

data

Banco de Dados

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- Banco de Dados
- Modelo Relacional
- Linguagem SQL
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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

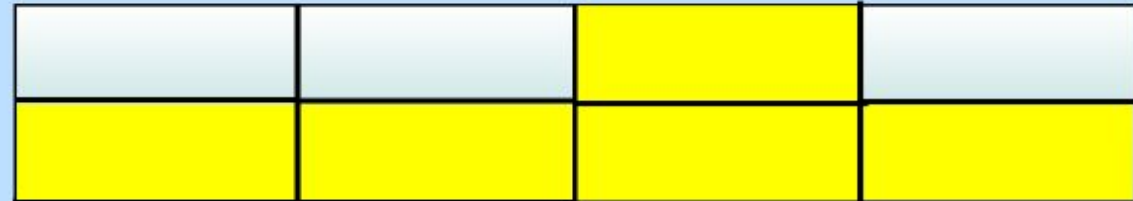


Relação

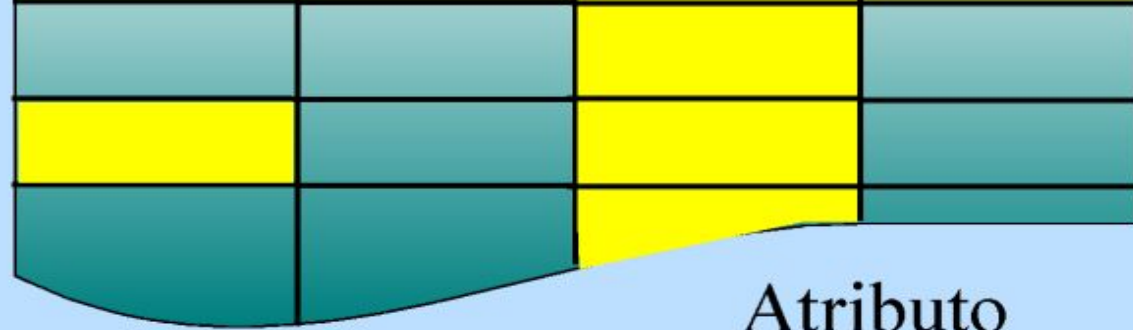
Papel



Tupla



Valor

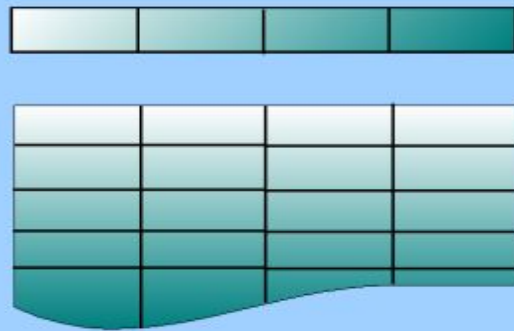


Atributo

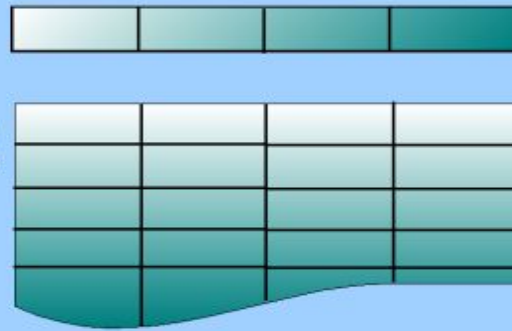
Relação



R1

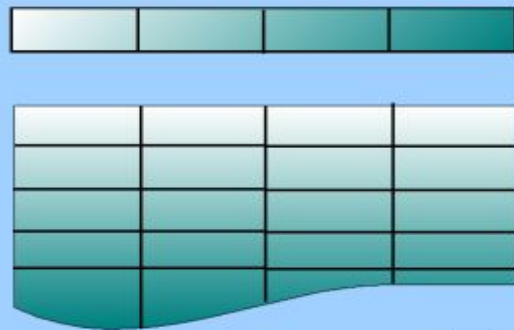


R2

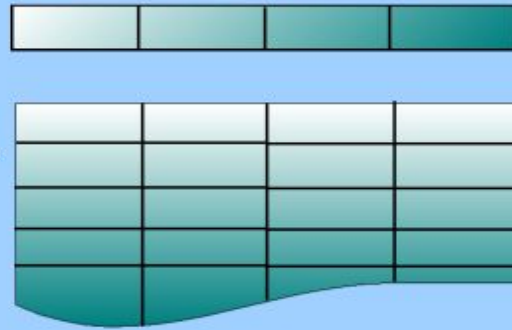


BASE DE DADOS

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...

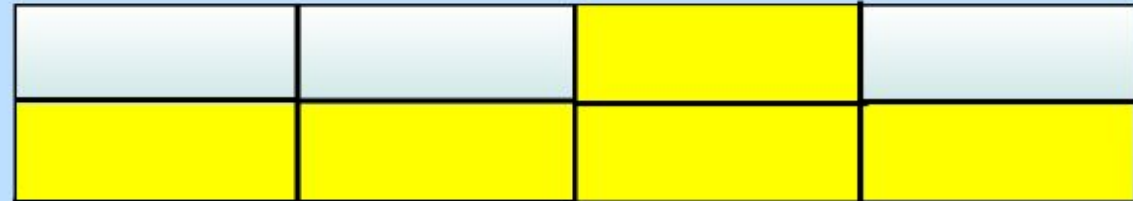


Relação

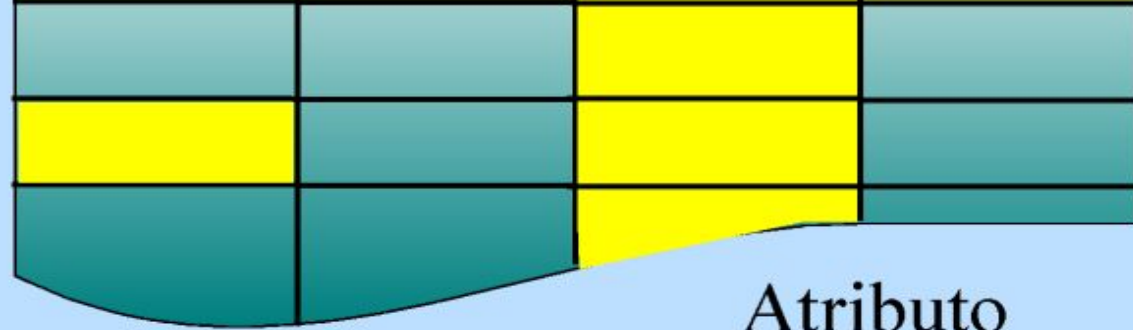
Papel



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)`

`Ch0(Aluno) = {NUSP}`

`Disciplina(Sigla, Nome, Créditos, NUSP_Monitor)`

`Ch0(Disciplina) = {Sigla}`

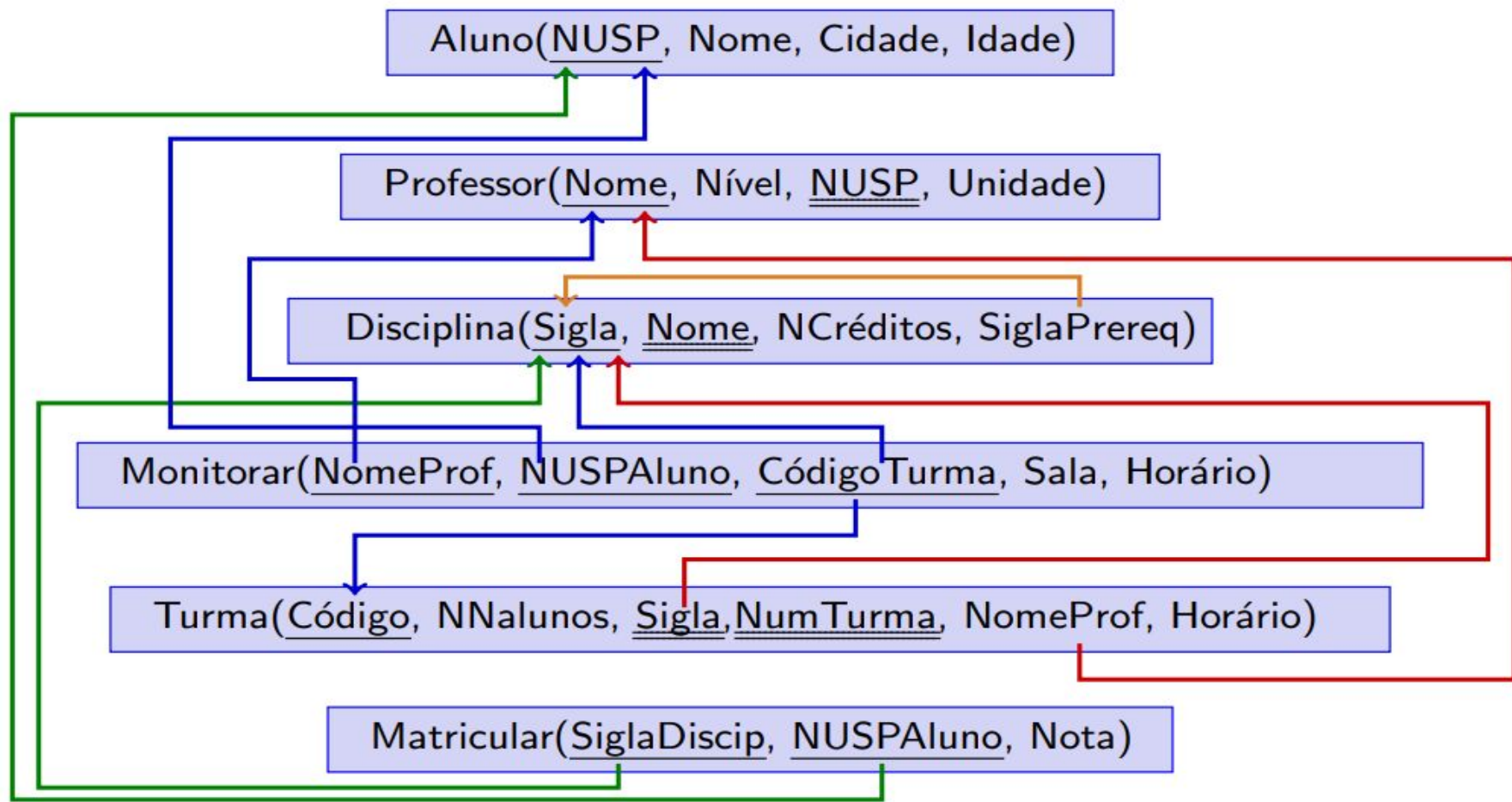
`Disciplina(N.USPMonitor) \xrightarrow{CE} Aluno(NUSP)`



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)



Two L-shaped lines framing the text. The left line is blue, starting with a vertical segment and then a horizontal segment. The right line is pink, starting with a horizontal segment and then a vertical segment.

PostgreSQL



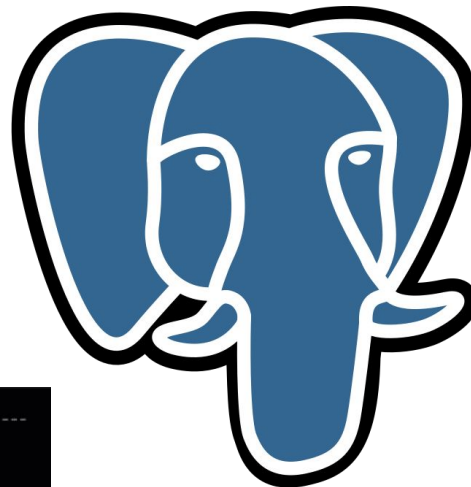
PostgreSQL

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	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
6	Caroline	Airton	Female	qairton5@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
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	gsalkelde@tuttocitta.it	1998-07-09	Russia
16	Nollie	Earwaker	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	Umfrey	Male	gumfreyly@cnbc.com	1990-01-12	Afghanistan
95	Jack	Ryhorovich	Male		1966-12-31	Afghanistan
872	Irene	Bonder	Female	ibondero7@mapy.cz	1945-04-04	Afghanistan
440	Jethro	McEvay	Male	jmcevayc7@patch.com	1956-11-02	Albania
372	Barbra	Graben	Female	bgrabenab@example.com	1956-07-04	Albania
718	Aldus	Ketchaside	Male	aketchasidejx@networkadvertising.org	1925-11-11	Albania
806	Valery	Bolderson	Female	vboldersonmd@hc360.com	1943-10-19	Andorra
297	Tine	Deighan	Female		1980-06-30	Angola
516	Demetre	Fippe	Male		1993-05-03	Argentina
72	Bettina	Sabater	Female		1987-06-06	Argentina
647	Sharon	Vicary	Female	svicaryhy@cmu.edu	2004-12-20	Argentina
65	Granville	Jime	Male	gjime1s@trellian.com	1967-08-01	Argentina
477	Archer	Clair	Male	aclaird8@quantcast.com	1931-11-28	Argentina
92	Rosita	Renshaw	Female	rrenshaw2j@wordpress.org	1983-01-10	Argentina
328	Dewain	Trippick	Male		1972-04-05	Argentina
682	Jude	Hindrick	Male		2006-08-08	Argentina
762	Dareen	Travers	Female	dtravers15@admin.ch	1932-10-11	Argentina
990	Henriette	Leeffe	Female		1983-04-11	Argentina
347	Claire	Pleming	Male		1996-11-02	Argentina
951	Andy	Ragborne	Female	aragbornege@goo.gl	1985-11-01	Argentina
77	Norean	Diffley	Female	ndiffley24@surveymonkey.com	1978-04-21	Armenia
306	Patton	Haylands	Male	phaylands8h@ashable.com	1986-05-28	Armenia
678	Moise	Chorlton	Male	mchorltonit@elegantthemes.com	1988-09-22	Armenia
571	Tricia	Ockwell	Female	tockwellfu@sohu.com	2008-11-17	Armenia
749	Franni	Tilly	Female	ftillyks@pcworld.com	1925-04-19	Armenia
981	Saundra	Putt	Male	sputtr8@t.co	1995-12-20	Armenia
437	Karola	Kleynermans	Female	kkleynermansc4@mac.com	1934-01-02	Austria
541	Demeter	Nattriss	Female	dnattrissf0@t.co	1964-06-07	Austria
126	Melba	Bim	Female	mbim3h@amazon.com	1957-01-02	Azerbaijan

id	first_name	last_name	gender	email	date_of_birth	country_of_birth
503	Garret	Trassler	Male		1976-09-15	Zimbabwe
224	Daron	Welsby	Male	dwelsby67@newyorker.com	1927-07-08	Zimbabwe
709	Nolana	Wisedale	Female		1970-04-13	Zimbabwe
369	Kile	Comber	Male	kcombera8@ovh.net	1963-02-18	Zambia
775	Kassandra	Formby	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	Bogie	Female	lbogiep@usatoday.com	1971-12-26	Vietnam
441	Layne	Leggis	Female	lleggisc8@google.ru	1962-11-23	Vietnam
734	Clarita	Kenningham	Female		1928-11-09	Vietnam
933	Emyl	Eberz	Female		2003-07-07	Vietnam
19	Ingmar	Eagleston	Male	ieaglestoni@quantcast.com	1990-11-30	Vietnam
701	Berkly	Ledeker	Male		1981-07-10	Vietnam
526	Isador	Meharry	Male	imeharryel@unc.edu	1987-01-11	Vietnam
957	Suzette	Huard	Female	shuardqk@nsw.gov.au	1963-01-17	Vietnam
862	Sallyann	Starzaker	Female	sstarzakerx@dailymail.co.uk	2001-01-09	Vietnam
904	Ferne	Gallety	Female	fgalletyp3@loc.gov	1949-01-02	Venezuela
281	Pavel	Mariotte	Male		1981-03-28	Venezuela
319	Analise	Haws	Female	ahaws8u@imdb.com	1964-09-29	Venezuela
124	Chastity	Sibbe	Female	csibbe3f@wikimedia.org	2007-05-15	Venezuela
627	Freemon	Salmoni	Male		1949-12-17	Venezuela
405	Georgeanna	Murrock	Female	gmurrockb8@postous.com	1973-02-07	Venezuela
149	Matthias	Braysher	Male	mbraysher44@google.co.jp	1956-04-22	Uzbekistan
287	Hyman	Spacy	Male		1987-11-06	Uzbekistan
697	Susan	Featherby	Female	sfeatherbyjc@stanford.edu	1992-01-14	Uruguay
991	Kristopher	Pynah	Male		1995-06-22	United States
620	Allis	Grzeszczak	Female	agrzeszczakh7@ebay.com	1936-01-30	United States
737	Paquito	McAuslan	Male		1951-02-04	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
Andorra
Angola
Argentina
Argentina
Argentina
Argentina
Argentina
Argentina
Argentina
Argentina
Argentina
Armenia
Armenia
Armenia
Armenia
Armenia
Austria

country_of_birth

Afghanistan
Albania
Andorra
Angola
Argentina
Armenia
Austria
Azerbaijan
Bahamas
Bangladesh
Belarus
Benin
Bhutan
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	Matuschek	Female	amatuschek2@feedburner.com	1965-02-28	Cameroon
4	Amalita	Offiler	Female	aoffiler3@arstechnica.com	1920-01-02	China
6	Caroline	Airton	Female	cairton5@wordpress.com	1976-09-18	China
7	Madel	Tourot	Female	mtourot6@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@dion.ne.jp	1977-03-11	Brazil
30	Geneva	Du Plantier	Female	gduplantiert@vimeo.com	1957-05-04	Sudan
31	Marsha	Bremley	Female		1932-06-30	United States
33	Ruthie	Petrichat	Female	rpetrichatw@github.io	1958-04-15	Latvia
34	Valeria	Cheers	Female		1970-05-01	Poland
39	Cherlyn	Olivi	Female	colivi12@technorati.com	1976-03-12	Indonesia
41	Carolyn	Arkle	Female	carkle14@is.gd	1967-01-04	Indonesia
42	Aidan	Ivashnikov	Female	aivashnikov15@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	Amalita	Offiler	Female	aoffiler3@arstechnica.com	1920-01-02	China
5	Gerri	Poundsford	Male	gpoundsford4@multiply.com	1952-10-16	China
6	Caroline	Airton	Female	cairton5@wordpress.com	1976-09-18	China
10	Charlot	Collaton	Female	ccollaton9@blinklist.com	1936-06-04	China
14	Wainwright	Etoile	Male	wetoiled@yale.edu	1923-10-04	France
17	Tynan	Riddell	Male		1925-01-12	Brazil
18	Faith	Chitson	Female	fchitsonh@house.gov	1971-02-19	China
20	Holly	Ather	Male	hatherj@dmoz.org	1943-12-18	China
21	Leonelle	Ladewig	Female	lladewigk@independent.co.uk	1931-08-22	France
23	Janot	Dummigan	Female	jdummiganm@twitter.com	1949-08-08	China
28	Leanora	Pinilla	Female	lpinillan@dian.ne.jp	1977-03-11	Brazil
36	Emmit	Jakoubek	Male	ejakoubekz@tmall.com	1964-03-05	France
38	Waylen	Crawley	Male	wcrawley11@imdb.com	1970-04-22	China
40	Artemas	Baish	Male	abaish13@bloomberg.com	1972-06-20	China
43	Tod	Crebo	Male	tcrebo16@businessinsider.com	2015-07-04	China
44	Rurik	Pietersma	Male	rpietersma17@ycombinator.com	1964-04-23	China
46	Talbert	Hambidge	Male	thambidge19@reference.com	1997-11-13	China
50	Carroll	Laffan	Male	claffan1d@toplist.cz	2012-07-26	China
60	Conroy	Shirlaw	Male	cshirlaw1n@google.de	1926-05-21	China
64	Tuesday	Cowdery	Female		1991-02-07	China
66	Willette	Greaves	Female	wgreaves1t@facebook.com	1950-02-16	China
67	Melony	Attwill	Female		1995-10-07	China
68	Orton	Dyke	Male		2007-05-08	France
69	Giovanni	Bushen	Male	gbushen1w@bravesites.com	1998-09-10	Brazil
70	Arlette	Goodburn	Female	agoodburn1x@comsenz.com	1949-01-14	Brazil
73	Radcliffe	Jillis	Male	rjillis20@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	fgoodlett2b@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	Esdras	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	McCossan	Male	nmccossan4o@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)

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

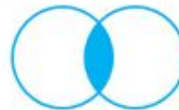
Output:

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

(2 rows)

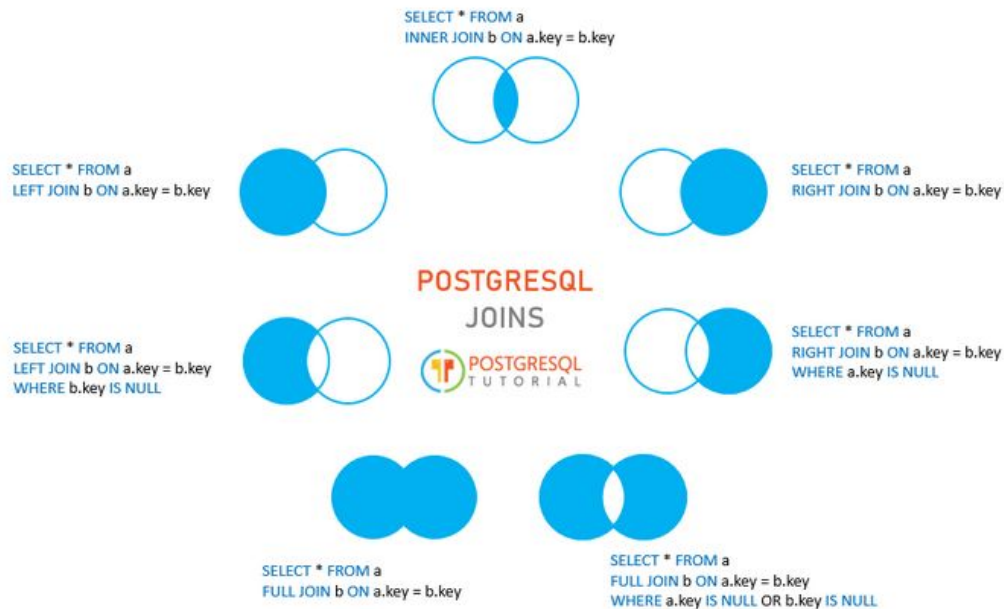
INNER JOIN

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



JOIN

Todos os tipos





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





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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/c/DataICMC



/icmc-data



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|| obrigado

