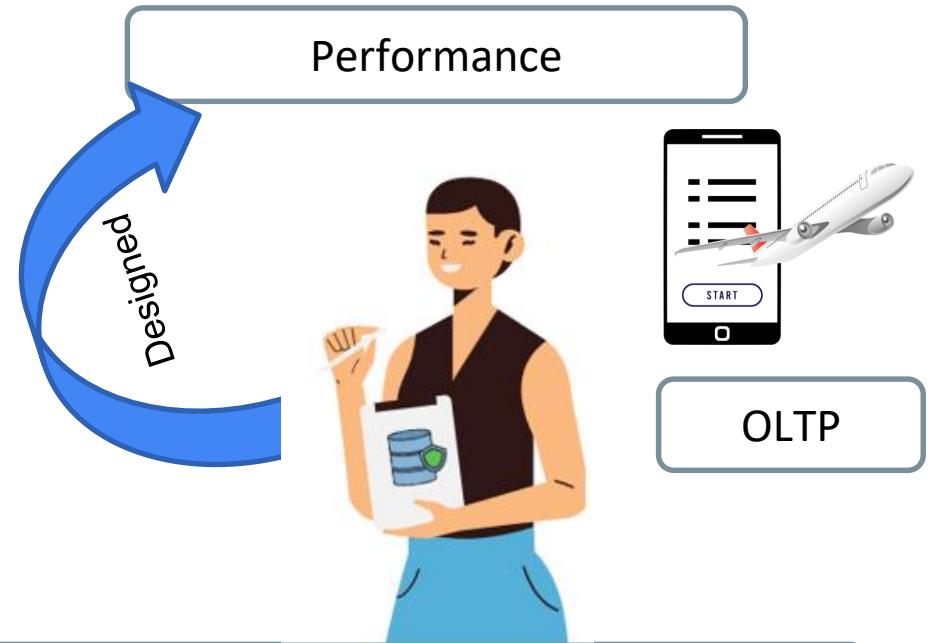
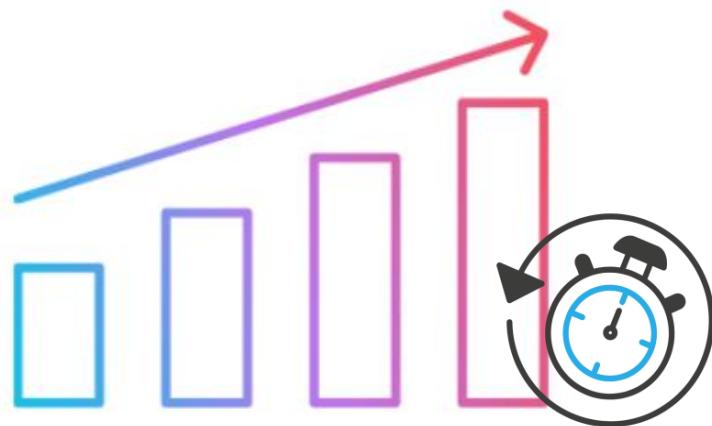
Classificação

Performance



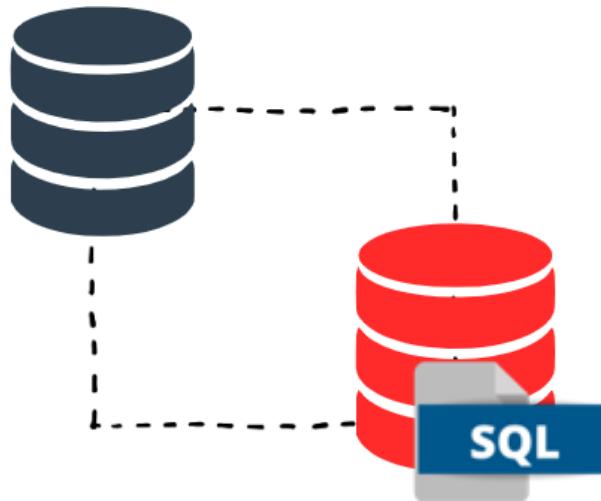
SGBD de Propósito Geral

Classificação



SGBD de Propósito Geral

Classificação - Relacional



Coleções de tabelas

Tabela



File

Alto Nível

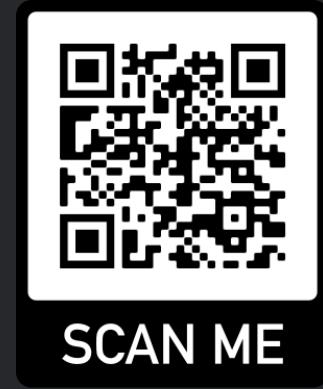
View



User

Dúvidas?

- > Fórum/Artigos
- > Comunidade [Online \(Discord\)](#)



Para saber mais

Referências principais:

- Referência bibliográfica: Fundamentals of Database Systems – Navathe, 7º edição editora: Pearson
- Projeto de banco de dados: Uma visão prática - Edição revisada e ampliada - Machado 17º edição, editora: Saraiva



Para saber mais

Outras referências:

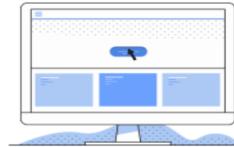
<https://www.ime.usp.br/~andrers/aulas/bd2005-1/aula3>

<https://www.devmedia.com.br/a-historia-dos-banco-de-dados/1678>

<https://db-engines.com/en/ranking>

<https://www.opservices.com.br/banco-de-dados/>

<https://www.quora.com/What-is-a-canned-transaction>

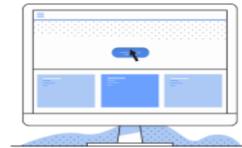


Para saber mais

Outras referências:

<https://www.geeksforgeeks.org/impedance-mismatch-in-dbms/#:~:text=Impedance%20mismatch%20is%20the%20term,Attributes%20and%20their%20data%20types>

<https://www.oreilly.com/library/view/mysql-reference-manual/0596002653/ch03s05.html>

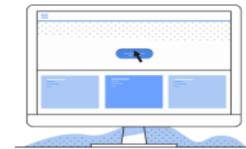


Para saber mais

Outras referências:

<https://docs.oracle.com/pt-br/solutions/deploy-lustre-fs/index.html#:~:text=Lustre%C3%A9um%20sistema%20de,do%20Linux%20e%20do%20cluster.>

<https://stackoverflow.com/questions/1075074/opinions-on-netcdf-vs-hdf5-for-storing-scientific-data#:~:text=NetCDF%20starting%20with%20version%204.0,a%20much%20wider%20tool%20base>



Para saber mais

Empresas e SGBDs:

<https://www.quora.com/What-are-all-the-DBMS-that-are-being-used-by-Google-Facebook-and-Twitter-1>
<https://introbigdata.org/>

<https://www.mongodb.com/big-data-explained/examples>

<https://intellipaat.com/blog/10-big-data-examples-application-of-big-data-in-real-life/>

<https://instagram-engineering.com/instagration-pt-2-scaling-our-infrastructure-to-multiple-data-centers-5745cbad7834>



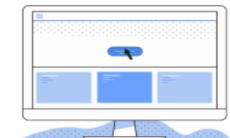
Para saber mais

Empresas e SGBDs:

https://blog.twitter.com/engineering/en_us/topics/infrastructure/2017/the-infrastructure-behind-twitter-scale#:~:text=Twitter%20was%20built%20on%20MySQL,many%20large%20database%20clusters.

<https://www.mysql.com/customers/view/?id=757>

<https://engineering.linkedin.com/espresso/introducing-espresso-linkeds-hot-new-distributed-document-store#:~:text=To%20meet%20the%20needs%20of,both%20serving%20different%20use%20cases>



Desafio textual

Defina!

- Dados e banco de dados
- SGBD, Sistema de Banco de Dados e Catálogo de BD
- Independência program/data, user view
- DBA, transações canned, metadados e aplicação de processamento de transação

Desafio

