

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



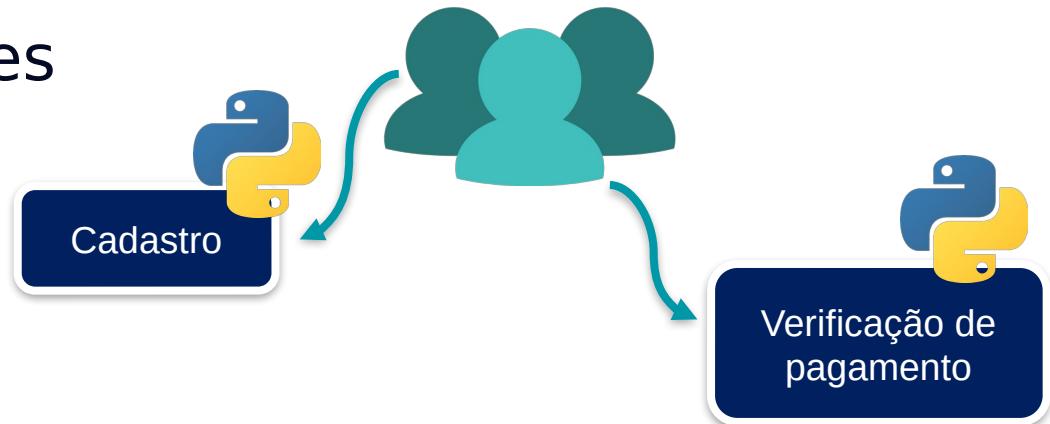
Abordagem tradicional



Abordagem BDs

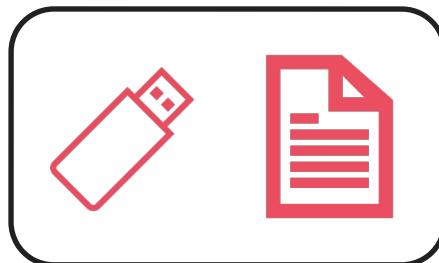
Abordagem de BD

Suponha as aplicações



Abordagem de BD

Suponha as aplicações

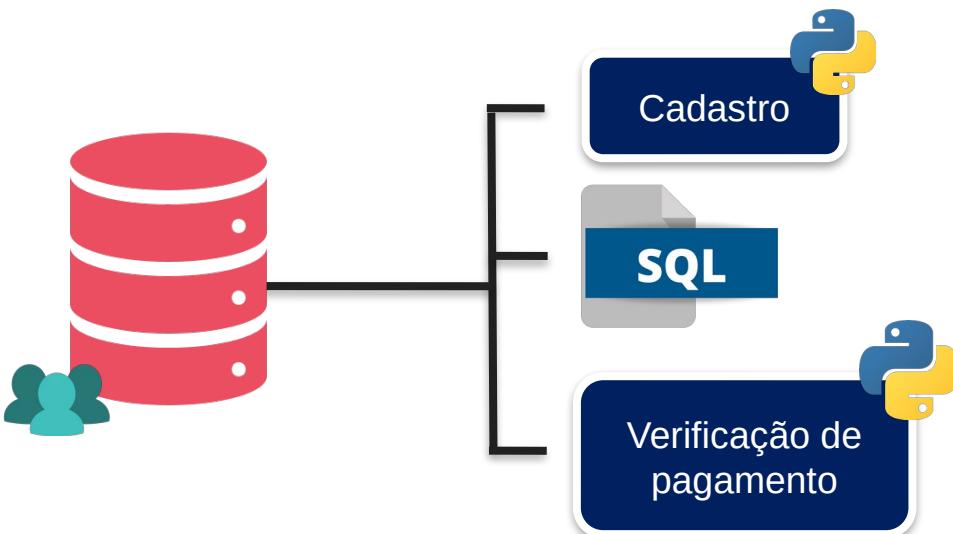


Abordagem de BD

Suponha as aplicações:

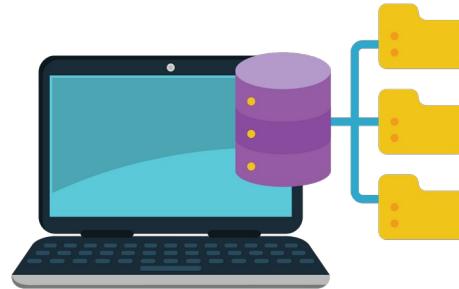


Abordagem de BD



Abordagem BDs

Abordagem de BD



Características principais:

Abordagem BDs

Abstração

Auto-descrição

Isolamento

Compartilhamento

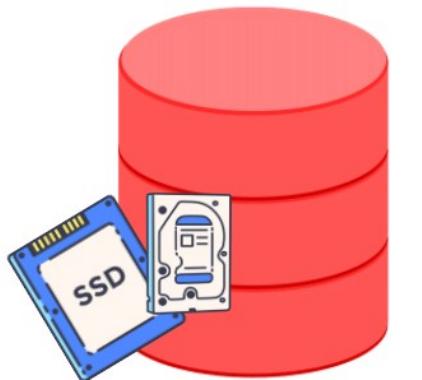
Múltiplas visões

Transação
multiuser

Natureza auto- descritiva da abordage de BD



Natureza Auto-descritiva



Descrição da
estrutura
e constraints

DB schema

Metadados
& Schema

Natureza Auto-descritiva



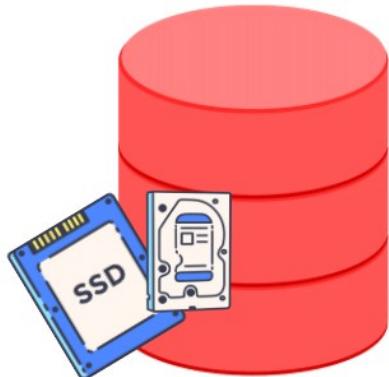
Descrição da
estrutura
e constrains

DB schema



~~NoSQL~~

Natureza Auto-descritiva

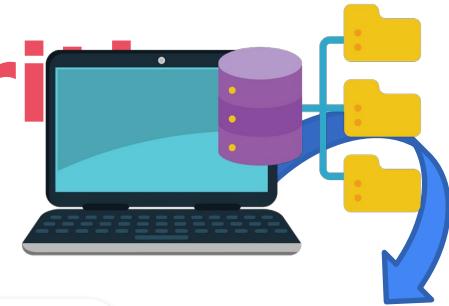


Descrição da estrutura e constrains

DB schema

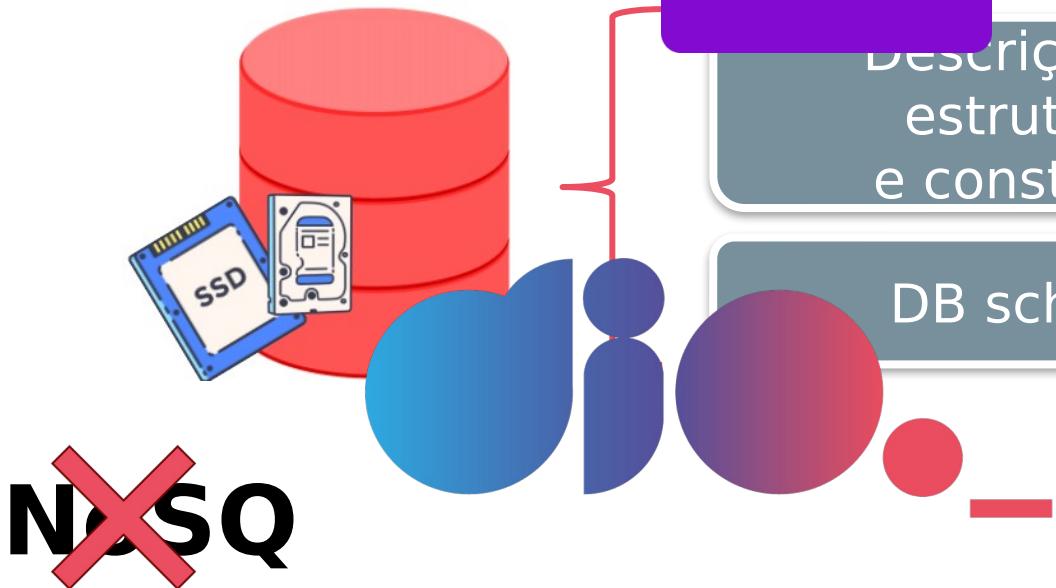


Metadados & Schema

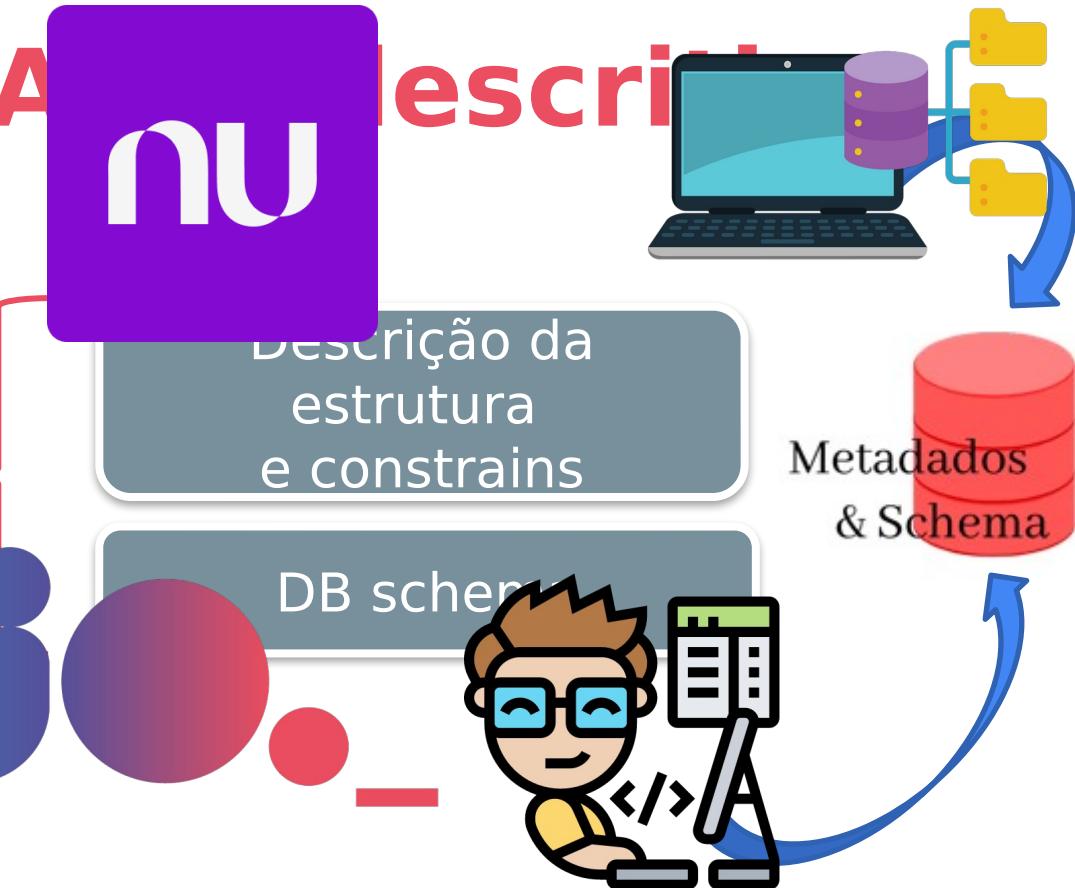


~~NoSQL~~

Natureza A amazon.com.br



~~NoSQL~~



Natureza Auto-descritiva



Abordagem tradicional



Programa da Aplicação

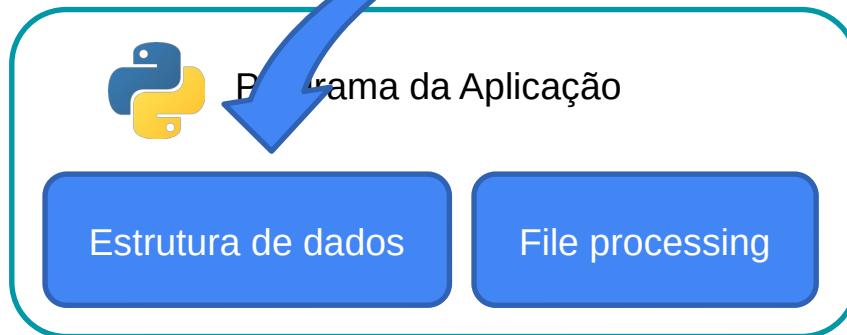
Estrutura de dados

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

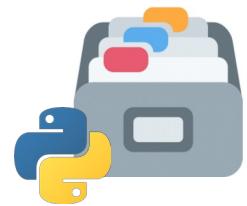
COLUMNS

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

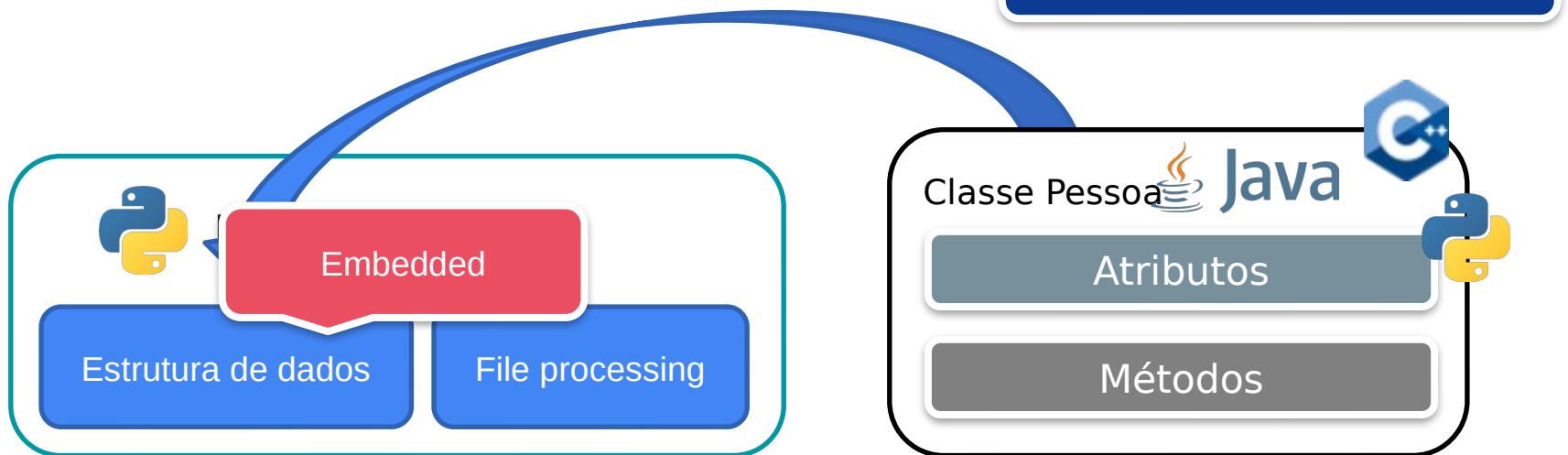
Isolamento entre Program/Data e Abstração



Isolamento e abstração



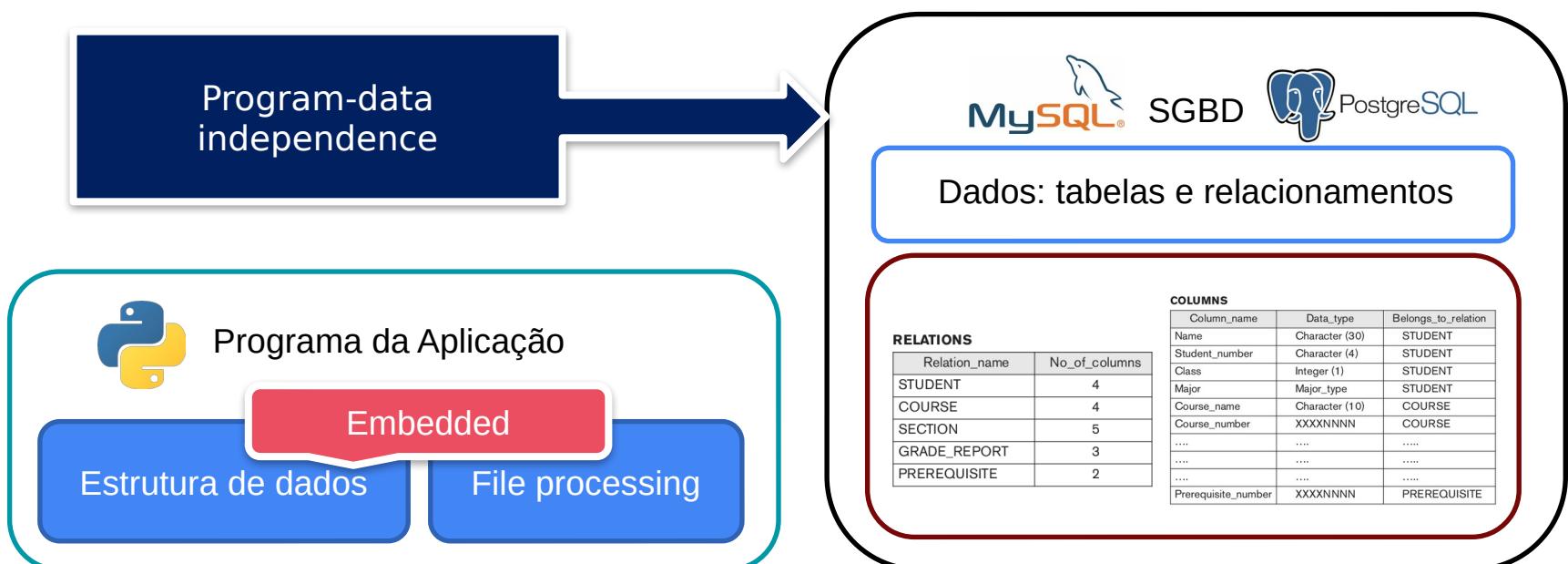
Abordagem tradicional



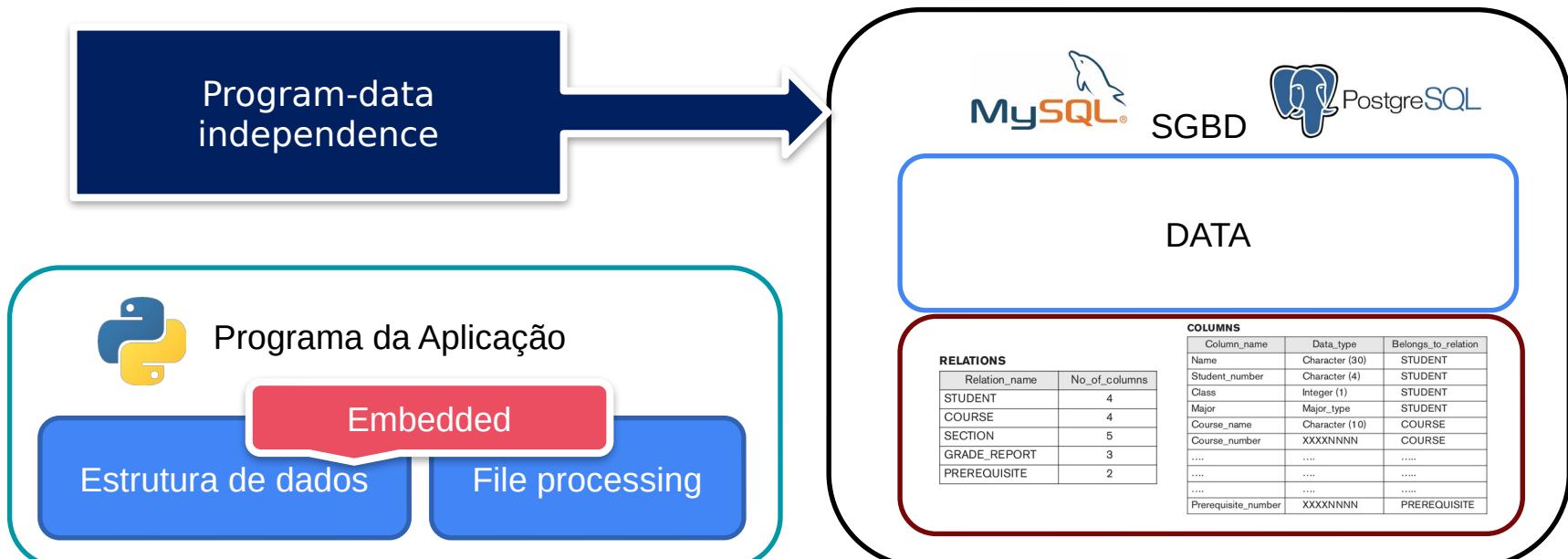
Isolamento e abstração



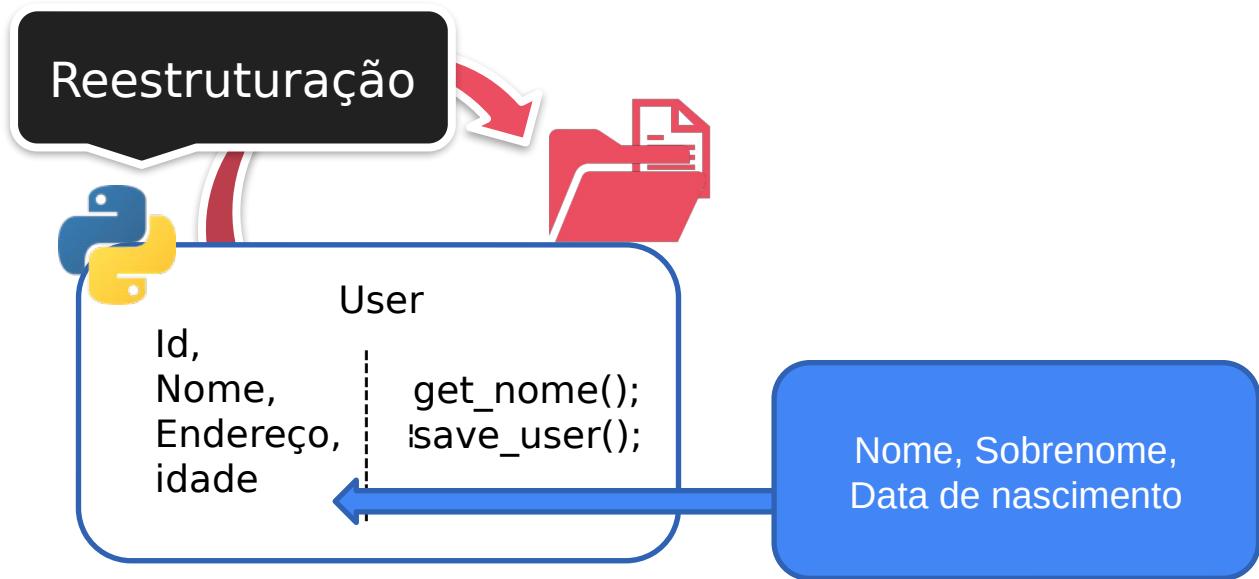
Isolamento e abstração



Isolamento e abstração



Isolamento e abstração



Isolamento e abstração



Isolamento e abstração

- Abstração
- Transparência



Independência do
programa e dados

Isolamento e abstração

- Abstração
- Transparência

Independência do
programa e dados



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

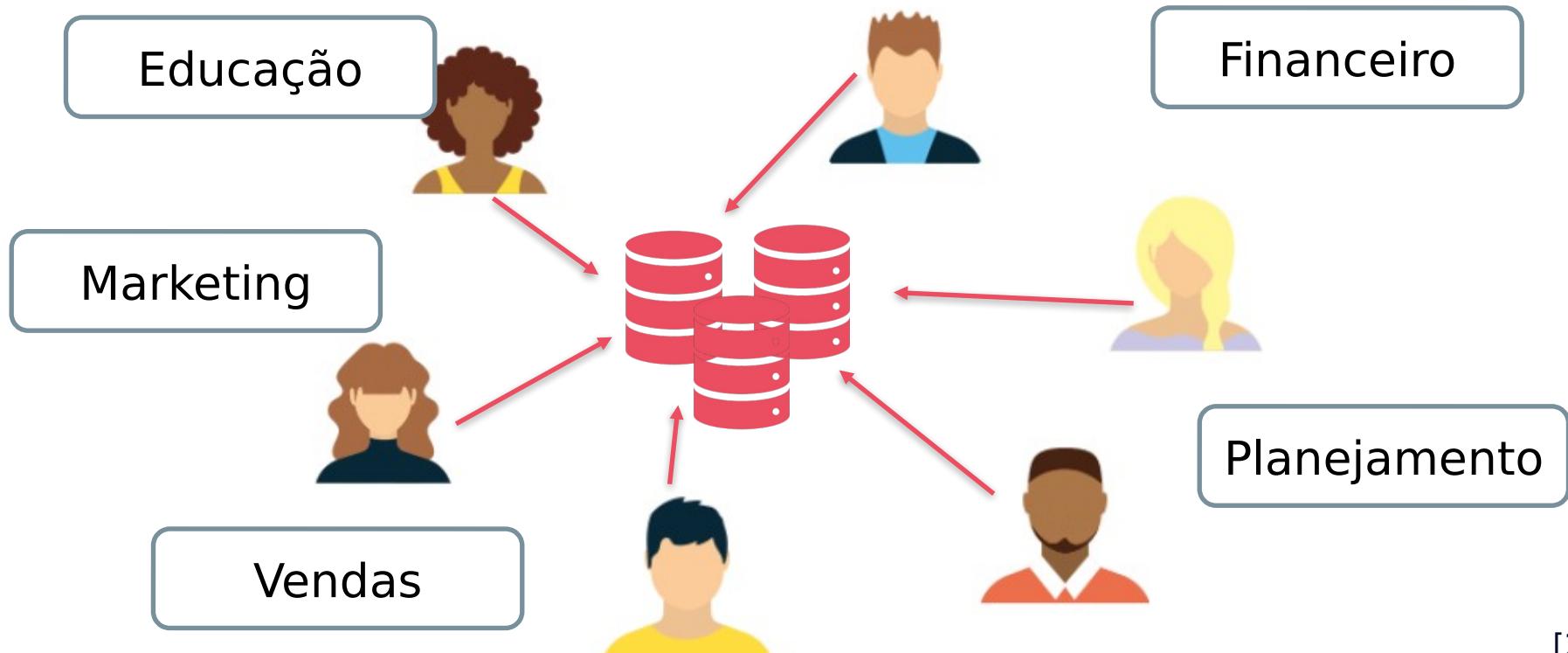


Table Views

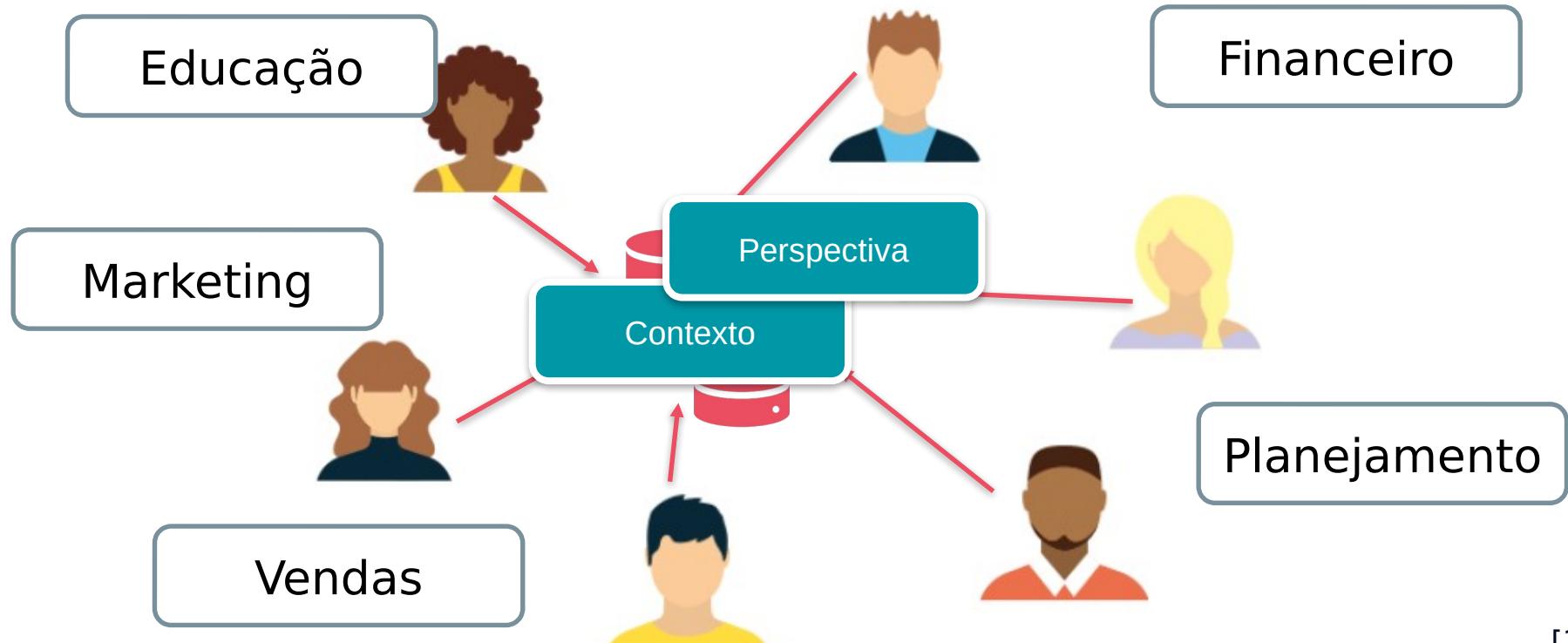


Table Views

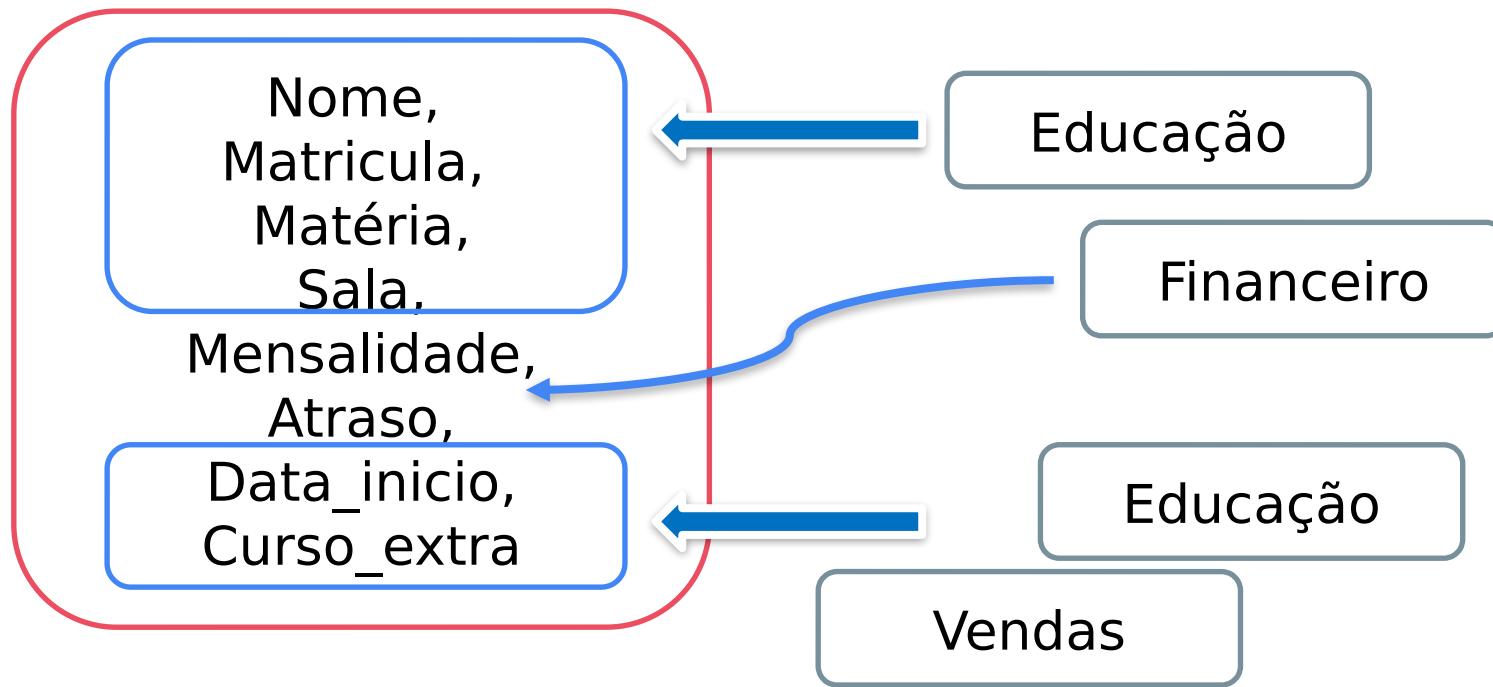


Table Views

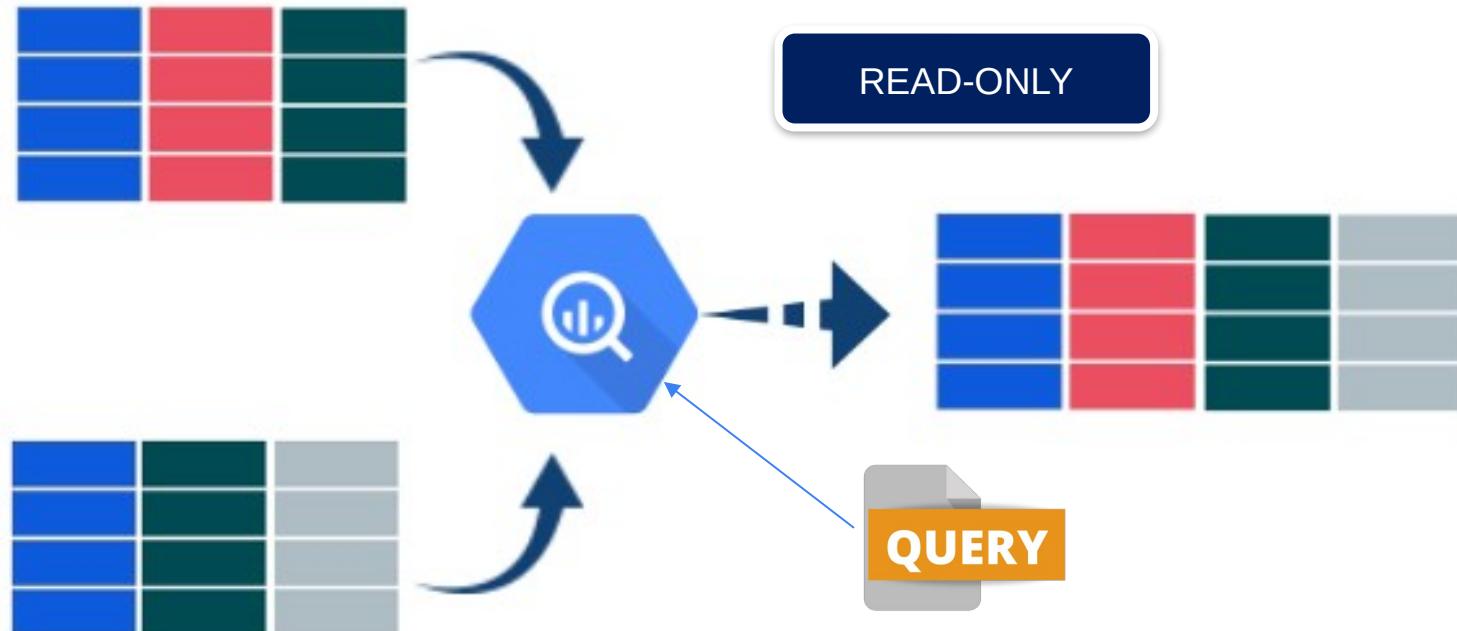


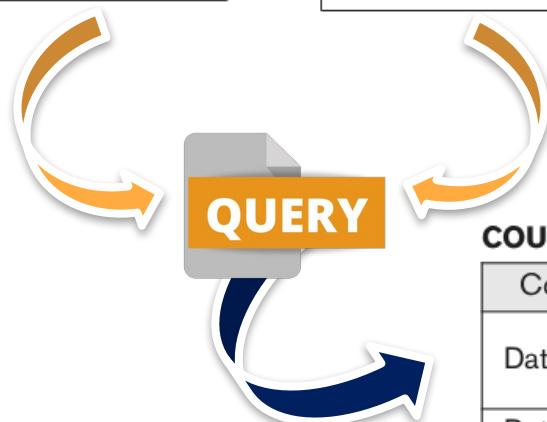
Table Views

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

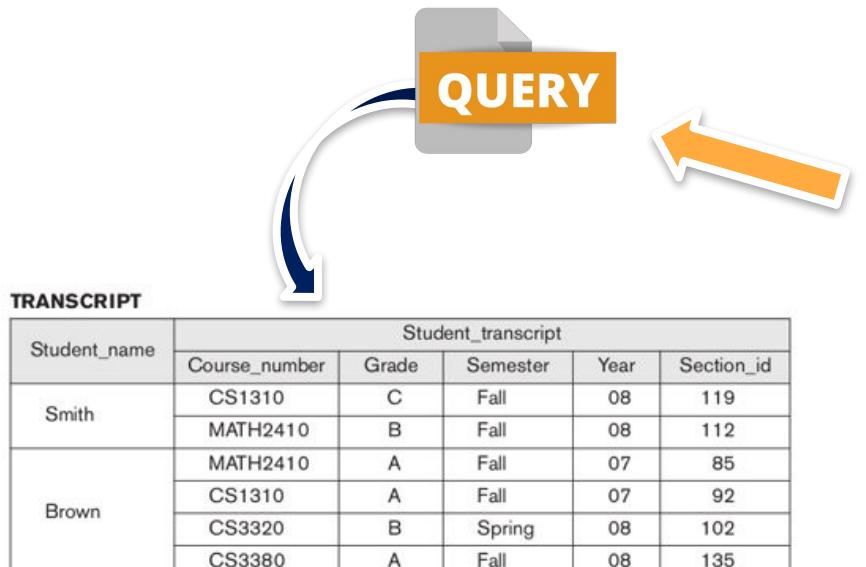
COURSE

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
Database	CS3380	CS3320
		MATH2410
Data Structures	CS3320	CS1310

Table Views



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

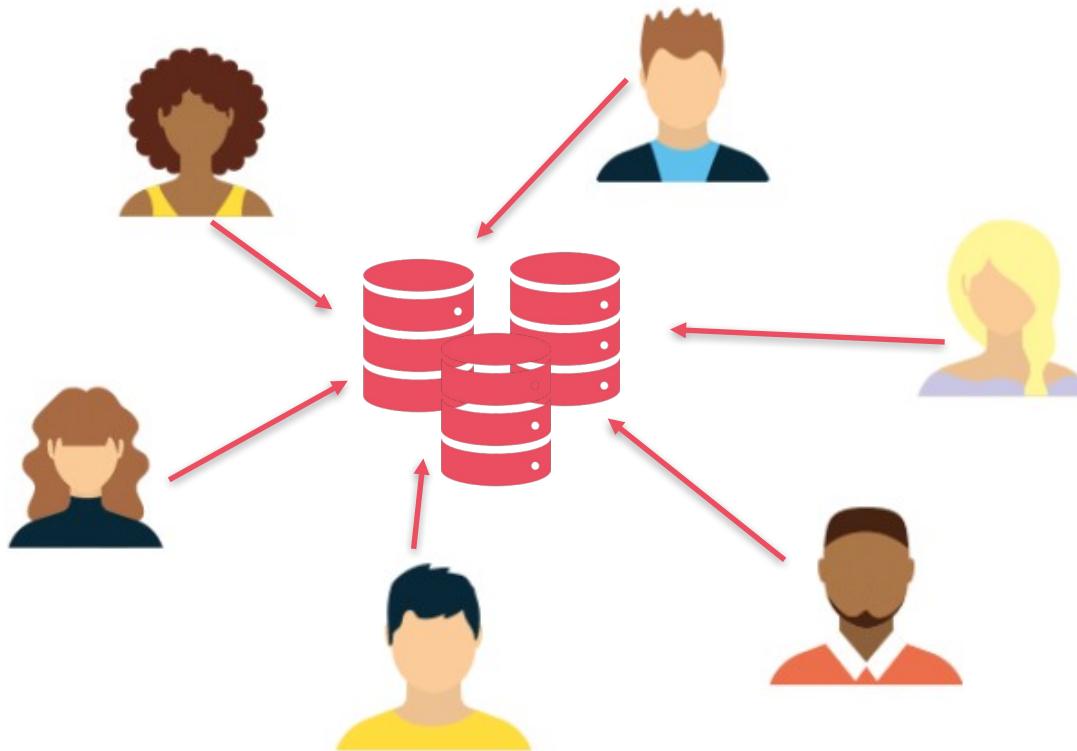
SECTION

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

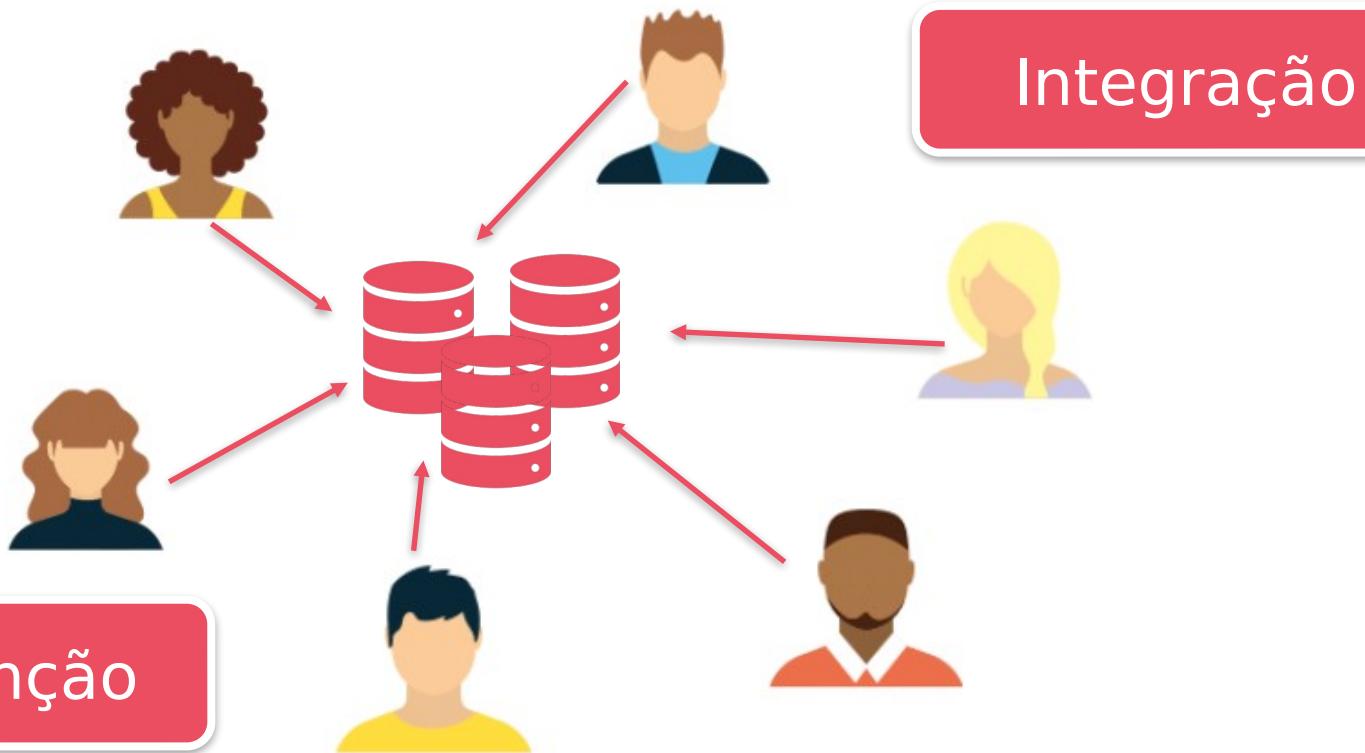
Compartilhamento de dados e processamento de transações multiusuários



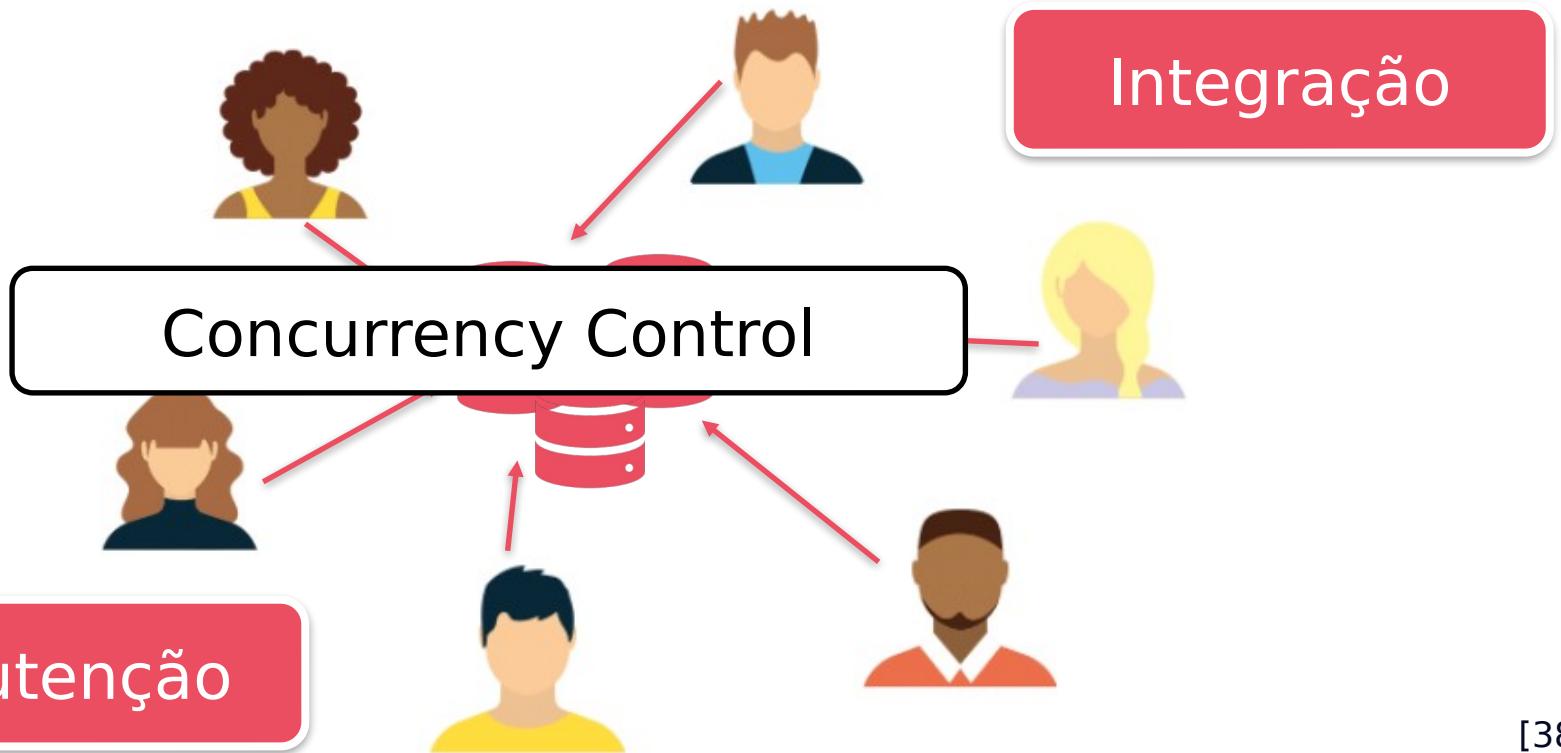
Design - Múltiplos acessos



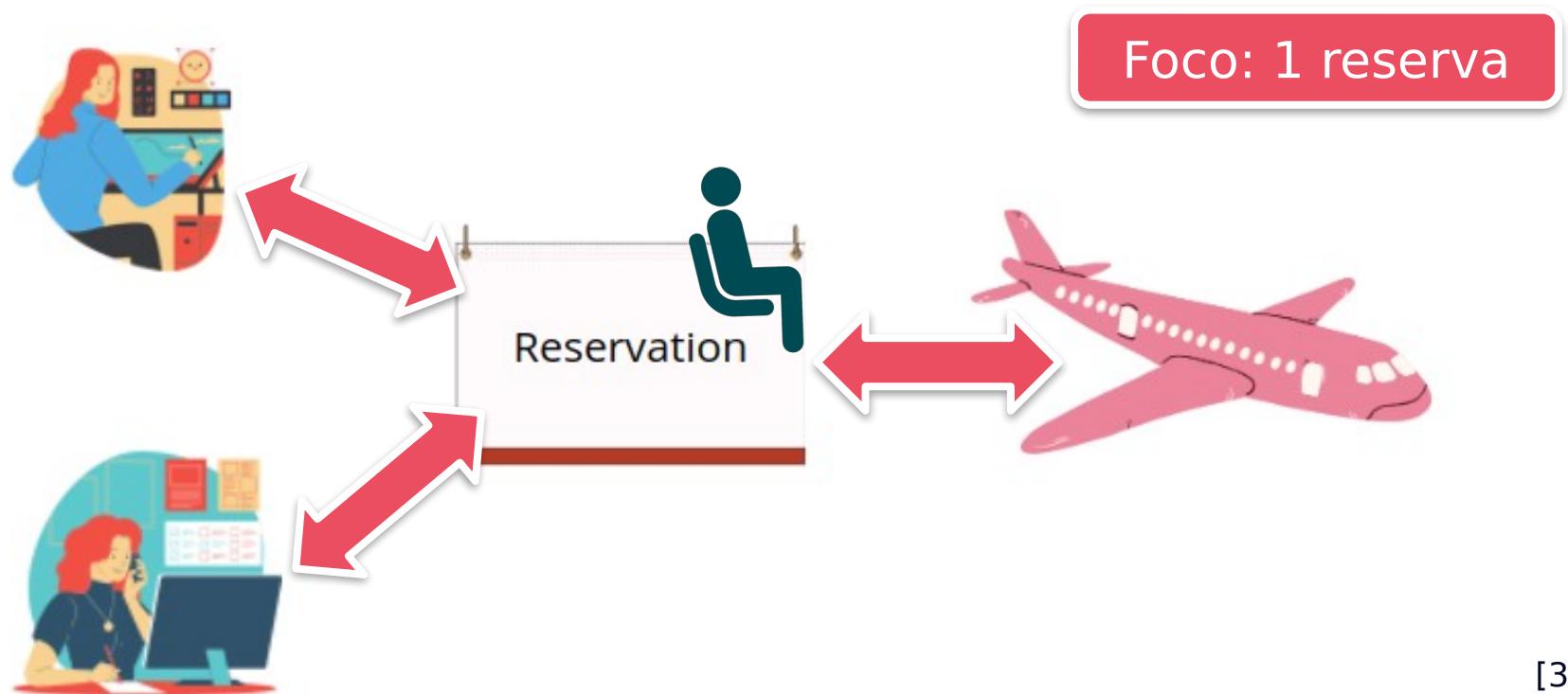
Design - Múltiplos acessos



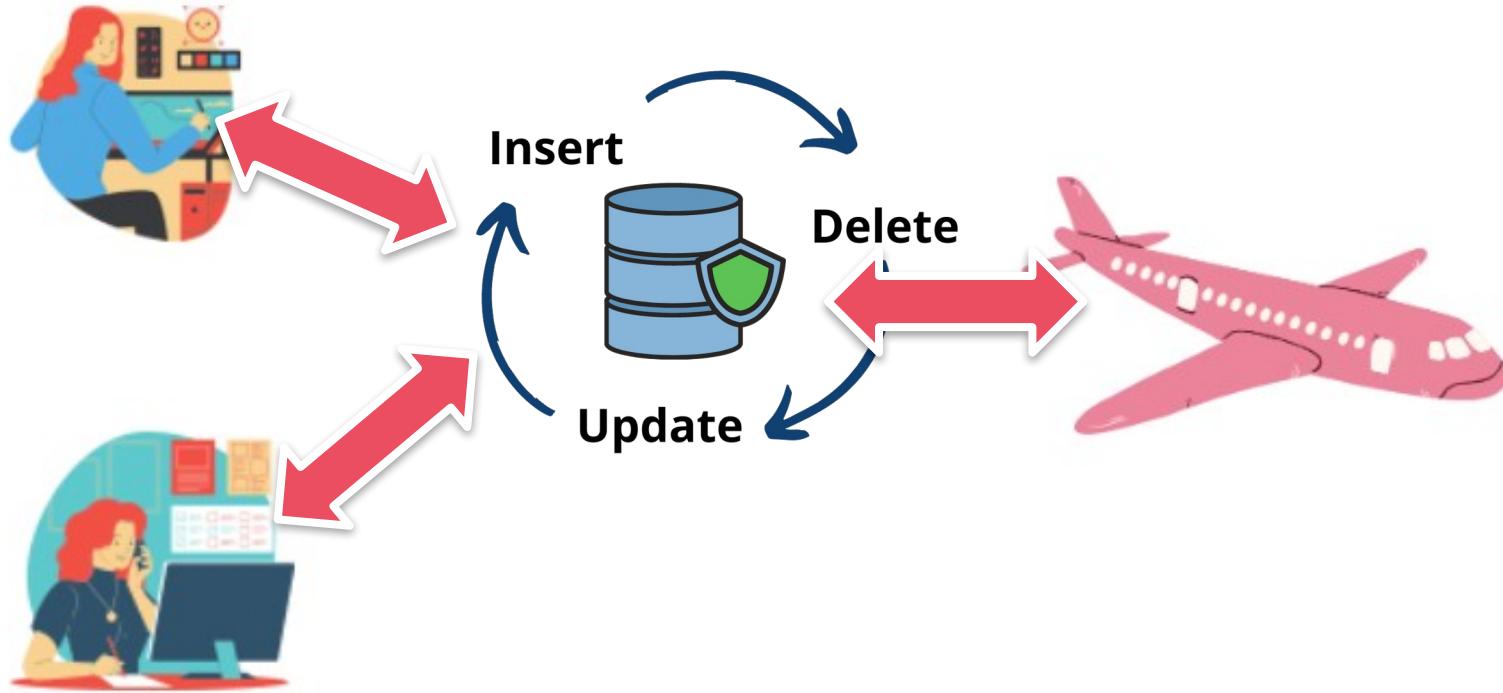
Concorrência



Múltiplos acessos



OLTP



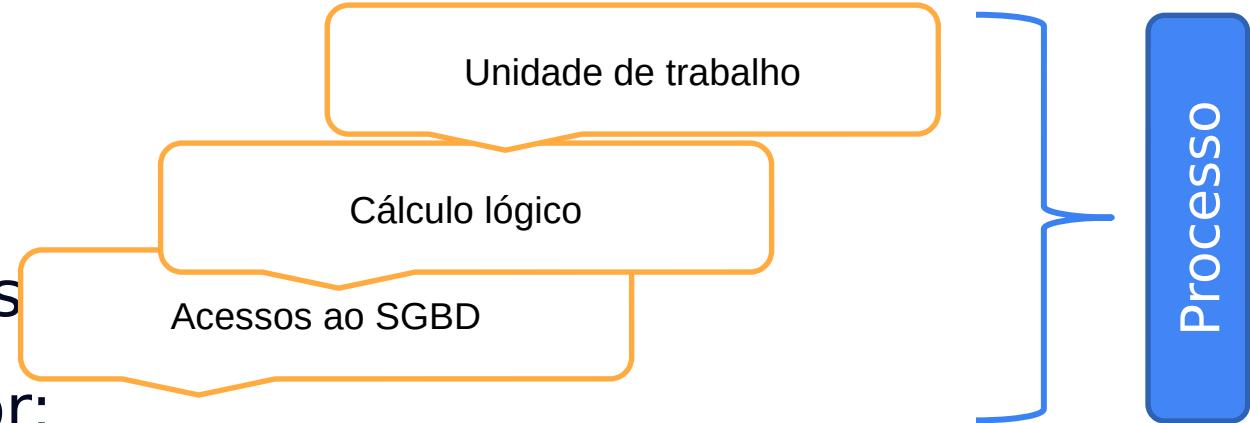
OLTP

- App multiuser
- Gerenciador:
transações concorrentes

Online Transaction Processing

OLTP

- App multiuso
- Gerenciador:
transações concorrentes



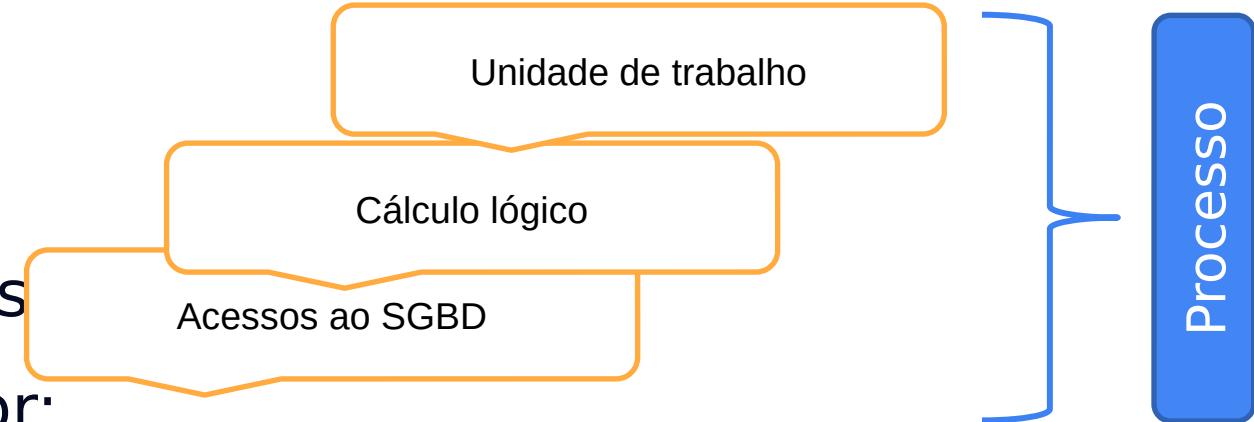
Execução sem interferência

Isolamento

Online Transaction Processing

OLTP

- App multiuso
- Gerenciador:
transações concorrentes



Execução sem interferência

Atomicidade

8 ou 80!

Online Transaction Processing

OLTP



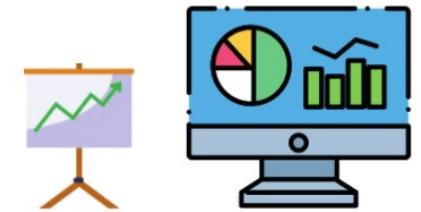
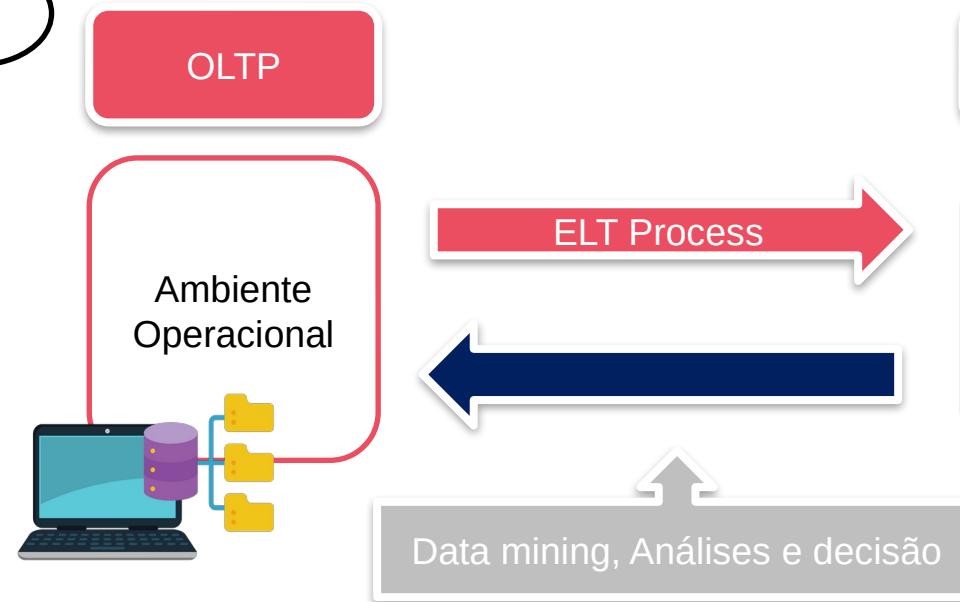
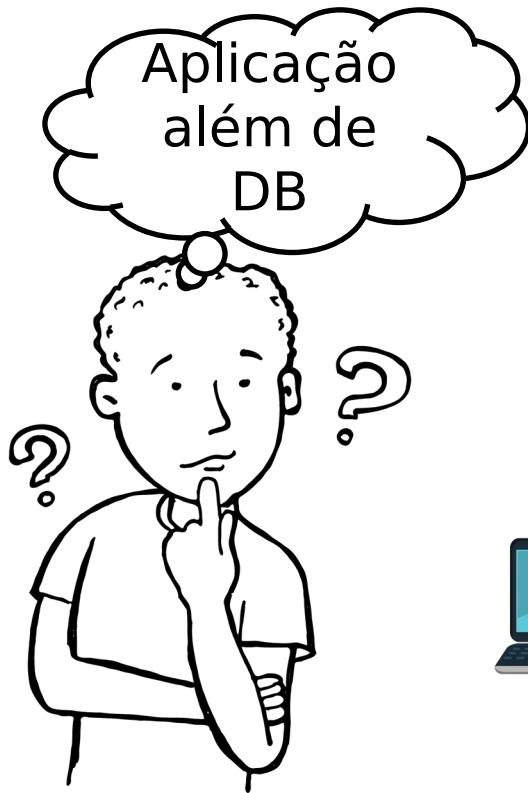
Operacional

Processamento de
dados

Processamento de
dados

Transaction-driven

OLTP



OLTP

Aplicação
além de
DB

Ambiente de
BD

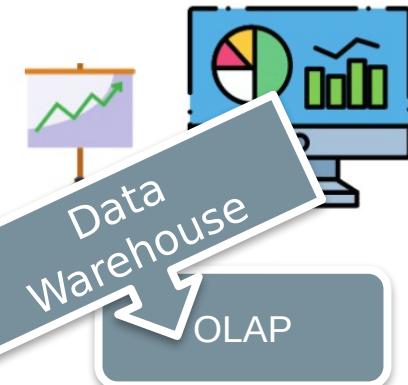
OLTP



Ambiente
Operacional

ELT Process

Data mining, Análises e decisão



Ambiente
informativo

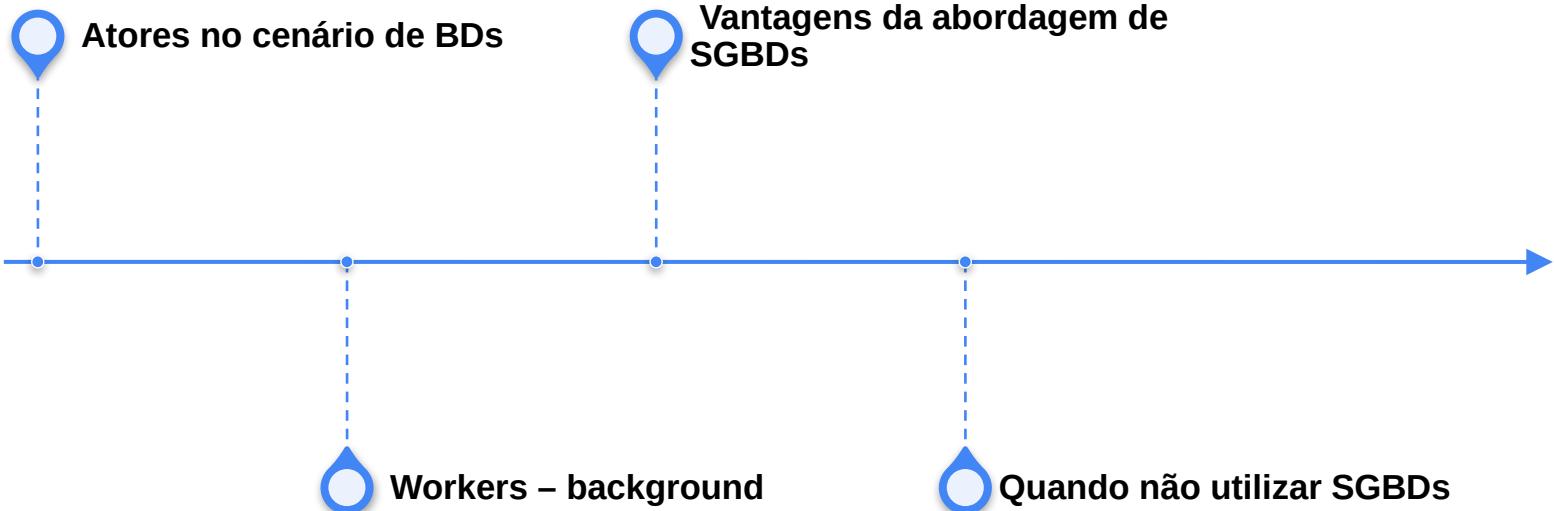


Etapa 6

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

// Introdução à Banco de dados

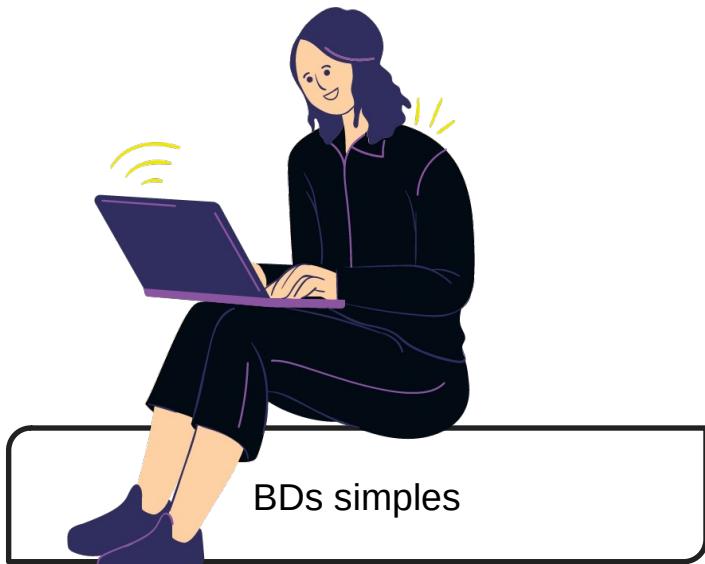
Conversa



Quais são os atores em Banco de Dados?

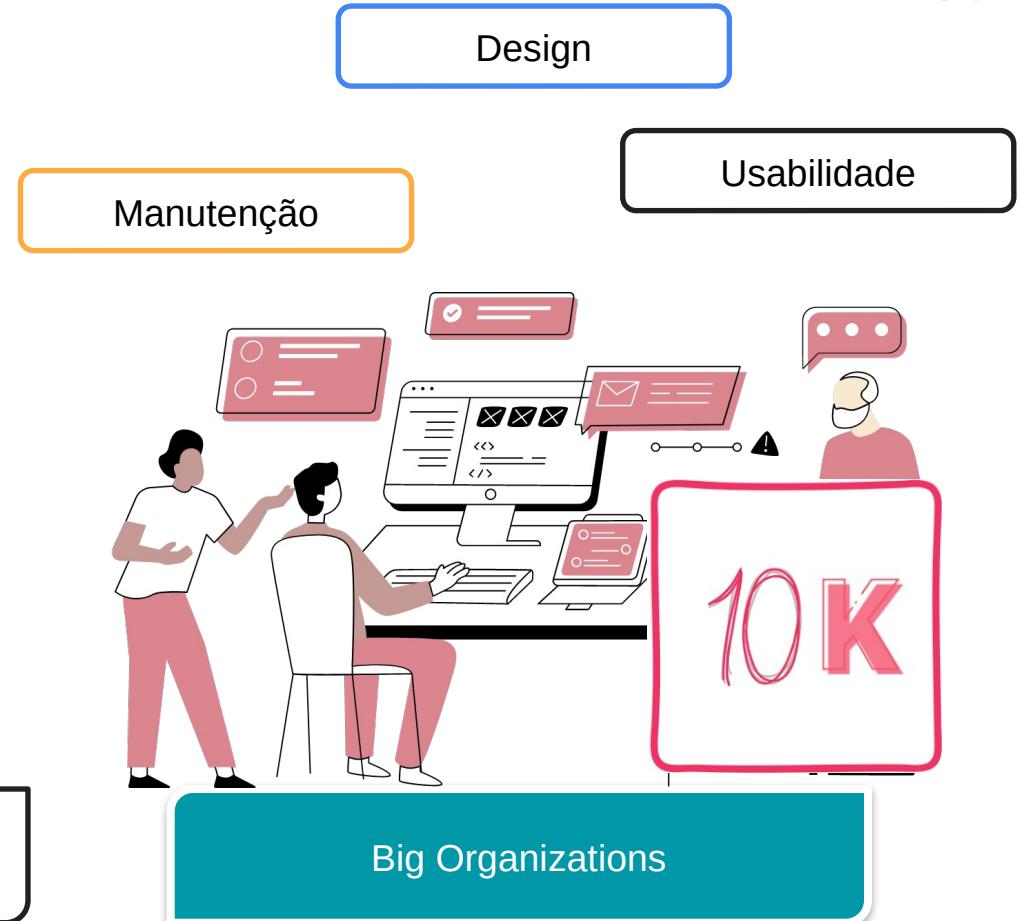


Atores



Big Organizations

Atores



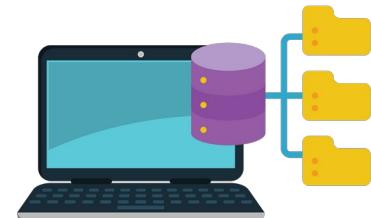
Atores

Administrador

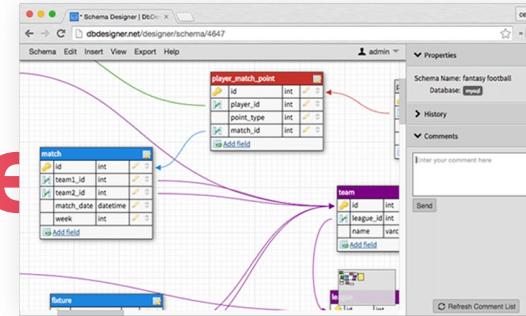
Designers

- Dia-a-dia
- Diretamente ligados ao contexto

Usuários finais



Atores - Designer



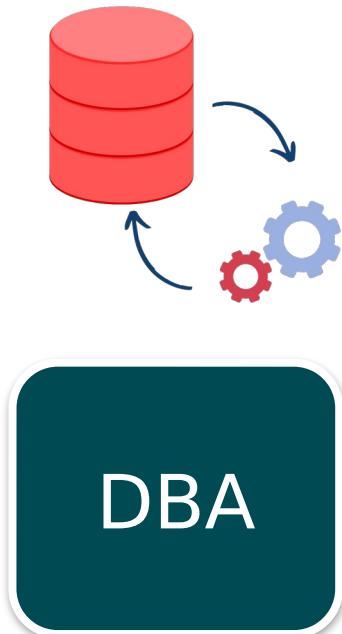
- Identificar dados e requisitos
- Represenação Estrutura
- Fase preliminar Modelagem



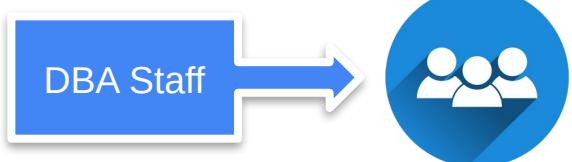
Designer



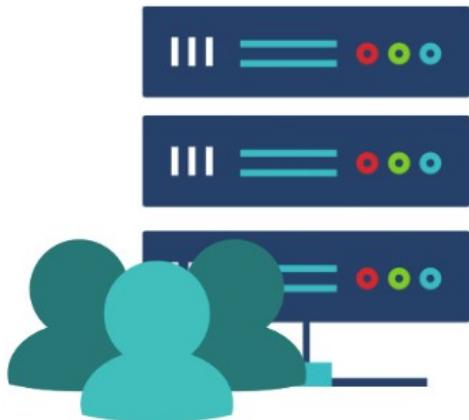
Atores - Administrador



- Gerencia Recursos
- Orquestração
- Autorização de acesso



Atores - Usuários Finais



- Accesso -> Querying
- Categorizados



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
- SofistiBD pessoal
- **Standalone**



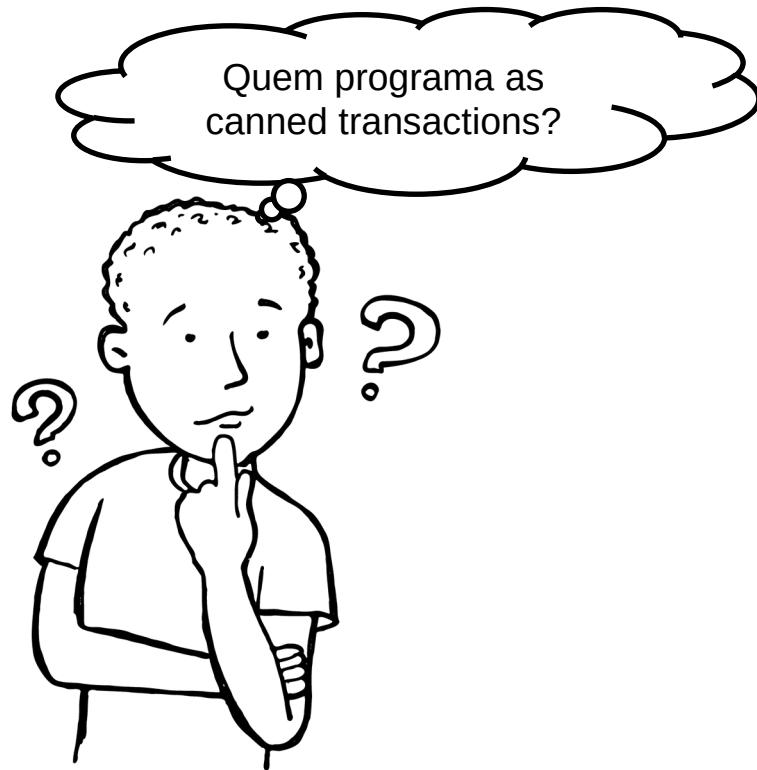
Propósito do SGBD

Atores - Usuários Finais

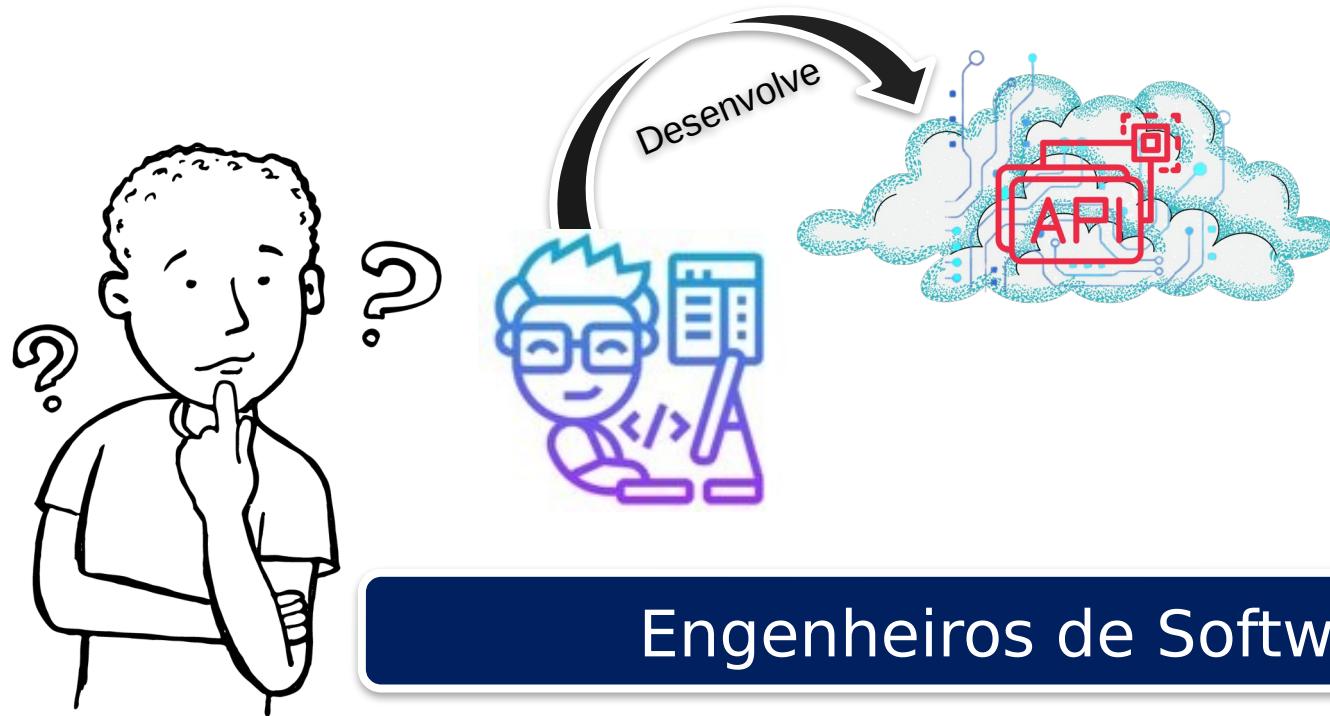


Diversas facilidades são implementadas para os users do SGBD

Atores

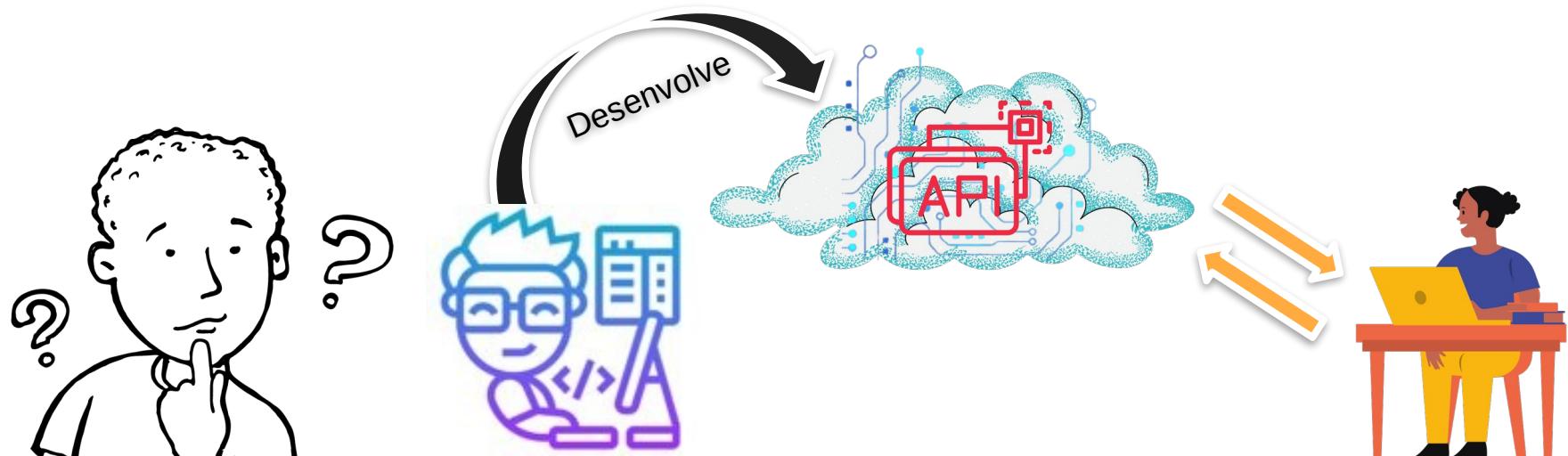


Atores



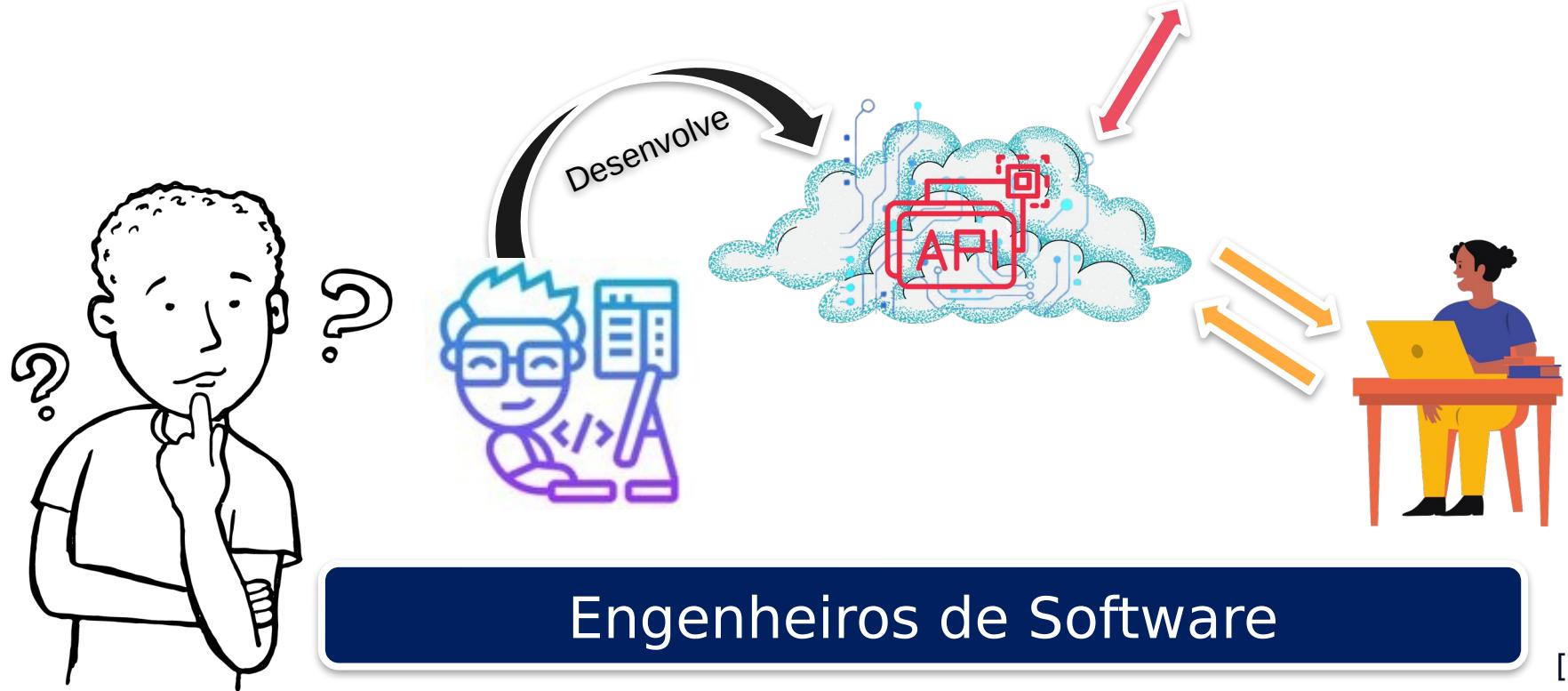
Engenheiros de Software

Atores



Engenheiros de Software

Atores

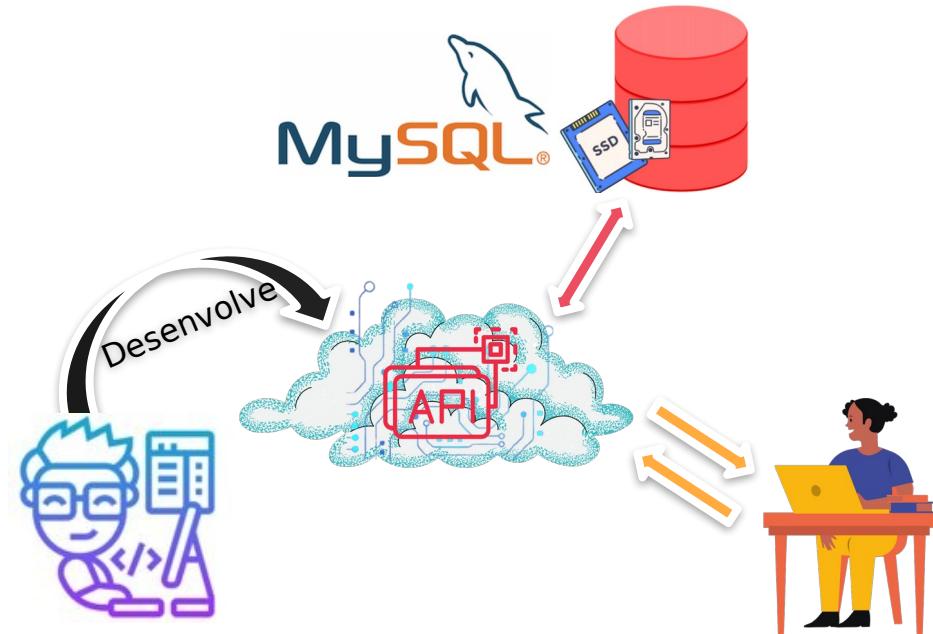


Atores

Análise de Sistema

Desenvolvimento da aplicação

Teste e documentação da aplicação



Engenheiros de Software

Workers em background - Banco de dados



Background



Background

Mantém o SGBD disponível para users

Designer do sistema de SGBD

Pessoal de operação e manutenção

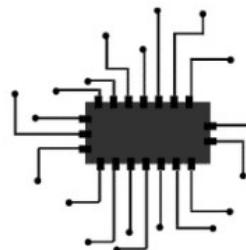
Implementação do sistema de SGBD

Desenvolvedores de ferramentas

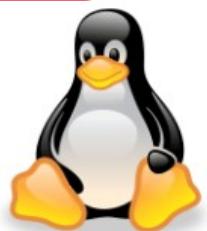
Background



Background



Responsável pelo ambiente de hardware e software para SGBD



Designer do sistema de SGBD

Pessoal de operação e manutenção

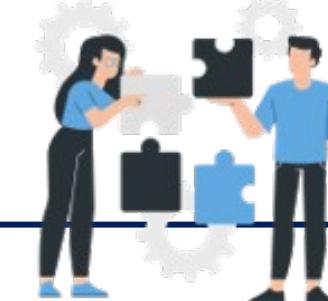
Implementação do sistema de SGBD

Desenvolvedores de ferramentas

Background



Ferramentas opcionais para diversos fins, como: performance, modelagem, análise



Designer do sistema de SGBD

Pessoal de operação e manutenção

Implementação do sistema de SGBD

Desenvolvedores de ferramentas

Vantagens de utilizar a abordagem com SGBD



Vantagens do SGBD

Abstração

Auto-descrição

Isolamento

Compartilhamento

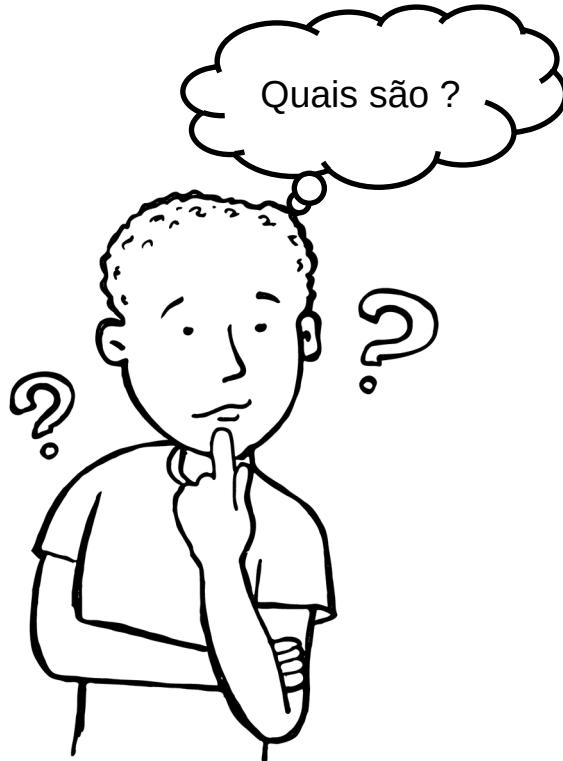
Múltiplas visões

Transação
multiuser

Além das
características...

4

Vantagens do SGBD



Controle de Redundância

Restrição de acesso

Storage - prove persistência

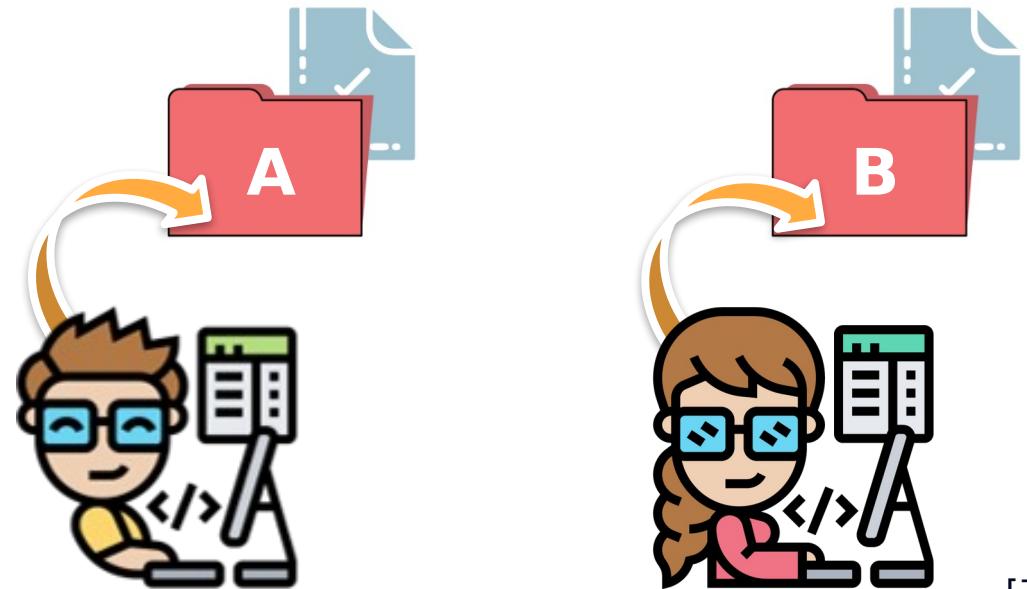
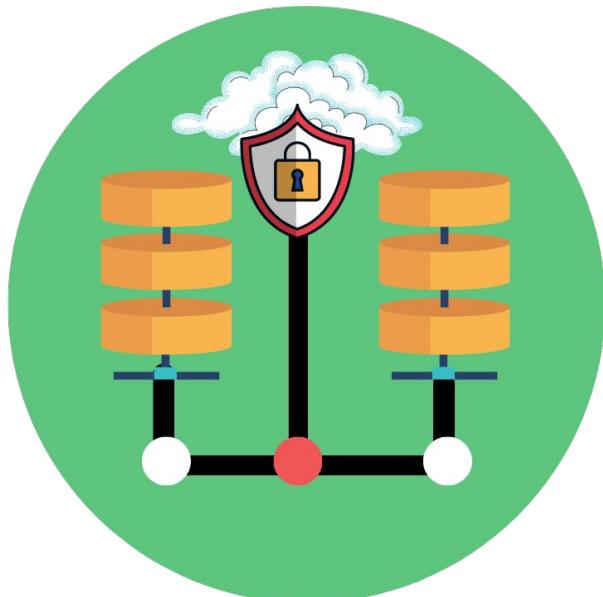
Storage - prove estrutura

Backup e Recovery

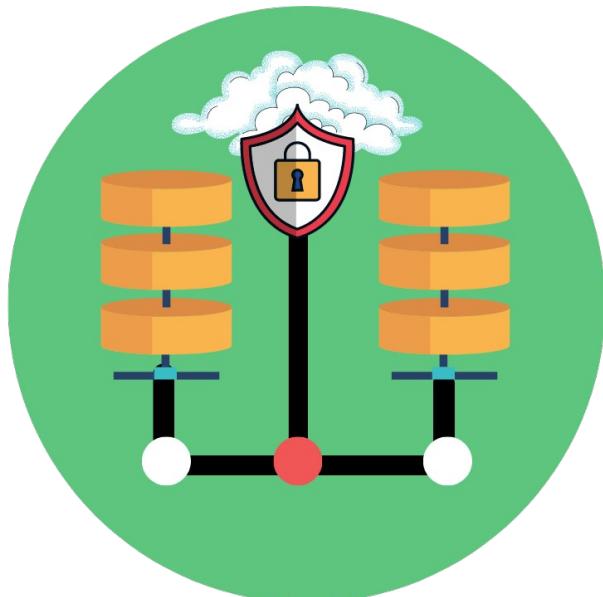


Vantagens do SGBD

Controle de Redundância



Vantagens do SGBD



Controle de Redundância

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



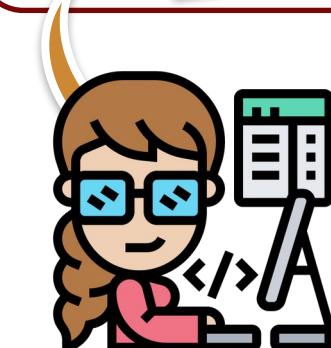
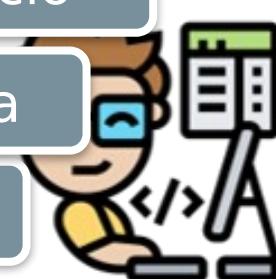
D: (storage)
Estudantes
Cursos
Relação alunoxcurso
...



Vantagens do SGB

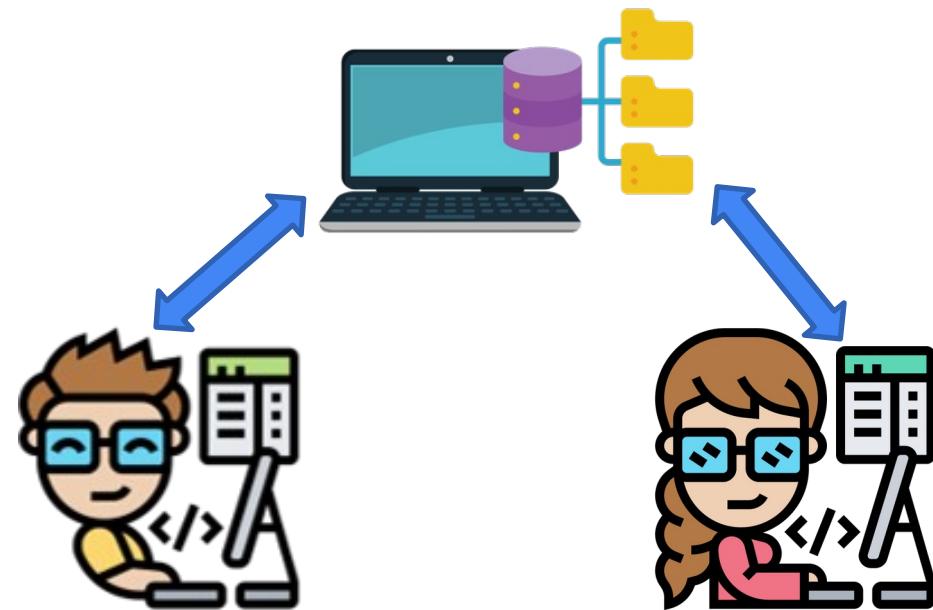
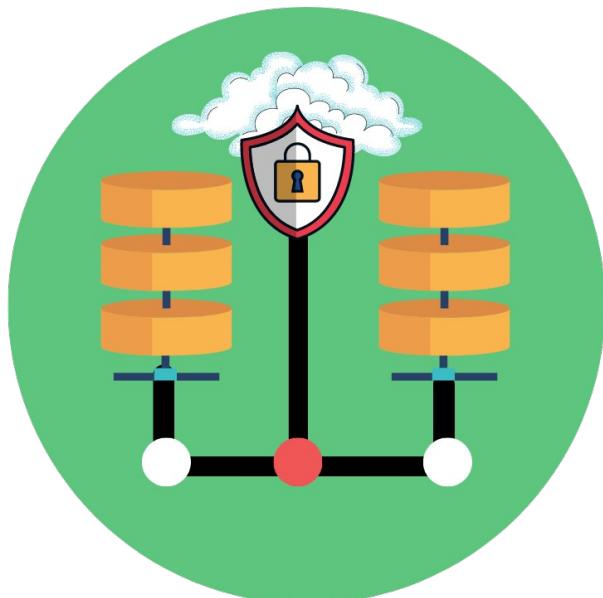
Updates
desnecessários

Controle de Redundância



Vantagens do SGBD

Controle de Redundância

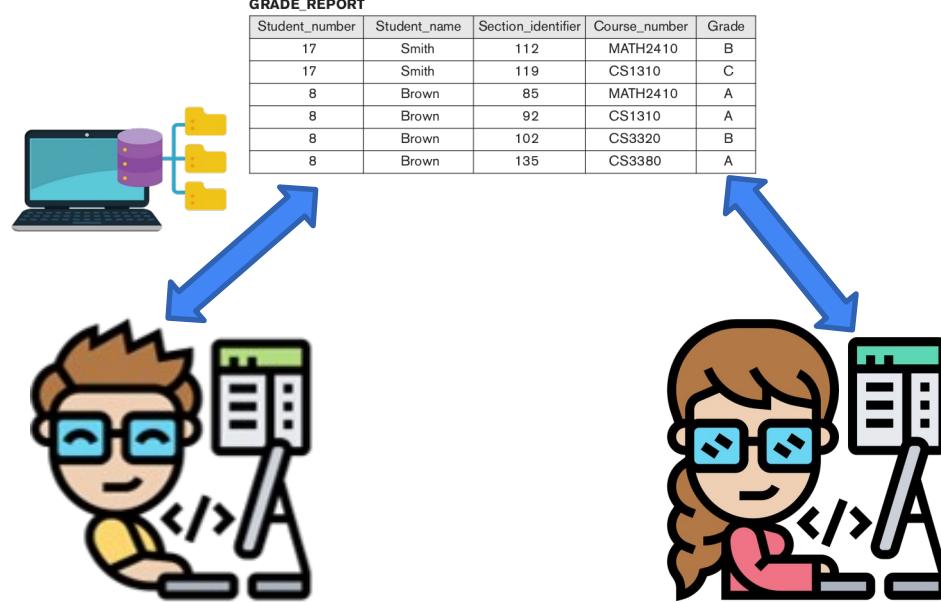


Vantagens do SGBD



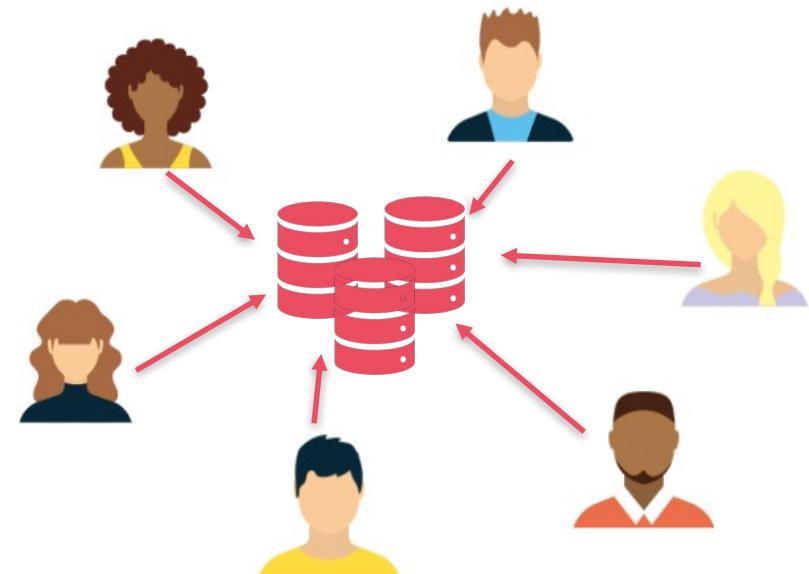
Desnormalização

Controle de Redundância

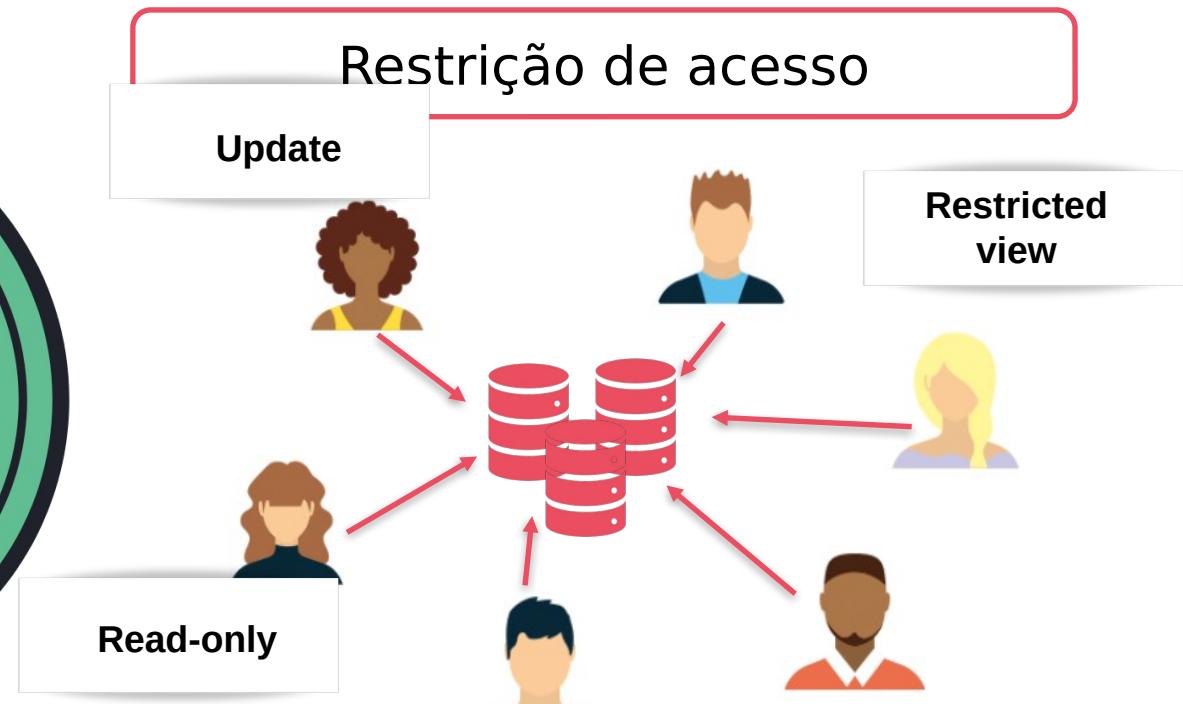


Vantagens do SGBD

Restrição de acesso



Vantagens do SGBD



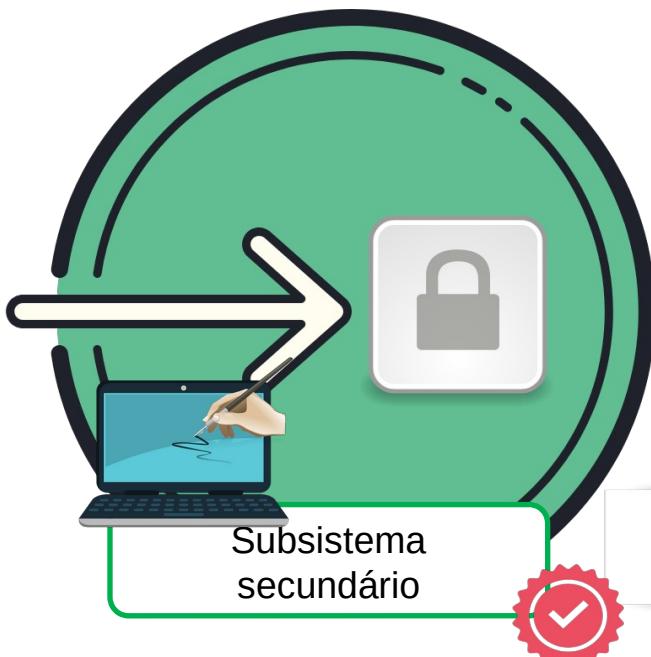
Vantagens do SGBD

DBA

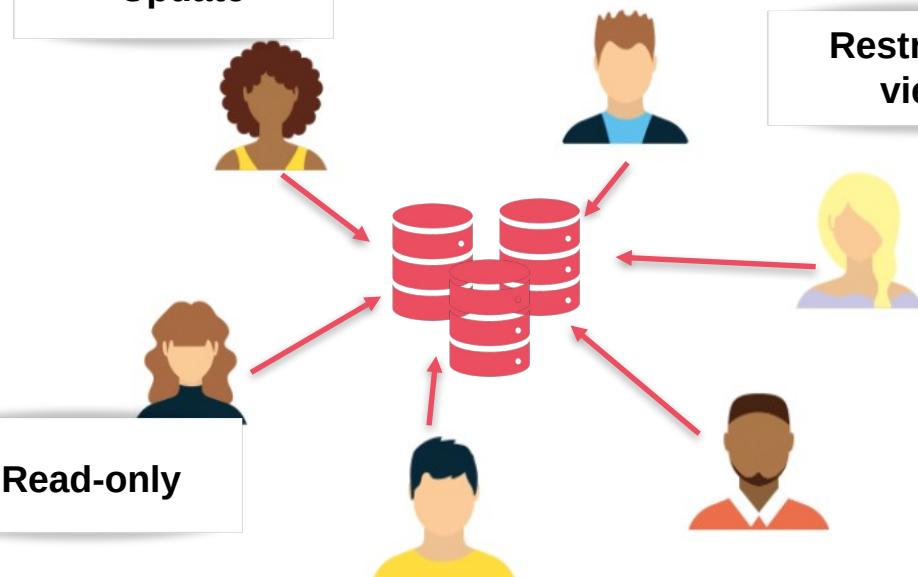
Restrição de acesso

Update

Restricted view

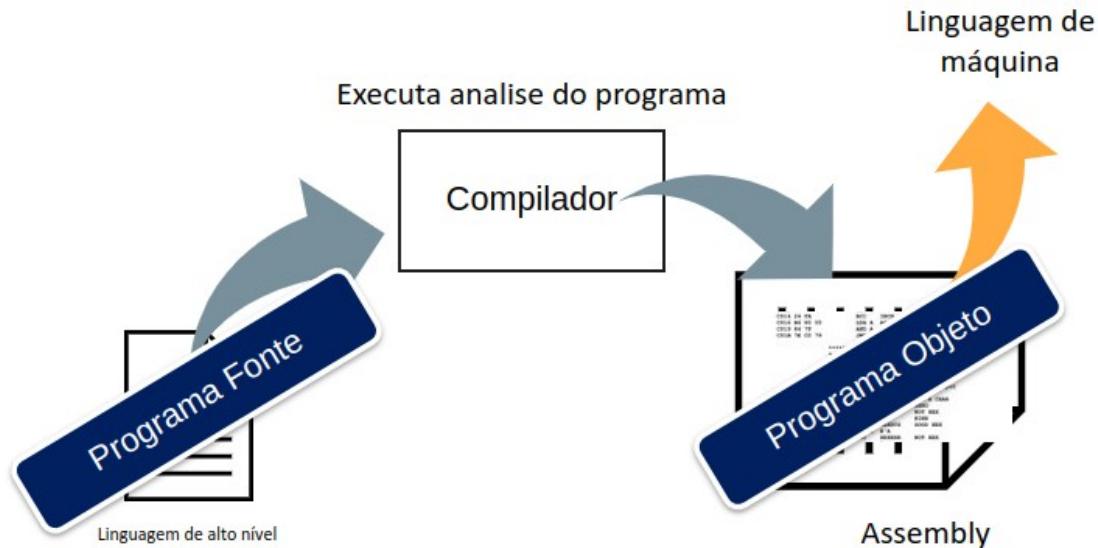
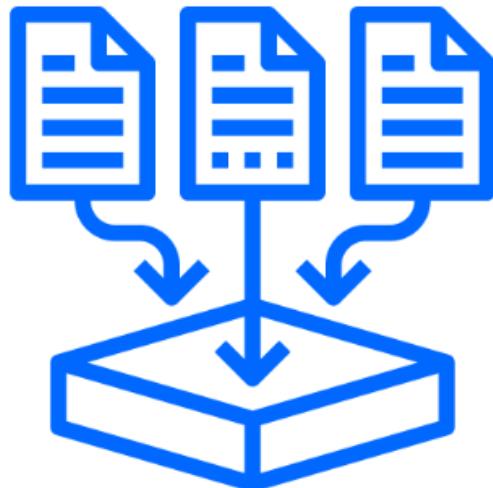


Read-only



Vantagens do SGBD

Provendo Persistência

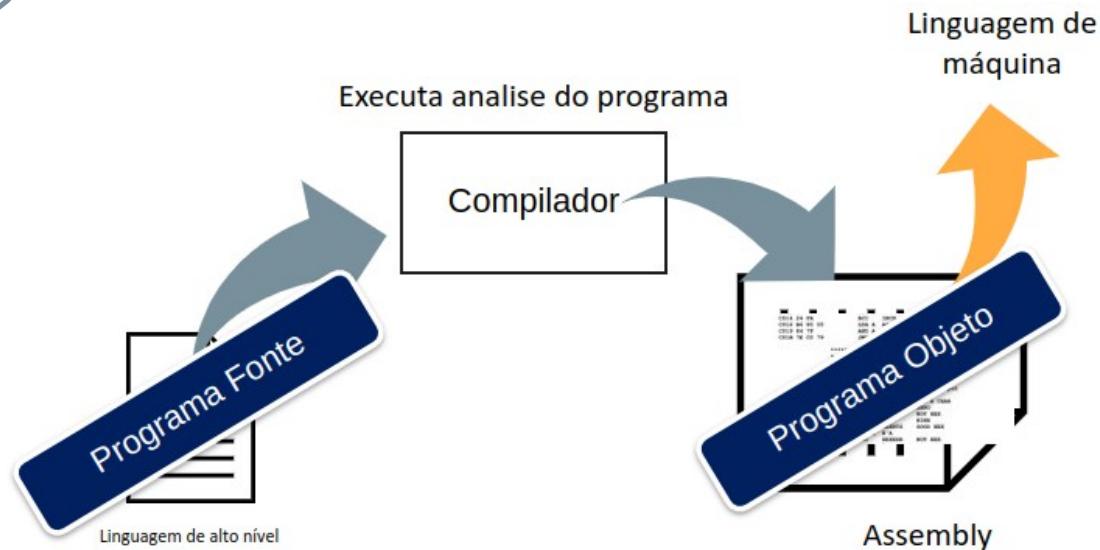


Vantagens do SGBD

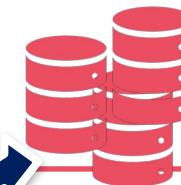
O que acontece
com os dados
de um programa
objeto?



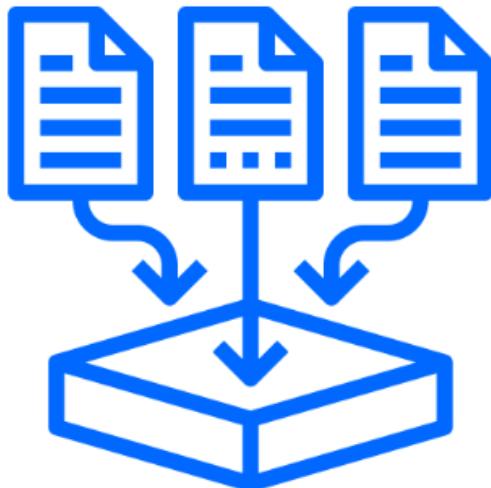
Provendo Persistência



Vantagens do SGBD

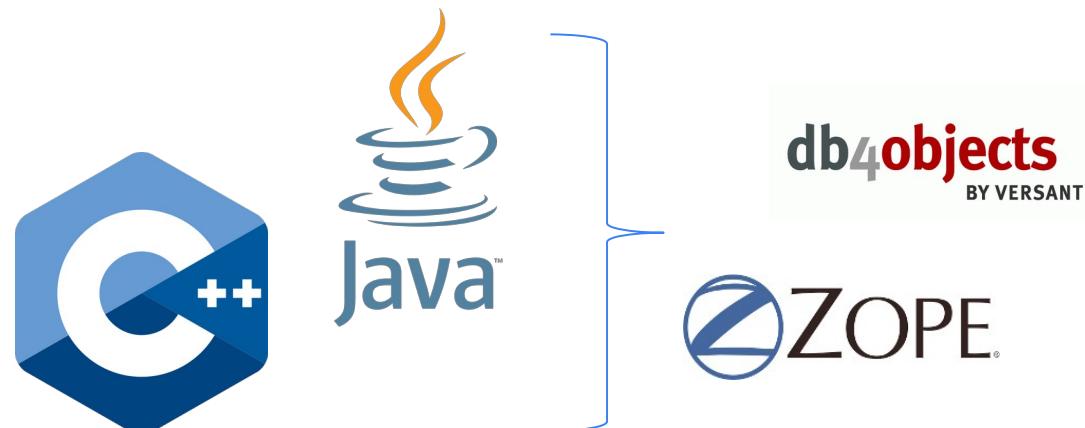
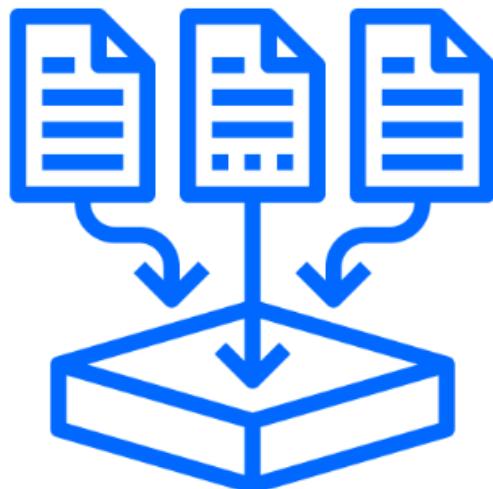


Provendo Persistência



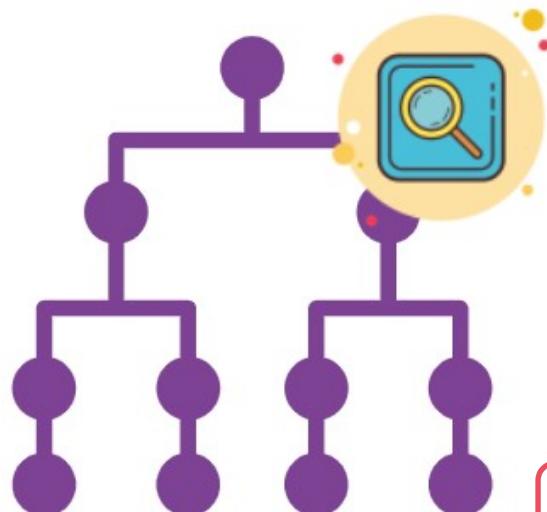
Vantagens do SGBD

Provendo Persistência



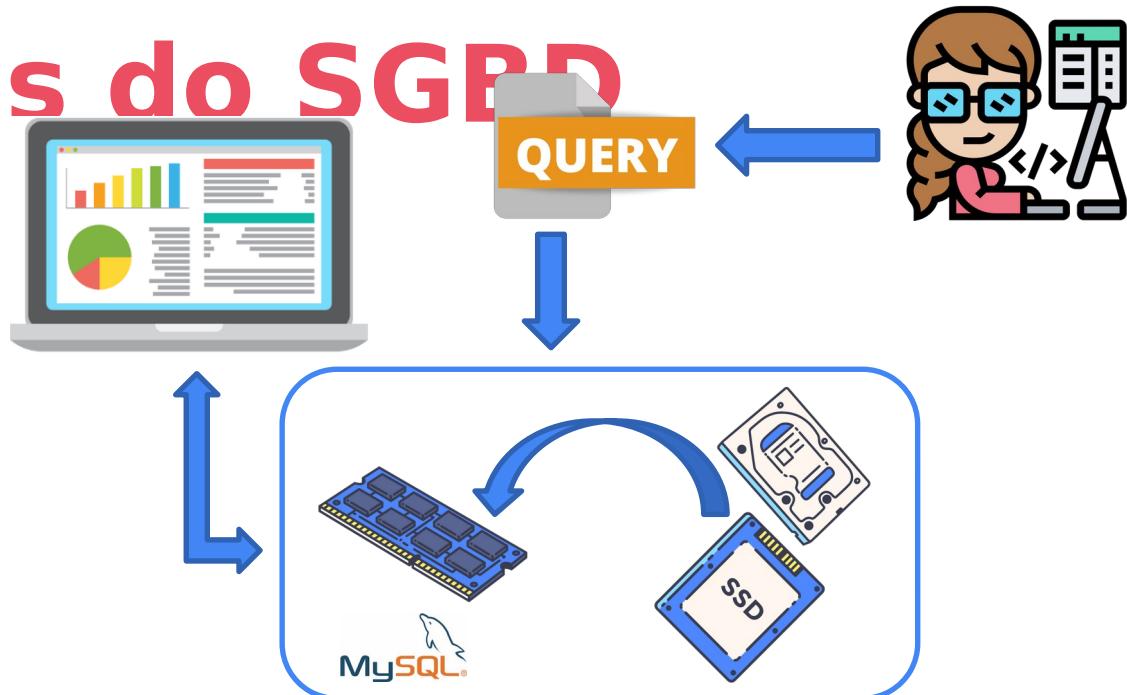
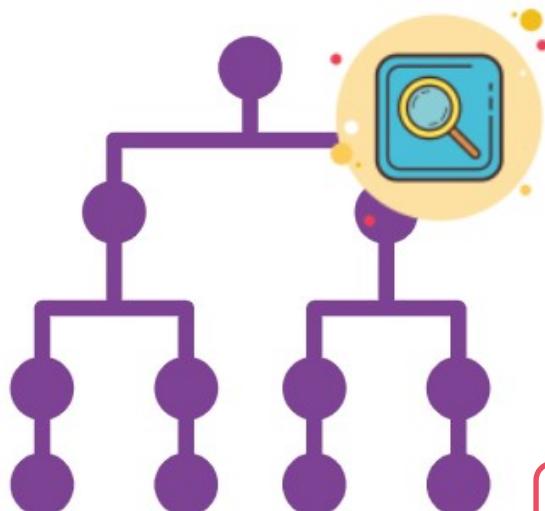
Impedance Mismatch Problem

Vantagens do SGBD



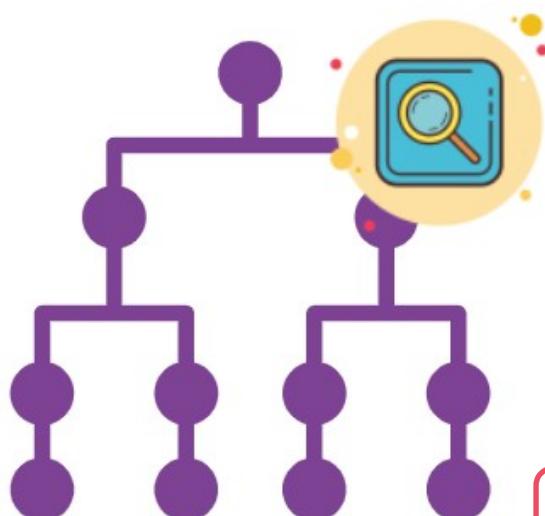
Estrutura de armazenamento e Técnicas
de busca

Vantagens do SGBD



Estrutura de armazenamento e Técnicas de busca

Vantagens do SGBD



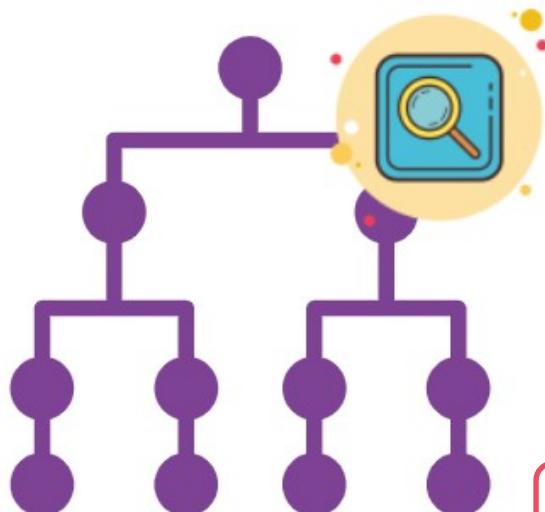
```
SELECT course_nome FROM COURSES WHERE  
Credit_hours = MAX(Credit_hours)
```

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

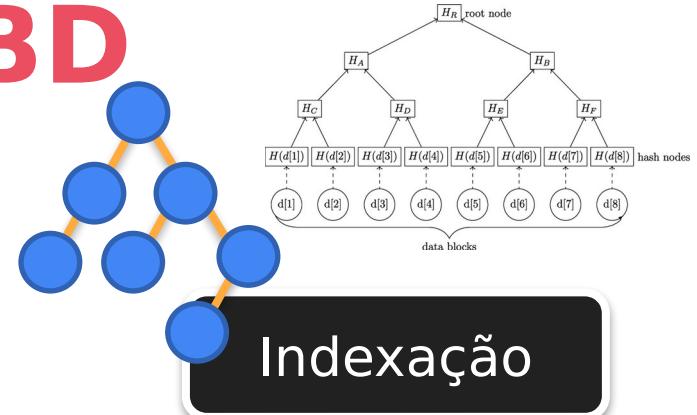
Estrutura de armazenamento e Técnicas
de busca

Vantagens do SGBD



Caching

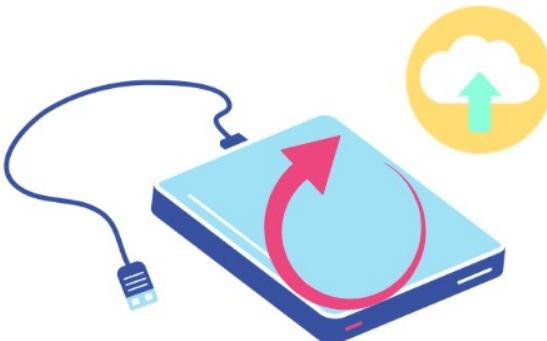
Buffering



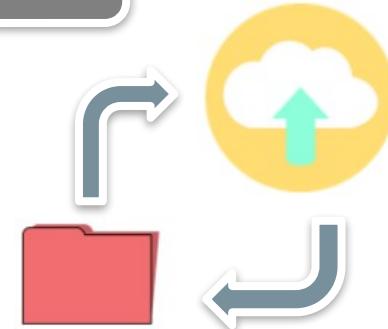
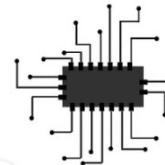
Estrutura de armazenamento e Técnicas de busca

Vantagens do SGBD

Backup e Recovery

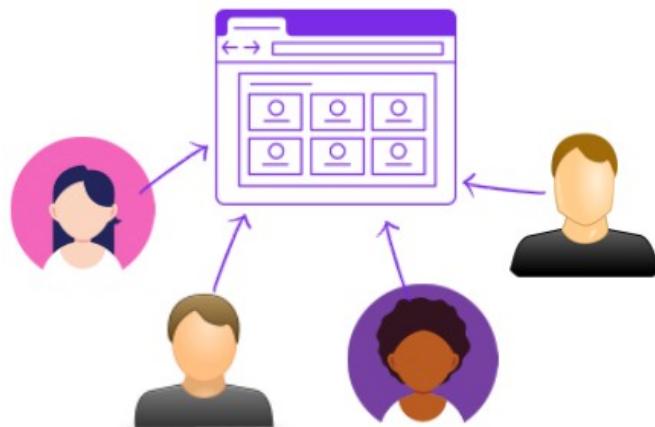


Recursos de
Recovery



Vantagens do SGBD

Provendo interface Multi-user



Vantagens do SGBD

Mobile apps

Provendo interface Multi-user

Natural
Language Interface

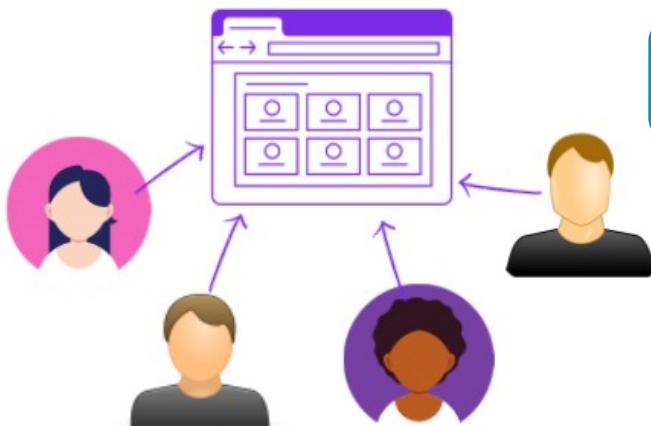
Query
language

Forms &
command codes



Menu-driven

Programming lang.
interface



Vantagens do SGBD



Repres. Relações complexas

- Variedade de dados inter-relacionados

STUDENT

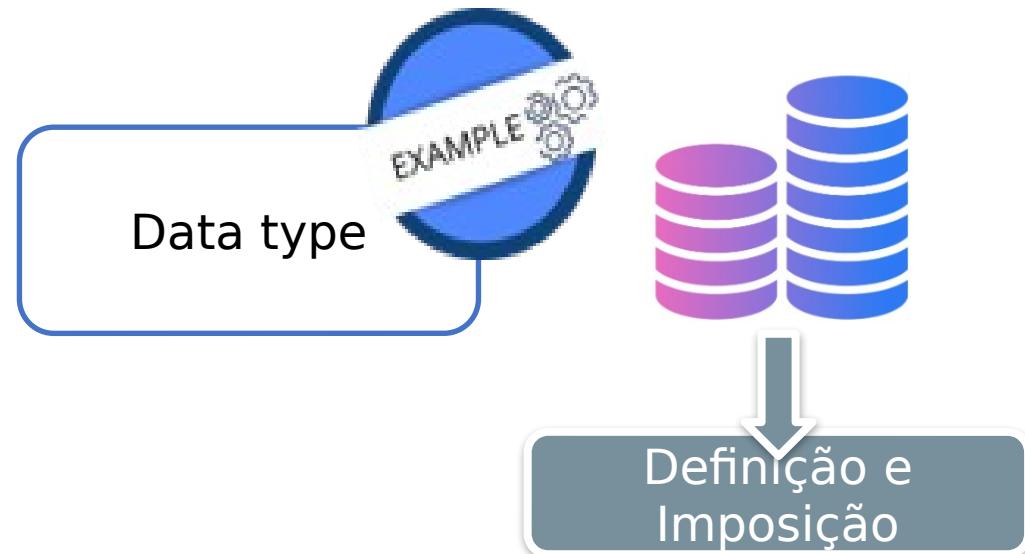
Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

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



Vantagens do SGBD

Integridade de dados

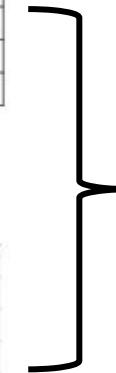


COURSE

Course_name	Course_number	Credit_hours	Department
Introduction 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
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone



Integridade de referência

Vantagens do SGBD

Integridade de dados



Regras de Domínio

Integridade
Referencial

Asserções

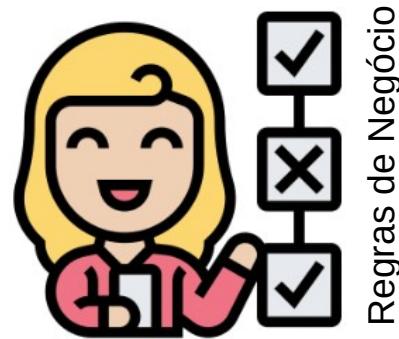
Gatilhos

Dependências
Funcionais

Constrains and Triggers

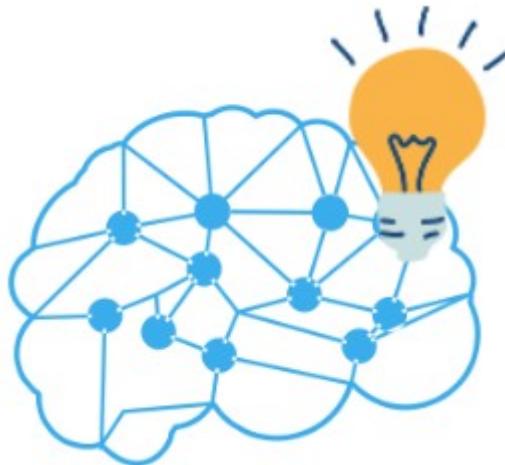
Vantagens do SGBD

Integridade de dados

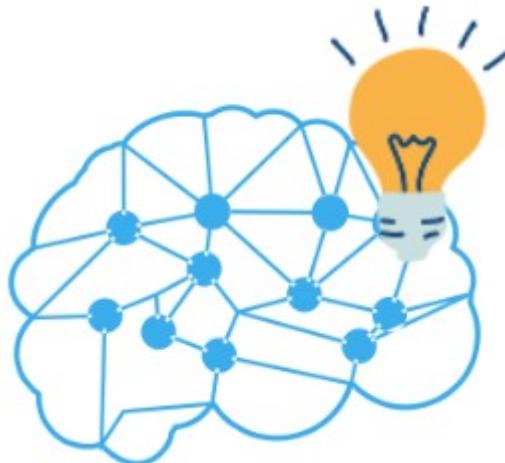


Semântica

Vantagens do SGBD



Vantagens do SGBD



Inferência | **ações com regras** |
Triggers



Dedução



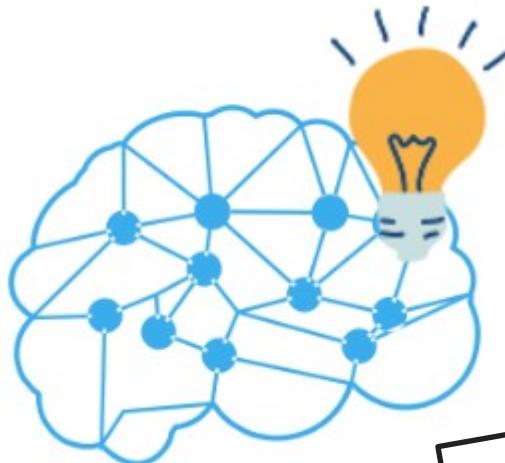
Estado de aprovação?

Prog. Procedural

Regra Declarativa



Vantagens do SGBD



Inferência | ações com regras |
Triggers

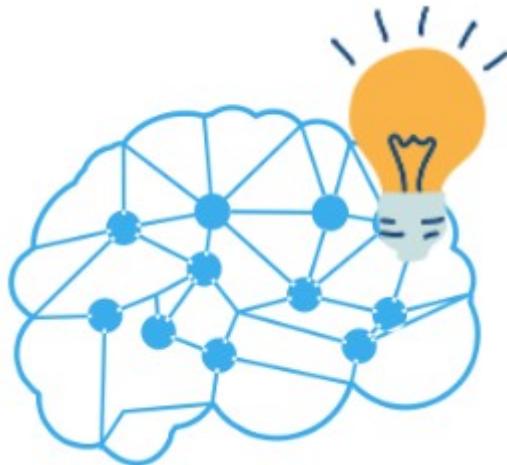
Regras e
dedução

Prog. Procedural

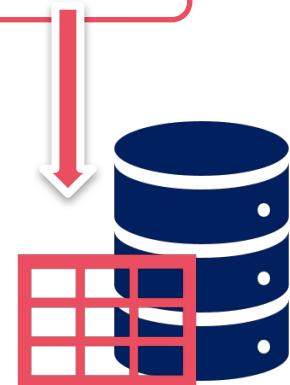
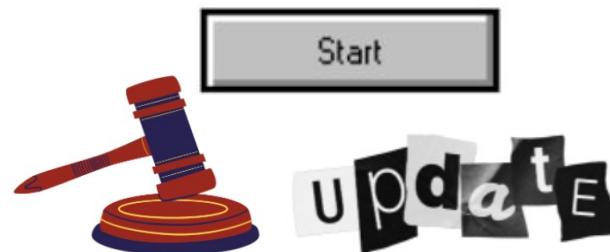
Regra Declarativa



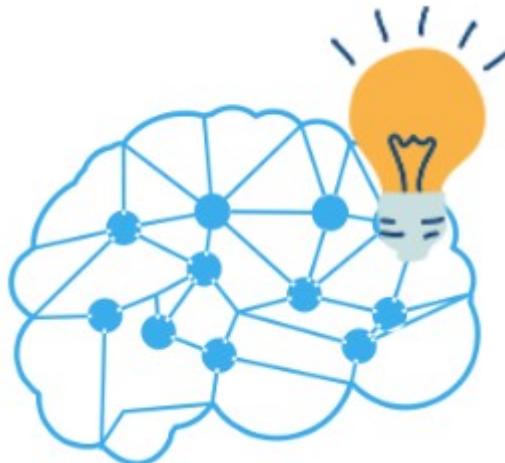
Vantagens do SGBD



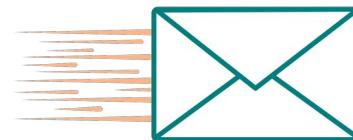
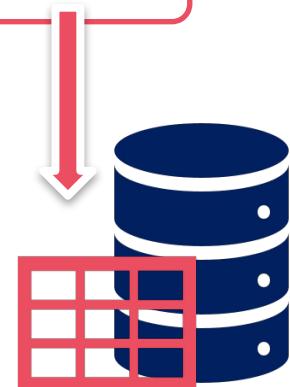
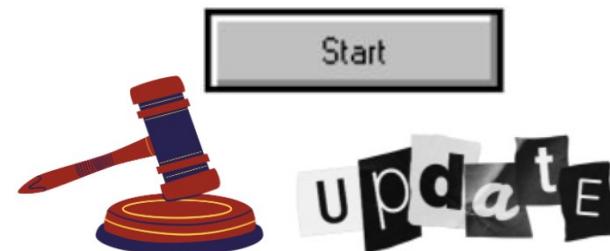
Inferência | ações com regras |
Triggers



Vantagens do SGBD



Inferência | ações com regras |
Triggers



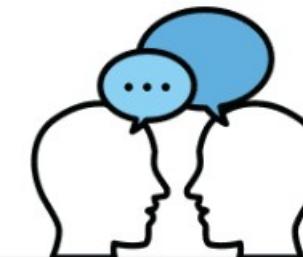
Ganhos em utilizar Sistemas de Gerenciamento de Banco de Dados



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

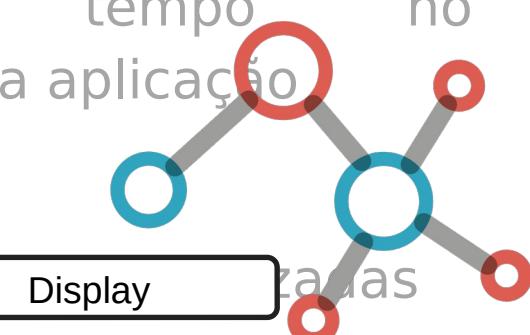
• Redução de tempo no desenvolvimento da aplicação

Tipos de dados

- Flexibilidade

- Disponibilidade

- Economia com escalabilidade



Display

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



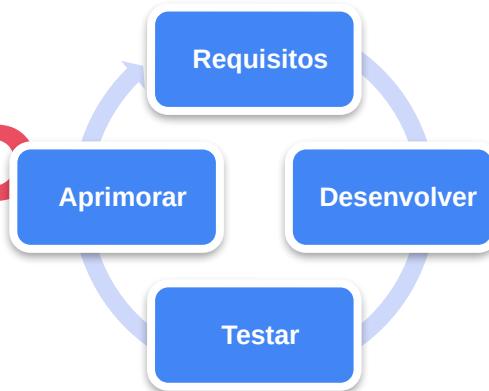
- Possibilidade de **retrieval** de features do app descontinuadas:
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade



Ganhos com SGBD



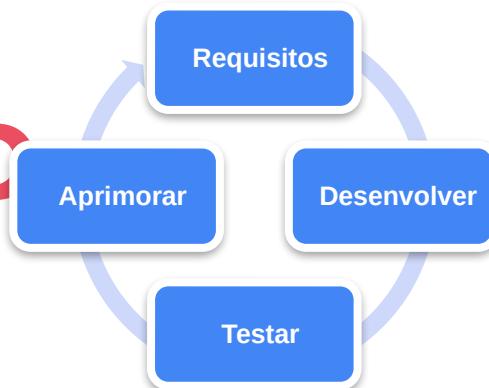
- Padronização
- Redução de tempo no desenvolvimento da aplicação
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade



Ganhos com SGBD



- Padronização
- Reduz tempo de desenvolvimento e implementação
- Novo requisito
- Flexibilidade
- Disponibilidade de info atualizadas
- Economia com escalabilidade



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
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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

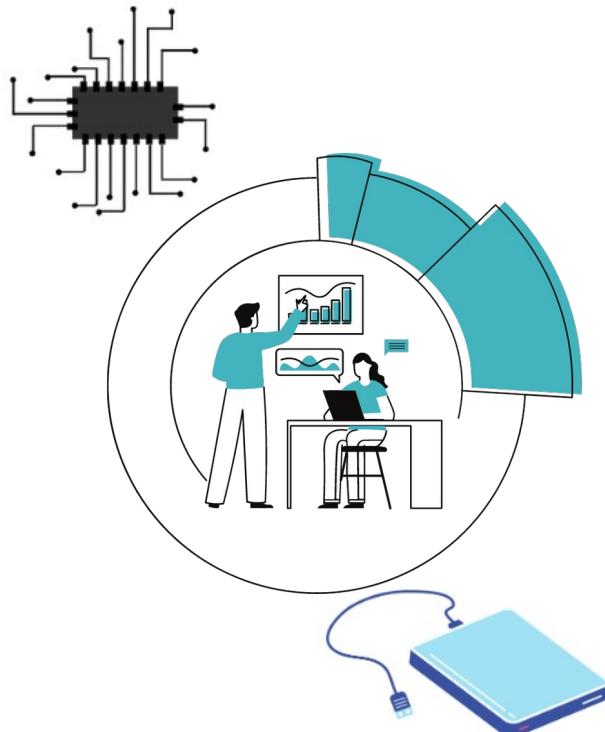
Ganhos com SGBD



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



Ganhos com SGBD



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



Quando não usar um SGBD?



Not use!



Custo-benefício



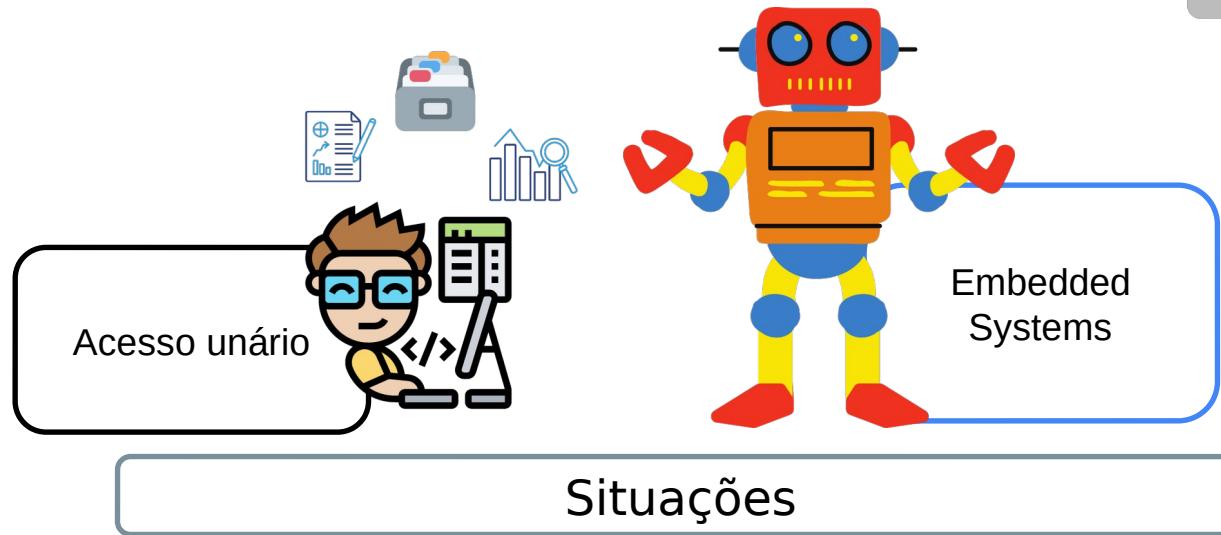
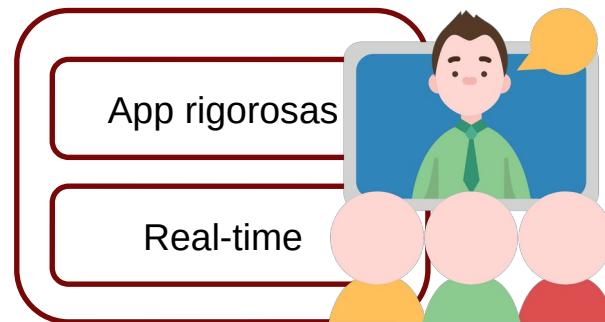
Not use!



Custo

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

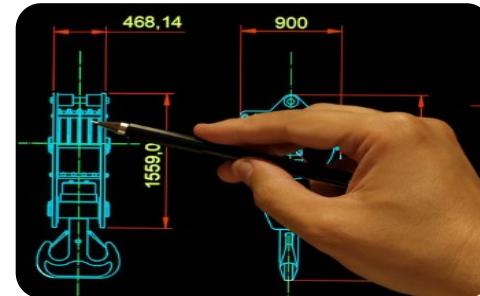
Not use!



Not use!



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GIS Systems

