



data

Banco de Dados

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- Banco de Dados
- Modelo Relacional
- Linguagem SQL
- Modelos não-relacionais





# Banco de Dados



# Banco de Dados

- Base de dados (dados em si)
- Sistema Gerenciador de Banco de Dados
- Linguagem de Exploração



# Base de Dados

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
removido	tamanhoRegistro				Prox								id			
1 byte	4 bytes				8 bytes								4 bytes			

17	18	19	20	21	22	23	24	25	...	...	...	...	...	...	...	...
idade				tamNomeJog				nomeJogador				tamNacionalidade				
4 bytes				4 bytes				variável				4 bytes				

...	...	...	...	...	...	...	...	...	...	...	...	...	...
nacionalidade				tamNomeClube				nomeClube					
variável				4 bytes				variável					



# Sistema Gerenciador de Base de Dados

- Interface entre programas e a base de dados
- Garante integridade, autorização de acesso e controle de atualizações
- Garante consistência de dados:
  - Validade – dados pertencem ao domínio de valores possíveis
  - Completeza – todos os campos obrigatórios são preenchidos
  - Consistência – informações iguais têm valores iguais



# Linguagem de Exploração

- Linguagem que permite criar, ler, alterar e deletar dados (CRUD).
- Structured Query Language (SQL) -> relacional
- NoSQL: not only SQL -> não relacional





# Modelo Relacional





# Modelos de Dados

- Estrutura de regras para tratar os dados
- Conceituais:
  - Entidade-Relacionamento (1976)
- Físicos:
  - Hierárquico (anos 60), Rede (anos 60), Relacional (1970)
- Hipotéticos (baseados em implementação ou tipo de dados):
  - NoSQL (1998)



# Modelos Relacional

- Baseado em relações/tabelas
- Possui sistema de chaves e chaves estrangeiras para relacionar as tabelas
- Possui diversas restrições de integridade
- Uma base relacional é definida por seu conjunto de relações mais suas restrições de integridade



# Relação

Papel

--	--	--	--

Tupla


Valor


Atributo

Relação



R1



R2

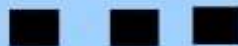


## BASE DE DADOS

R3



R4



Termo relacional  $\Rightarrow$  Implementação ou Termo coloquial

- Relação  $\Rightarrow$  Tabela, Arquivo, Base de Dados
- Tupla  $\Rightarrow$  Registro, linha
- Atributo  $\Rightarrow$  Campo, Atributo, Coluna, Cabeçalho
- Papel  $\Rightarrow$  Campo, Atributo, Cabeçalho
- Valor  $\Rightarrow$  esse é sempre **Valor** mesmo...



# Relação

Papel

--	--	--	--

Tupla


Valor


Atributo

Relação



# Superchave

- Um conjunto de atributos de uma relação que identifique univocamente cada tupla é chamada uma **Superchave**

Aluno(Nome, RG, EstadoRG, Idade, Curso, NUSP)

$SCh_1(\text{Aluno}) = \{\text{NUSP}, \text{Idade}, \text{RG}, \text{EstadoRG}\}$

$Ch_1(\text{Aluno}) = \{\text{RG}, \text{EstadoRG}\}$

$Ch_2(\text{Aluno}) = \{\text{NUSP}\}$



# Chave

- Chave é uma superchave da qual não se pode retirar nenhum atributo sem perder a propriedade de identificação unívoca

$\text{Aluno}(\text{Nome}, \text{RG}, \text{EstadoRG}, \text{Idade}, \text{Curso}, \text{NUSP})$

$SCh_1(\text{Aluno}) = \{\text{NUSP}, \text{Idade}, \text{RG}, \text{EstadoRG}\}$

$Ch_1(\text{Aluno}) = \{\text{RG}, \text{EstadoRG}\}$

$Ch_2(\text{Aluno}) = \{\text{NUSP}\}$





# Chave Candidata

- É comum que exista mais de uma chave para uma mesma relação
- Cada chave útil para buscas é chamada de Chave Candidata

Aluno(Nome, RG, EstadoRG, Idade, Curso, NUSP)

$Ch_2(\text{Aluno}) = \{\text{NUSP}\}$

$Ch_1(\text{Aluno}) = \{\text{RG}, \text{EstadoRG}\}$



# Chave Primária

- Havendo mais de uma chave candidata, escolhe-se uma para ser a chave primária .
- Essa é a chave que se supõe ser a mais frequentemente utilizada para as buscas nessa relação.

`Aluno(Nome, RG, EstadoRG, Idade, Curso, NUSP)`

`$Ch_0(\text{Aluno}) = \{\text{NUSP}\}$`

`$Ch_1(\text{Aluno}) = \{\text{RG}, \text{EstadoRG}\}$`



# Chave Estrangeira

- Está presente na relação A, mas é chave da relação B.
- Garante o relacionamento e conexão entre as relações

Aluno(Nome, RG, EstadoRG, Idade, Curso, NUSP )

$Ch_0(\text{Aluno}) = \{\text{NUSP}\}$

Disciplina(Sigla, Nome, Créditos, NUSP\_Monitor )

$Ch_0(\text{Disciplina}) = \{\text{Sigla}\}$

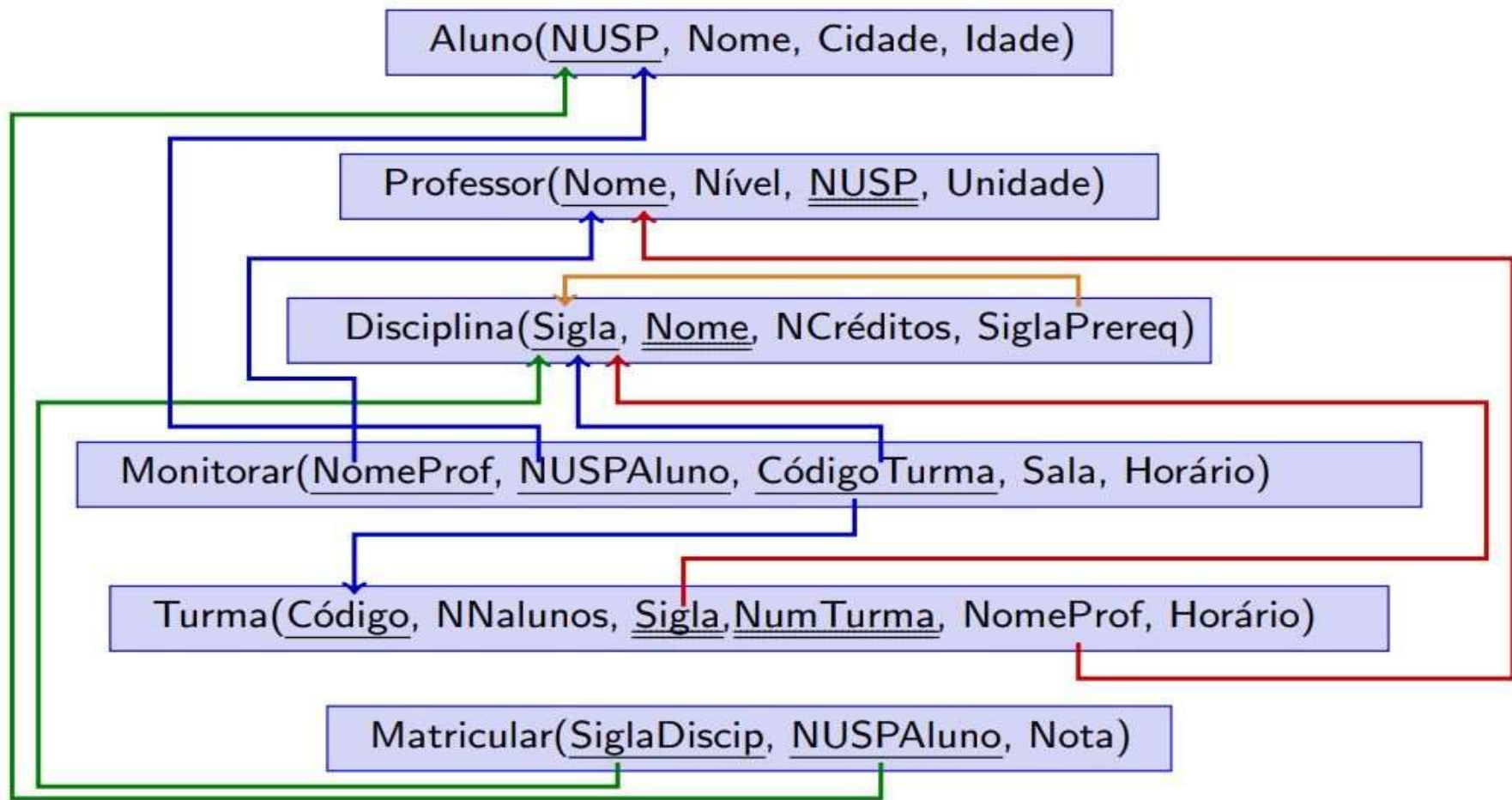
$\text{Disciplina}(\text{N.USPMonitor}) \xrightarrow{CE} \text{Aluno}(\text{NUSP})$



# Restrições de Integridade

- de Chave: Uma chave candidata qualquer não pode ter o mesmo valor em duas tuplas distintas da mesma relação.
- de Entidade: A chave primária de qualquer relação não pode ser nula em nenhuma tupla dessa relação
- Referencial: uma chave estrangeira só pode se referir a chaves existentes na base de dados







SQL




# Linguagens SQL

## Top 10 SGBDRs do mundo



# Índices Disponíveis em Cada Linguagem

SGBD	ISAM	invertido	BitMap	hash	Outras
 PostgreSQL	B-tree GIST-B-tree	GIN	(Bitmap join)	Hash BRUM	GIST (R-tree, ...) SP-GIST (Quad-tree, ...)
 ORACLE	B-tree B-tree cluster	(extender)	Bitmap Bitmap join	Hash cluster	R-tree Quad-tree
 Microsoft SQL Server  SYBASE	B-tree	XML		(in memory)	Spatial ColumnStore
 IBM  DB2	B-tree	(extender)	Auto, Dynamic	(table org.)	(Spatial extender)







PostgreSQL



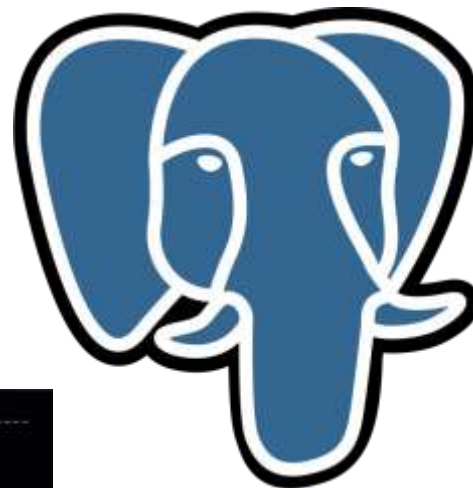
# PostgreSQL

Engine de banco de dados que utiliza a linguagem de programação SQL.

Open source, utilizada por muitas empresas

Armazena os dados com base no modelo relacional.

O elemento básico é a tabela, e cada tabela tem linhas e colunas.



id	first_name	last_name	gender	email	date_of_birth	country_of_birth
1	Alfredo	Beardon	Female	a beardon@is.gd	1953-10-28	Canoros
2	Omar	Colmore	Male		1921-04-03	Finland
3	Adriana	Matuschek	Female	amatuschek2@feedburner.com	1965-02-28	Cameroon
4	Anallita	Offiler	Female	aoffiler3@arstechnica.com	1920-01-02	China
5	Gerri	Poundsford	Male	gpoundsford4@multiply.com	1952-10-16	China
6	Caroline	Airtan	Female	qairtan5@wordpress.com	1976-09-18	China
7	Model	Tourot	Female	mtourot6@esj.com	1969-03-30	Philippines
8	Russ	Ruddoch	Male	rruddoch7@hhs.gov	1952-09-25	Norway
9	Marilyn	Rigts	Female	mrigts8@discuz.net	1978-03-22	Burundi
10	Charlot	Collaton	Female	ccollaton9@blinklist.com	1936-06-04	China
11	Magdaia	Sole	Female	msolea@networkadvertising.org	1997-01-24	Poland
12	Lilia	Spire	Female	lspireb@army.mil	1974-06-03	Poland
13	Nikos	Kime	Male		1936-02-06	United States
14	Wainwright	Etoile	Male	wetoiled@yale.edu	1923-10-04	France
15	Graehme	Salkeld	Male	gsalkeldc@tuttocitta.it	1998-07-09	Russia
16	Nollie	Earmaker	Male		2005-03-02	Peru
17	Tynan	Riddell	Male		1925-01-12	Brazil



# Comandos básicos do PostgreSQL

CREATE DATABASE teste;

DROP DATABASE teste;

CREATE TABLE

INSERT INTO

SELECT FROM

ORDER BY

WHERE

GROUP BY

etc

Obs: Os comandos em SQL estão sempre em letras maiúsculas, então isso é ótimo para distinguir e ajudar na hora de codar



# DATABASE

CREATE DATABASE test;

DROP DATABASE test;

Obs: cuidado!



# CREATE TABLE

```
CREATE TABLE table_name (  
    Column name + data type + constraints if any  
)
```

```
CREATE TABLE person (  
    id int,  
    first_name VARCHAR(50),  
    last_name VARCHAR(50),  
    gender VARCHAR(5),  
    date_of_birth DATE,  
)
```



```
CREATE TABLE person (  
    id BIGSERIAL NOT NULL PRIMARY KEY,  
    first_name VARCHAR(50) NOT NULL,  
    last_name VARCHAR(50) NOT NULL,  
    gender VARCHAR(5) NOT NULL,  
    date_of_birth DATE NOT NULL,  
)
```



# CREATE TABLE

```
test=# CREATE TABLE person (  
test(#  id BIGSERIAL NOT NULL PRIMARY KEY,  
test(#  first_name VARCHAR(50) NOT NULL,  
test(#  last_name VARCHAR(50) NOT NULL,  
test(#  gender VARCHAR(7) NOT NULL,  
test(#  date_of_birth DATE NOT NULL,  
test(#  email VARCHAR(150) );  
CREATE TABLE  
test=#
```

```
test=# \d person  
Table "public.person"  
+-----+-----+-----+-----+  
| Column | Type | Collation | Nullable |  
+-----+-----+-----+-----+  
| id      | bigint |           | not null |  
| first_name | character varying(50) |           | not null |  
| last_name  | character varying(50) |           | not null |  
| gender     | character varying(7) |           | not null |  
| date_of_birth | date |           | not null |  
| email      | character varying(150) |           |           |  
Indexes:  
    "person_pkey" PRIMARY KEY, btree (id)  
test=#
```



# INSERT INTO

```
test=# INSERT INTO person (first_name, last_name, gender, date_of_birth)
test=# VALUES ('Anne', 'Smith', 'FEMALE', date '1988-01-09');
INSERT 0 1
test=# INSERT INTO person (first_name, last_name, gender, date_of_birth, email)
VALUES ('Jake', 'Jones', 'MALE', date '1990-12-31', 'jake@gmail.com');
INSERT 0 1
test=#
```

## How to insert records into tables



```
INSERT INTO person (
  first_name,
  last_name,
  gender,
  date_of_birth,
  email)
VALUES ('Jake', 'Jones', 'MALE', DATE '1990-01-10', 'jake@gmail.com');
```

id	first_name	last_name	gender	date_of_birth	email
1	Anne	Smith	FEMALE	09/01/88	
2	Jake	Jones	MALE	10/01/90	jake@gmail.com

realist Data generator para praticar

<https://www.mockaroo.com/>



# SELECT FROM

```
test=# SELECT email FROM person;  
      email
```

```
-----  
jake@gmail.com  
(2 rows)
```

```
test=# SELECT * FROM person;
```

```
 id | first_name | last_name | gender | date_of_birth |      email  
----+-----+-----+-----+-----+-----  
  1 | Anne      | Smith    | FEMALE | 1988-01-09    |  
  2 | Jake      | Jones    | MALE   | 1990-12-31    | jake@gmail.com  
(2 rows)
```





# SELECT FROM

## ORDER BY ASC / DESC

SELECT \* FROM person ORDER BY country\_of\_birth;    SELECT \* FROM person ORDER BY country\_of\_birth DESC;

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
791	Gannon	Unfrey	Male	gunfrey1@cbc.com	1990-01-12	Afghanistan
95	Jack	Ryhanovich	Male		1966-12-31	Afghanistan
872	Leene	Bonder	Female	ibondero@eapz.cz	1945-04-04	Afghanistan
448	Jethro	McEvoy	Male	jcevoyc7@patch.com	1956-11-02	Albania
372	Barbara	Groben	Female	bgroben@exaple.com	1956-07-04	Albania
718	Aldus	Ketchaside	Male	aketchasideja@networkadvertising.org	1925-11-11	Albania
886	Valery	Balderson	Female	vbaldersond@hc388.com	1943-10-19	Andorra
297	Tine	Deighan	Female		1980-06-30	Angola
516	Demetra	Fippe	Male		1993-05-03	Argentina
72	Hettina	Sabater	Female		1987-06-06	Argentina
647	Sharon	Vicary	Female	svicaryh@cmu.edu	2004-12-20	Argentina
65	Gromville	Jine	Male	gjinels@trellian.com	1967-08-01	Argentina
477	Archer	Cloir	Male	acloird8@quantcast.com	1931-11-28	Argentina
92	Rosita	Renshaw	Female	rrenshaw2@wordpress.org	1983-01-10	Argentina
328	Dewain	Trippick	Male		1972-04-05	Argentina
682	Jude	Hindrick	Male		2006-08-08	Argentina
762	Dareem	Travers	Female	dtravers15@admin.ch	1932-10-11	Argentina
998	Henriette	Leece	Female		1983-04-11	Argentina
347	Claire	Plewing	Male		1996-11-02	Argentina
951	Andy	Ragborne	Female	aragborneq@goo.gl	1985-11-01	Argentina
77	Norben	Diffley	Female	ndiffley24@surveymonkey.com	1978-04-21	Armenia
386	Patton	Haylands	Male	phaylands8@masshole.com	1986-05-28	Armenia
678	Moise	Choriton	Male	mchoritonite@elegantthemes.com	1988-09-22	Armenia
571	Tricia	Ockwell	Female	tockwell1u@sohu.com	2008-11-17	Armenia
749	Franni	Tilly	Female	ftillyk8@pocworld.com	1925-04-19	Armenia
981	Saundra	Putt	Male	sputtr5@t.co	1995-12-20	Armenia
437	Karola	Kleynermans	Female	kkleynermansc4@mac.com	1934-01-02	Austria
541	Demeter	Nattriss	Female	dnattrissf@t.co	1964-06-07	Austria
126	Meiba	Bin	Female	mbin3@amazon.com	1957-01-02	Azerbaijan

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
583	Garret	Trassler	Male		1976-09-15	Zimbabwe
224	Daron	Welsby	Male	dwelsby67@newyorker.com	1927-07-08	Zimbabwe
709	Nolana	Wisadale	Female		1970-04-13	Zimbabwe
369	Kille	Conber	Male	kconbera8@ovh.net	1963-02-18	Zambia
775	Kassandra	Fornby	Female		1958-07-07	Yemen
444	Myca	Hearsum	Male		1928-01-02	Yemen
363	Gayleen	Sulland	Female	gsullanda2@epa.gov	2012-06-24	Yemen
940	Blaine	Butting	Male	bbuttinga3@is.gd	1933-07-16	Yemen
26	Leena	Bogle	Female	lboglep@usatoday.com	1971-12-26	Vietnam
441	Layne	Leggis	Female	lleggiscl@google.ru	1962-11-23	Vietnam
734	Clarita	Kenningham	Female		1928-11-09	Vietnam
933	Emyle	Uberz	Female		2003-07-07	Vietnam
19	Ingnar	Eagleston	Male	ieaglestoni@quantcast.com	1990-11-30	Vietnam
701	Berkly	Iedecker	Male		1981-07-10	Vietnam
526	Isador	Mcharry	Male	imecharrye@unc.edu	1987-01-11	Vietnam
857	Suzette	Huard	Female	shuardqk@nsw.gov.au	1963-01-17	Vietnam
862	Sallyann	Starzaker	Female	sstarzakernd@dailywall.co.uk	2002-01-09	Vietnam
904	Ferne	Gallety	Female	fgalletyp3@loc.gov	1949-01-02	Venezuela
281	Pavel	Mariotte	Male		1981-03-28	Venezuela
319	Analise	Hawes	Female	ahawes8@sindb.com	1964-09-29	Venezuela
124	Chastity	Stibbe	Female	csibbe3f@wikimedia.org	2007-05-15	Venezuela
627	Freeman	Salwoni	Male		1949-12-17	Venezuela
485	Georgeanna	Murrock	Female	gmurrock8@postarous.com	1973-02-07	Venezuela
149	Matthias	Braysher	Male	mbraysher44@google.co.jp	1956-04-22	Uzbekistan
287	Hyman	Spocy	Male		1971-11-06	Uzbekistan
697	Susan	Featherby	Female	sfeatherbyjc@stanford.edu	1992-01-14	Uruguay
991	Kristopher	Pyrah	Male		1995-06-22	United States
620	Allia	Grzeszczak	Female	agrzeszczakh7@ebay.com	1936-01-30	United States
737	Paquito	McAuslon	Male		1952-02-04	United States



# SELECT FROM

## DISTINCT

```
SELECT DISTINCT country_of_birth person ORDER BY country_of_birth;
```

```
SELECT country_of_birth person ORDER BY country_of_birth;
```

Afghanistan  
Afghanistan  
Afghanistan  
Albania  
Albania  
Albania  
Andorra  
Angola  
Argentina  
Argentina  
Argentina  
Argentina  
Argentina  
Argentina  
Argentina  
Argentina  
Argentina  
Argentina  
Armenia  
Armenia  
Armenia  
Armenia  
Armenia  
Austria

country\_of\_birth

afghanistan  
albania  
algeria  
angola  
argentina  
armenia  
austria  
azerbaijan  
bahamas  
bangladesh  
belarus  
belgium  
bolivia  
bosnia and Herzegovina  
brazil  
bulgaria  
burundi  
cambodia  
cameroon  
canada  
chad  
chile  
china



# WHERE

```
test=# SELECT * FROM person WHERE gender = 'Female'
```

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
1	Alfreda	Beardon	Female	abeardon0@is.gd	1953-10-28	Comoros
3	Adriana	Natuschek	Female	anatuschek2@feedburner.com	1965-02-28	Cameroon
4	Anailita	Offiler	Female	aoffiler3@arstechnica.com	1920-01-02	China
6	Caroline	Airton	Female	cairton5@wordpress.com	1976-09-18	China
7	Madel	Taurot	Female	mtaurot6@wsj.com	1969-03-30	Philippines
9	Merilyn	Rigts	Female	mrigts8@discuz.net	1978-03-22	Burundi
10	Charlot	Collaton	Female	ccollaton9@blinklist.com	1936-06-04	China
11	Magdaia	Sole	Female	msolea@networkadvertising.org	1997-01-24	Poland
12	Lilia	Spire	Female	lspireb@army.mil	1974-06-03	Poland
18	Faith	Chitson	Female	fchitsonh@house.gov	1971-02-19	China
21	Leonelle	Ladewig	Female	lladewigk@independent.co.uk	1931-08-22	France
23	Janot	Dummigan	Female	jdummiganm@twitter.com	1949-08-08	China
24	Megen	Bezley	Female	mbezleyn@ucsd.edu	1946-11-10	Mexico
25	Susann	Battin	Female	sbattino@godaddy.com	1984-04-25	United States
26	Leena	Bogie	Female	lbogiep@usatoday.com	1971-12-26	Vietnam
27	Louise	Sherebrook	Female	lsherebrookq@icio.us	1966-01-27	Bulgaria
28	Leanora	Pinilla	Female	lpinillar@don.ne.jp	1977-03-11	Brazil
30	Genevo	Du Plantier	Female	gduplantiert@vimeo.com	1957-05-04	Sudan
31	Morsha	Bremley	Female		1932-06-30	United States
33	Ruthie	Petrichot	Female	rpetrichotw@github.io	1958-04-15	Latvia
34	Valeria	Cheers	Female		1970-05-01	Poland
39	Cherlyn	Ollivi	Female	collivil2@technorati.com	1976-03-12	Indonesia
41	Carolyn	Arkle	Female	carkle14@is.gd	1967-01-04	Indonesia
42	Aidan	Ivashnikov	Female	aivashnikov1@aboutads.info	2001-08-20	Greece
49	Penny	Capell	Female		1965-12-31	Chile
53	Nannie	Deniset	Female		1991-06-12	Bangladesh
55	Sydney	Fulkes	Female		1949-12-16	Portugal
56	Mariana	Lowers	Female	mlowers1j@webmd.com	1920-10-28	Bulgaria



# UPDATE

Caso queira mudar alguma informação na tabela, basta usar UPDATE.

No entanto, não esquecer de usar o WHERE, caso contrário todas as informações serão mudadas.

```
1  
2 UPDATE pessoasusp  
3 SET idade = 20  
4 WHERE ID = 3;  
5
```



# SELECT FROM

```
SELECT * FROM person WHERE gender = 'Male' AND (country_of_birth = 'Poland' OR country_of_birth = 'China');
```

Operadores lógicos OR e AND, OFFSET e LIMIT

```
test=# SELECT * FROM person LIMIT 5;
```

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
1	Alfreda	Beardon	Female	abeardon0@is.gd	1953-10-28	Comoros
2	Omar	Colmore	Male		1921-04-03	Finland
3	Adriana	Matuschek	Female	amatuschek2@feedburner.com	1965-02-28	Cameroon
4	Amalita	Offiler	Female	aoffiler3@arstechnica.com	1920-01-02	China
5	Gerri	Poundsford	Male	gpoundsford4@multiply.com	1952-10-16	China

(5 rows)

```
test=# SELECT * FROM person OFFSET 5 LIMIT 5;
```

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
6	Caroline	Airton	Female	cairton5@wordpress.com	1976-09-18	China
7	Madel	Tourot	Female	mtourot6@wsj.com	1969-03-30	Philippines
8	Russ	Ruddoch	Male	rruddoch7@hhs.gov	1952-09-25	Norway
9	Merilyn	Rigts	Female	mrigts8@discuz.net	1978-03-22	Burundi
10	Charlot	Collaton	Female	ccollaton9@blinklist.com	1936-06-04	China

(5 rows)



# Outros

IN

```
test=# SELECT *  
test=# FROM person  
test=# WHERE country_of_birth IN ('China', 'Brazil', 'France');
```

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
4	Amalia	Offiler	Female	aoffiler3@arstechnica.com	1928-01-02	China
5	Gerri	Poundsford	Male	gpoundsford4@multiply.com	1952-10-16	China
6	Caroline	Airtan	Female	cairtan5@wordpress.com	1976-09-18	China
10	Charlot	Collaton	Female	ccollaton9@blinklist.com	1936-06-04	China
14	Wainwright	Etoile	Male	wetoile@yale.edu	1923-10-04	France
17	Tynon	Riddell	Male		1925-01-12	Brazil
18	Faith	Chitson	Female	fchitson@house.gov	1971-02-19	China
20	Holly	Ather	Male	hatherj@moz.org	1943-12-18	China
21	Leonelle	Ladewig	Female	lladewig@independent.co.uk	1931-08-22	France
23	Jonot	Dumigan	Female	jdumigan@twitter.com	1949-08-08	China
28	Leonora	Pinilla	Female	lpinilla@dnr.ne.jp	1977-03-11	Brazil
36	Emit	Jakoubek	Male	ejakoubek@icloud.com	1964-03-05	France
38	Maylen	Crawley	Male	mcrawley1@indb.com	1978-04-22	China
40	Artenas	Baish	Male	abaish13@bloomberg.com	1972-06-20	China
43	Tod	Crebe	Male	tcrebe16@businessinsider.com	2015-07-04	China
44	Rurik	Pietersma	Male	rpetersma17@ycombinator.com	1964-04-23	China
46	Talbert	Hambridge	Male	thambridge19@reference.com	1997-11-13	China
50	Carroll	Laffan	Male	claffan1@toplist.cz	2012-07-26	China
60	Conroy	Shirlaw	Male	cshirlaw@google.de	1926-05-21	China
64	Tuesday	Cowdery	Female		1991-02-07	China
66	Willette	Greaves	Female	wgreaves1@facebook.com	1958-02-16	China
67	Melony	Attwill	Female		1995-10-07	China
68	Orton	Dyke	Male		2007-05-08	France
69	Giovanni	Bushen	Male	gbushen1@bravesites.com	1998-09-10	Brazil
70	Arlette	Goodburn	Female	agoodburn1@comsenz.com	1949-01-14	Brazil
73	Radcliffe	Jillis	Male	rjillis2@google.com.au	1999-09-04	France
76	Cassandra	McGeachie	Female	cmcgeachie23@nationalgeographic.com	1968-08-02	China
78	Nisse	Pavel	Female	npavel25@princeton.edu	1999-12-26	China
84	Forrester	Goodlett	Male	fgoodlett2@usa.gov	2009-11-25	France



# Outros

```
test=# SELECT * FROM person
WHERE date_of_birth
BETWEEN DATE '2000-01-01' AND '2015-01-01';
```

id	first_name	last_name	gender	email	date_of_birth
16	Nollie	Earwaker	Male		2005-03-02
29	Robb	Davydychev	Male	rdavydychevs@mapquest.com	2013-03-19
42	Aidan	Ivashnikov	Female	aivashnikov15@aboutads.info	2001-08-20
47	Esdra	Grigoriev	Male		2006-01-05
48	Jules	Bendall	Male	jbendall1b@washington.edu	2012-12-14

BETWEEN, LIKE, ILIKE

```
test=# SELECT * FROM person WHERE email LIKE '%@google.%';
```

id	first_name	last_name	gender	email	date_of_birth
60	Conroy	Shirlaw	Male	cshirlaw1n@google.de	1926-05-21
61	Manfred	Rust	Male	mrust1o@google.ca	1939-12-21
73	Radcliffe	Jillis	Male	rjillis20@google.com.au	1999-09-04
149	Matthias	Braysher	Male	mbraysher44@google.co.jp	1956-04-22
169	Ned	McCrossan	Male	nmccrossan4o@google.com.hk	1995-05-23

```
test=# SELECT * FROM person WHERE country_of_birth LIKE 'P%';
test=# SELECT * FROM person WHERE country_of_birth ILIKE 'p%';
```

portugal = Portugal





# COUNT

```
test=# SELECT country_of_birth, COUNT(*) FROM person GROUP BY country_of_birth;
```

country_of_birth	count
Bangladesh	1
Indonesia	96
Venezuela	6
Cameroon	3
Luxembourg	2
Czech Republic	19
Sweden	33
Uganda	3
Jordan	2
Dominican Republic	1
Ireland	1
Cambodia	1
Macedonia	5
Papua New Guinea	1
Uzbekistan	2
Portugal	28
Finland	5
Colombia	10
Albania	3

```
test=# SELECT country_of_birth, COUNT(*) FROM person GROUP BY country_of_birth HAVING COUNT(*) >= 41 ORDER BY country_of_birth;
country_of_birth | count
-----+-----
Brazil           |    44
China            |   182
Indonesia        |    96
Philippines      |    53
Poland           |    55
Russia           |    41
(6 rows)
```

É possível combinar várias funções para organizar os dados da maneira desejada.

<https://www.postgresql.org/docs/current/functions.html>

Muito mais dessas aggregate functions





# JOIN

a	fruit_a
1	Apple
2	Orange
3	Banana
4	Cucumber

(4 rows)

b	fruit_b
1	Orange
2	Apple
3	Watermelon
4	Pear

(4 rows)

## INNER JOIN

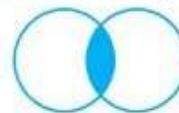
```
SELECT
  a,
  fruit_a,
  b,
  fruit_b
FROM
  basket_a
INNER JOIN basket_b
  ON fruit_a = fruit_b;
```

Output:

a	fruit_a	b	fruit_b
1	Apple	2	Apple
2	Orange	1	Orange

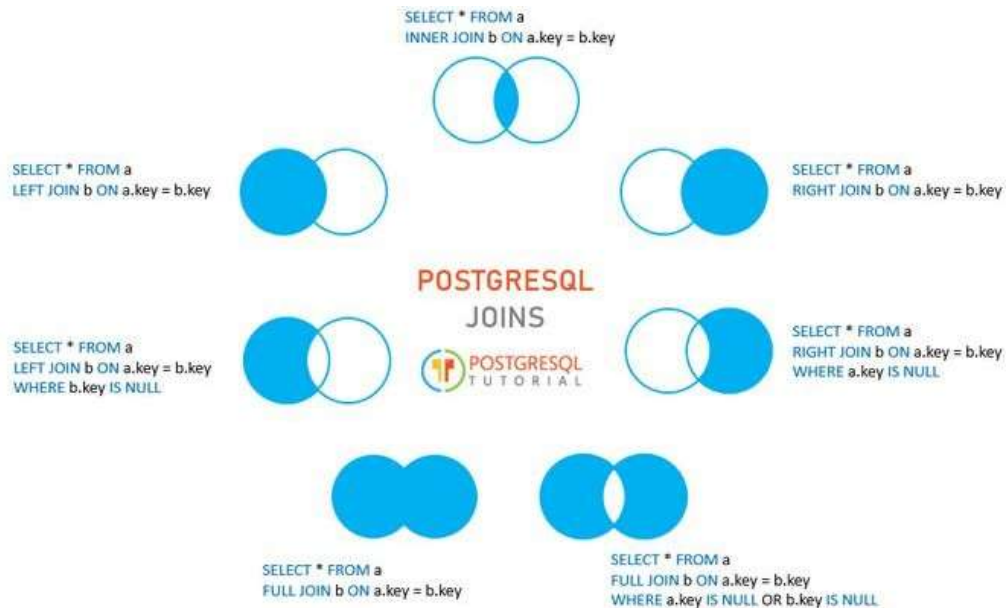
(2 rows)

```
SELECT * FROM a
INNER JOIN b ON a.key = b.key
```



# JOIN

Todos os tipos



A decorative graphic consisting of two L-shaped lines. The first is blue and starts with a vertical line on the left, then turns 90 degrees clockwise to become a horizontal line. The second is magenta and starts with a horizontal line on the left, then turns 90 degrees clockwise to become a vertical line. These lines are positioned around the text 'NoSQL'.

NoSQL



# Banco de Dados NoSQL

- Não baseado em tabelas (não relacional)
- Baseado em documentos, chave-valor, grafos ou wide-column
- Permite escalabilidade horizontal



# THE MOST POPULAR NOSQL DATABASES



mongoDB



*cassandra*



Elasticsearch



**amazon**  
DynamoDB



[www.taffinc.com](http://www.taffinc.com)





# NoSQL x SQL



# Relacional X Não Relacional

- Vantagens do Relacional:

- escalabilidade vertical
- bem estruturado
- fácil de relacionar dados
- melhor para consultas

- Desvantagens do Relacional:

- escalabilidade horizontal
- precisa preparar tudo antes
- ruim para dados não estruturados



# Relacional X Não Relacional

- Vantagens do Não Relacional:
  - escalabilidade horizontal
  - não precisa organizar tudo antes
  - bom para dados não estruturados
  - bom para escrever
- Desvantagens do Não Relacional:
  - escalabilidade vertical
  - pode ter perda de consistência nos dados
  - limitado em consultas







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|| obrigado

