FIAP

FIAP GRADUAÇÃO

Bacharelado em Sistemas de Informação

Profº Me. Alexandre Barcelos
profalexandre.barcelos@fiap.com.br

2020

Design e Desenvolvimento de Bancos de Dados

Profº Me. Alexandre Barcelos
profalexandre.barcelos@fiap.com.br

2020

AGENDA

- Introdução
  - Dado
  - Informação
  - Conhecimento
  - Sabedoria
  - Inteligência
- Banco de Dados – Definição
- Objetivo da construção de um BD
- SGDB/DBMS – SGBDR/RDBMS
- Edgar Frank Codd
- Peter Chen
- Requisitos de um SGBD

- DADO X INFORMAÇÃO
  - Uma percepção do mundo real pode ser vista como uma série de fenômenos diferentes que algumas vezes têm alguma relação entre si.

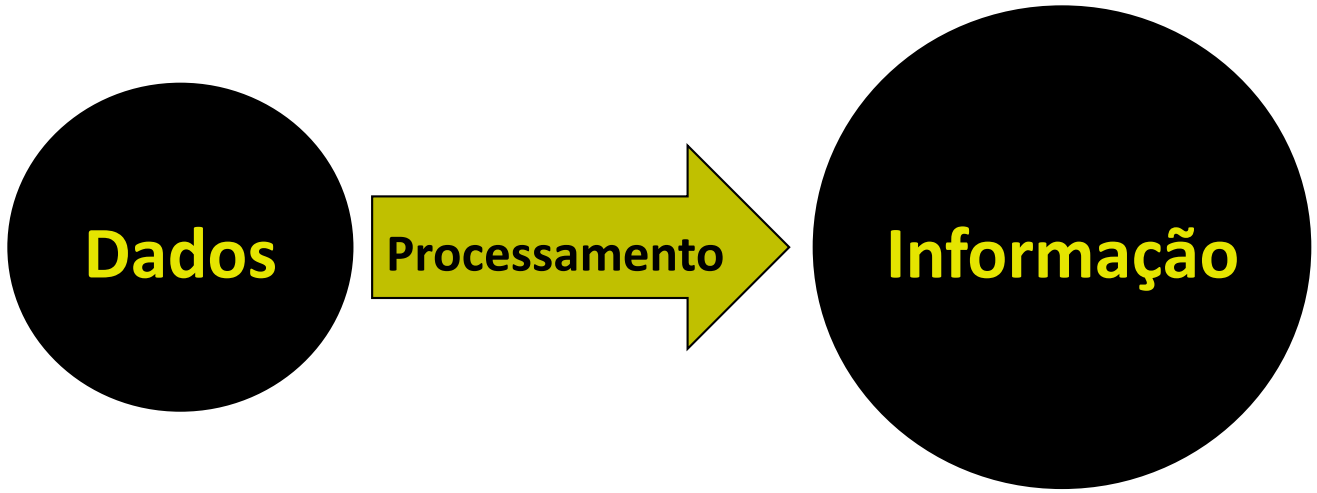
Conceitos de Bancos de Dados

Dados

A descrição destes fenômenos. Através deles obtemos informação do mundo real

Informação

Qualquer aumento do conhecimento Informação obtido através da interpretação e uso de dados.



Dado

Funcionário	Cargo	Idade	Salário
Bob	Engenheiro de Dados	42	R$ 12.500
Meg	Analista de Dados	32	R$ 9.800

Dado

Representa um valor numérico

Dado – Informação

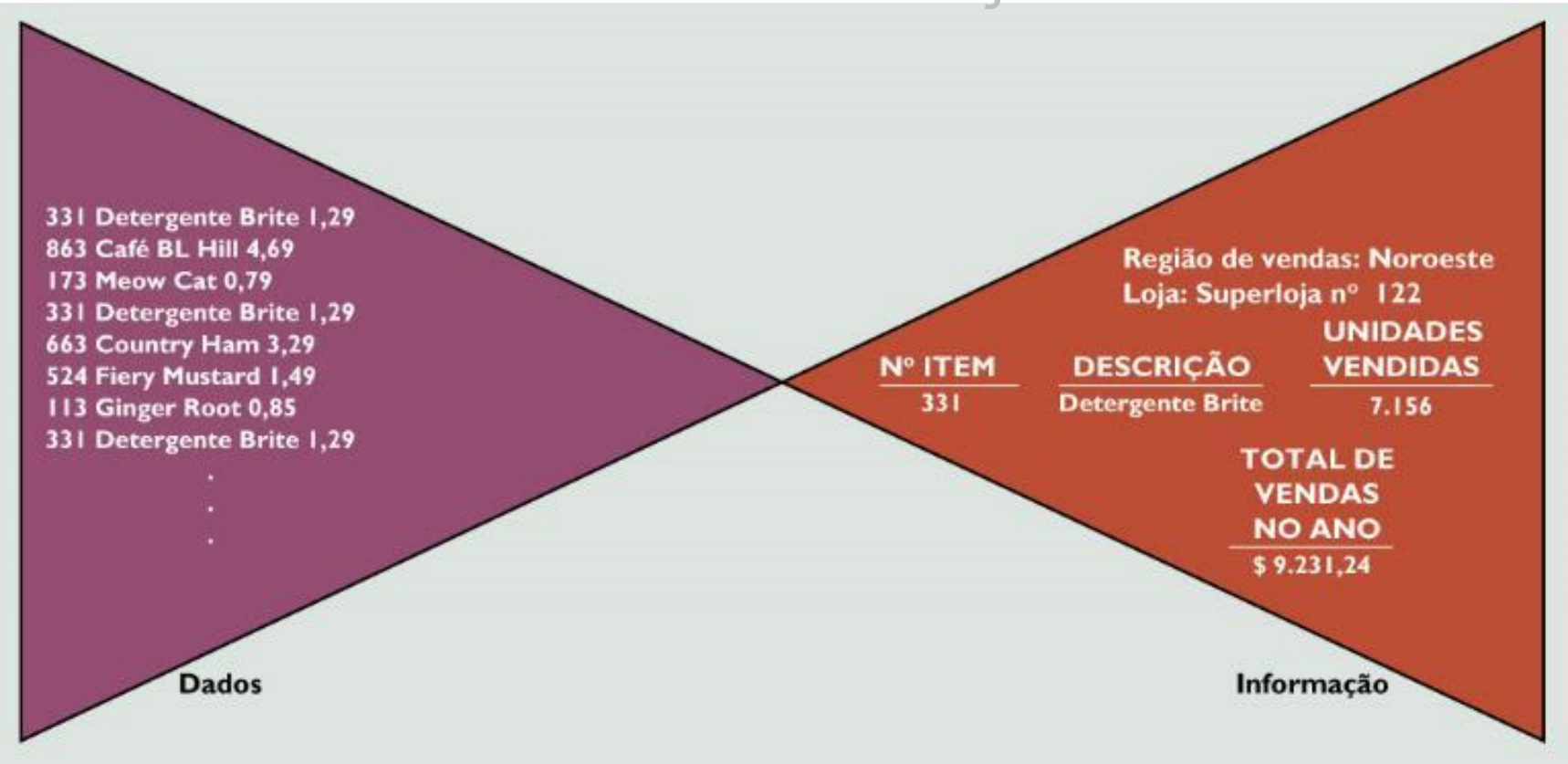
Funcionário	Cargo	Idade	Salário
Bob	Engenheiro de Dados	42	R$ 12.500
Meg	Analista de Dados	32	R$ 9.800

Informação

32 anos é a idade da funcionário Meg

Dado – Informação

Dados e Informações




A tecnologia armazena dados
As pessoas trabalham com informações

Dado – Informação – Conhecimento

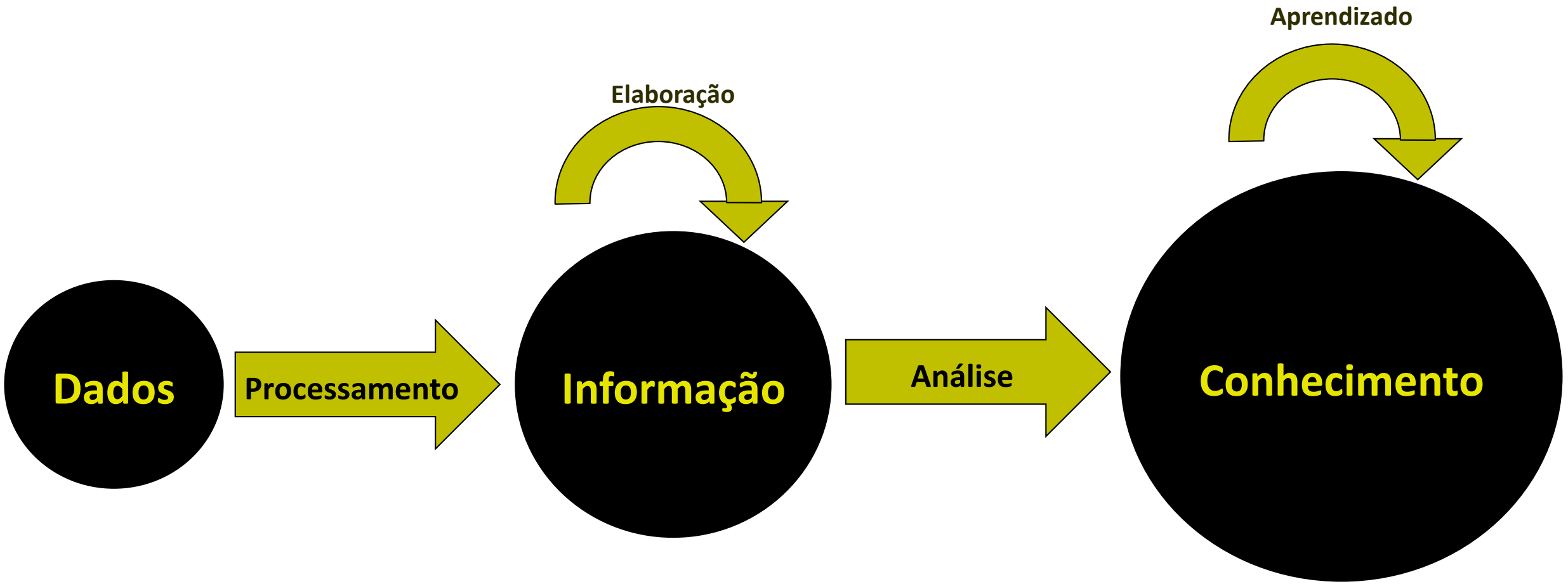
Funcionário	Cargo	Idade	Salário
Bob	Engenheiro de Dados	42	R$ 12.500
Meg	Analista de Dados	32	R$ 9.800

Conhecimento

Os funcionários do departamento

Tem salário superior a R$ 7000

Dado – Informação – Conhecimento



Dado – Informação – Conhecimento

- Portanto, dado não é informação e informação não é conhecimento.
- Hoje em dia, organizações competem pelo domínio do conhecimento científico e tecnológico.

Sabedoria

Dado → Informação → Conhecimento

Sabedoria

Inteligência/Sabedoria

Capacidade de resolver problemas, usando o conhecimento, através das informações disponíveis, compreendidas através de dados

Banco de Dados

- Definição
  - Um conjunto de informações relacionadas entre si, referentes a um mesmo assunto e organizadas de maneira útil, com o propósito de servir de base para que o usuário recupere informações, tire conclusões e tome decisões.

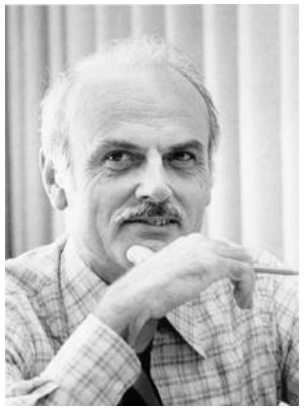
(Fonte: dicionário on-line sucesu).

Banco de Dados

- O Objetivo da construção de um banco de dados deve ser a busca da integração das atividades gerenciais e operacionais na empresa.

Modelo de Banco de Dados Relacional

- ***Edgar Frank Codd***
- ***A relational model of data for large shared data banks. Volume 13 Issue 6, June 1970 Pages 377-387***
  - *1970, IBM*
  - *Turing Award 1981*
- ***Forte base teórica matemática***
  - *teoria dos conjuntos, lógica de predicados, etc.*



Information Retrieval — P. BAXENDALE, Editor

A Relational Model of Data for Large Shared Data Banks

E. F. Codd
IBM Research Laboratory, San Jose, California

Future users of large data banks must be protected from having to know how the data is organized in the machine (the internal representation). A prompting service which supplies such information is not a satisfactory solution. Activities of users at terminals and most application programs should remain unaffected when the internal representation of data is changed and even when some aspects of the external representation are changed. Changes in data representation will often be needed as a result of changes in query, update, and report traffic and natural growth in the types of stored information.

Existing noninferential, formatted data systems provide users with tree-structured files or slightly more general network models of the data. In Section 1, inadequacies of these models are discussed. A model based on n-ary relations, a normal form for data base relations, and the concept of a universal data sublanguage are introduced. In Section 2, certain operations on relations (other than logical inference) are discussed and applied to the problems of redundancy and consistency in the user's model.

KEY WORDS AND PHRASES: data bank, data base, data structure, data organization, hierarchies of data, networks of data, relations, derivability, redundancy, consistency, composition, join, retrieval language, predicate calculus, security, data integrity
CR CATEGORIES: 3.70, 3.73, 3.75, 4.20, 4.22, 4.29

1. Relational Model and Normal Form

1.1. Introduction

This paper is concerned with the application of elementary relation theory to systems which provide shared access to large banks of formatted data. Except for a paper by Childs [1], the principal application of relations to data systems has been to deductive question-answering systems. Levein and Maron [2] provide numerous references to work in this area.

In contrast, the problems treated here are those of *data independence*—the independence of application programs and terminal activities from growth in data types and changes in data representation—and certain kinds of *data inconsistency* which are expected to become troublesome even in nondeductive systems.

The relational view (or model) of data described in Section 1 appears to be superior in several respects to the graph or network model [3, 4] presently in vogue for noninferential systems. It provides a means of describing data with its natural structure only—that is, without superimposing any additional structure for machine representation purposes. Accordingly, it provides a basis for a high level data language which will yield maximal independence between programs on the one hand and machine representation and organization of data on the other.

A further advantage of the relational view is that it forms a sound basis for treating derivability, redundancy, and consistency of relations—these are discussed in Section 2. The network model, on the other hand, has spawned a number of confusions, not the least of which is confusing the derivation of connections for the derivation of relations (see remarks in Section 2 on the "connection trap").

Finally, the relational view permits a clearer evaluation of the scope and logical limitations of present formatted data systems, and also the relative merits (from a logical standpoint) of competing representations of data within a single system. Examples of this clearer perspective are cited in various parts of this paper. Implementations of systems to support the relational model are not discussed.

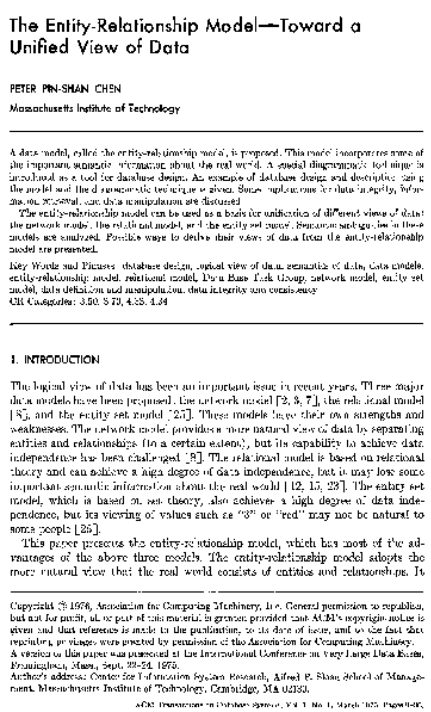
1.2. Data Dependencies in Present Systems

The provision of data description tables in recently developed information systems represents a major advance toward the goal of data independence [5, 6, 7]. Such tables facilitate changing certain characteristics of the data representation stored in a data bank. However, the variety of data representation characteristics which can be changed *without logically impairing some application programs* is still quite limited. Further, the model of data with which users interact is still cluttered with representational properties, particularly in regard to the representation of collections of data (as opposed to individual items). Three of the principal kinds of data dependencies which still need to be removed are: ordering dependence, indexing dependence, and access path dependence. In some systems these dependencies are not clearly separable from one another.

1.2.1. *Ordering Dependence.* Elements of data in a data bank may be stored in a variety of ways, some involving no concern for ordering, some permitting each element to participate in one ordering only, others permitting each element to participate in several orderings. Let us consider those existing systems which either require or permit data elements to be stored in at least one total ordering which is closely associated with the hardware-determined ordering of addresses. For example, the records of a file concerning parts might be stored in ascending order by part serial number. Such systems normally permit application programs to assume that the order of presentation of records from such a file is identical to (or is a subordering of) the

Modelo Entidade Relacionamento

- ***Peter Chen***
  - ***Criador do Modelo de Entidade-Relacionamento (Modelo ER).***
- ***The entity-relationship model: toward a unified view of data. ACM Transactions on Database Systems, v. 1, n. 1, p. 6-36, mar. 1976.***
- ***(This paper is one of the most cited papers in the computer field. It was selected as one of the most influential papers in computer science in a survey of over 1,000 computer science professors.)***
- ***http://www.csc.lsu.edu/~chen/***



The Entity-Relationship Model—Toward a Unified View of Data

PETER PIN-SHAN CHEN

Massachusetts Institute of Technology

A data model, called the entity-relationship model, is proposed. This model incorporates some of the important semantic information about the real world. A special diagrammatic technique is introduced as a tool for database design. An example of database design and description using the model and the diagrammatic technique is given. Some implications for data independency, consistency, and data manipulation are discussed.

The entity-relationship model can be used as a basis for unification of different views of data: the network model, the relational model, and the entity set model. Semantic ambiguities in these models are analyzed. Possible ways to derive their views of data from the entity-relationship model are presented.

Key Words and Phrases: database design, logical view of data, semantics of data, data models, entity-relationship model, relational model, Data Base Task Group, network model, entity set model, data definition and manipulation, data integrity, consistency

CR Categories: 3.50, 3.70, 4.33, 4.34

1. INTRODUCTION

The logical view of data has been an important issue in recent years. Three major data models have been proposed: the network model [2, 3, 7], the relational model [8], and the entity set model [23]. These models have their own strengths and weaknesses. The network model provides a more natural view of data by separating entities and relationships (to a certain extent), but its capability to achieve data independence has been challenged [8]. The relational model is based on relational theory and can achieve a high degree of data independence, but it may lose some important semantic information about the real world [12, 15, 23]. The entity set model, which is based on set theory, also achieves a high degree of data independence, but its viewing of values such as "3" or "red" may not be natural to some people [25].

This paper presents the entity-relationship model, which has most of the advantages of the above three models. The entity-relationship model adopts the more natural view that the real world consists of entities and relationships. It

A version of this paper was presented at the International Conference on Very Large Data Bases, Framingham, Mass., Sept. 22-24, 1975.

Author's address: Center for Information Systems Research, Alfred P. Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA 02139.

Requisitos de um SGBD

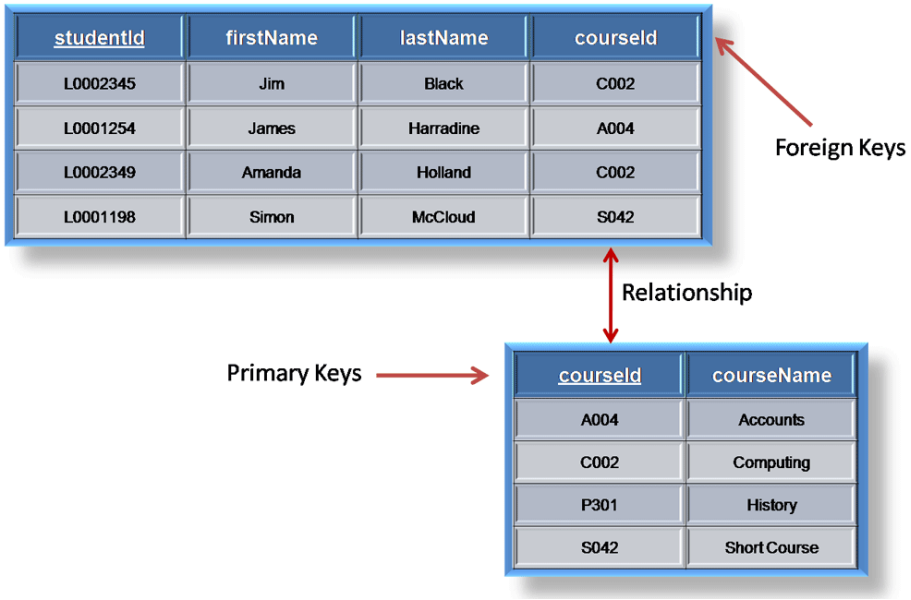
1. Independência dos Dados
2. Controle de Redundância dos Dados
3. Garantia de Integridade dos Dados
4. Compartilhamento dos Dados
5. Privacidade dos Dados
6. Segurança dos Dados

Independência dos Dados

- **SGBD** (Sistema Gerenciador de Banco de Dados) ou **DBMS** (Database Management Systems) é um Software de controle posicionado entre o banco de dados e as aplicações. Controla e gerência os dados e atende as solicitações de acesso aos mesmos.
- **SGDBR** (Sistema Gerenciador de Banco de Dados Relacional) ou **RDBMS** (Relational Database Management Systems)

Controle de Redundância dos Dados

- Em um sistema de banco de dados, ninguém na verdade quer abolir as ocorrências de dados duplicados.
  - Ex: Chave Estrangeira
- Sempre haverá redundância, mas ela será controlada.



Garantia de Integridade dos Dados

- Mecanismos de controle de *Lock*, garantem que uma informação não será atualizada ao mesmo tempo por processos diferentes.

Compartilhamento dos Dados

- Se existe um banco de dados, todos os usuários devem acessar todos os dados, pois o banco não é construído apenas para uma pessoa e sim para a empresa.

Privacidade dos Dados

- Somente usuários devidamente autorizados poderão acessar os seus respectivos dados.

Segurança dos Dados

- Envolve todos os conceitos anteriores e mais outros recursos técnicos. Vária desde a segurança lógica até a segurança física.

REFERÊNCIAS

- AMARAL, Fernando. Introdução a ciência de dados. Alta Books, 2016
- ELMASRI, RAMES; NAVATHE, SHAMKANT B. Sistemas de Banco de Dados. 6 edição. Pearson, 2011.
- HEUSER, Carlos Alberto. Projeto de banco de dados. 6ª Edição. Sagra Luzzatto, 2008.
- SILBERSCHATZ, ABRAHAM; KORTH, HENRY F.; SUDARSAHN, S. Sistema de banco de dados. 6 edição. Campus, 2012