



XXIV SALÓN DE INFORMÁTICA

Motores de Base de Datos Libres: Postgresql y MySql

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“Encontrando el camino hacia el Software Libre”



Motores de Base de Datos Libres: Postgresql y MySql

Durante la charla resolveremos los cuestionamientos que un desarrollador de software o gerente de tecnología interesado en migrar sus bases de datos a software libre tiene:

- ¿que se puede hacer?
- ¿Cuales son sus características?
- ¿Que tan compatibles son?
- ¿hasta donde se puede llegar con ellas?

Haciendo un especial énfasis en las fuentes de documentación existentes y los primeros pasos para implementar soluciones.

Agenda

- Primeros pasos
- Interfaces
- Fuentes de información
- Características técnicas

Primeros pasos

- Descargar el archivo para la plataforma en donde se va a ejecutar
 - www.postgresql.org
 - www.mysql.org
 - CDs de instalación de Linux
- Instalarlo
 - Generalmente funcionará: `rpm -Uvh postgres.rpm`
- Iniciar el servidor
 - `/etc/rc.d/init.d/postgresql start`

Interfaces - monitor pgsq1

```
[gramo@okeefe ~]$ su -  
Password:  
[root@okeefe /root]# su - postgres  
[postgres@okeefe pgsq1]$ createuser gramo  
Shall the new user be allowed to create databases? (y/n) y  
Shall the new user be allowed to create more new users? (y/n) n  
CREATE  
createuser: creation of user "gramo" success  
[postgres@okeefe pgsq1]$ logout  
[root@okeefe /root]# logout  
gramo@okeefe ~]$ createdb ejemplo  
CREATE DATABASE  
[gramo@okeefe ~]$
```

Interfaces - monitor pgsql

```
[gramo@okeefe ~]$ psql ejemplo
Welcome to psql, the PostgreSQL interactive terminal.

Type:  \copyright for distribution terms
       \h for help with SQL commands
       \? for help on internal slash commands
       \g or terminate with semicolon to execute query
       \q to quit

ejemplo=#
```

Interfaces - monitor pgsql

```
ejemplo=# create sequence id_asistentes;
ejemplo=# CREATE
ejemplo=# CREATE TABLE asistentes (
ejemplo=#           ID           int4 PRIMARY KEY
ejemplo=#           DEFAULT nextval
ejemplo=#           ('id_asistentes'),
ejemplo=#           nombre      text,
ejemplo=#           apellido    text,
ejemplo=#           cedula      varchar(16)
ejemplo=# );
NOTICE:  CREATE TABLE/PRIMARY KEY will create implicit
         index 'asistentes_pkey' for table 'asistentes'
CREATE
```

Interfaces - monitor pgsql

```
ejemplo=# REVOKE ALL on "asistentes" from PUBLIC;
CHANGE
```

```
ejemplo=# GRANT ALL on "asistentes" to "gramo";
CHANGE
```

```
ejemplo=# GRANT READ on "asistentes" to "apache";
CHANGE
```

```
ejemplo=# \d asistentes
```

```
Table "asistentes"
```

Attribute	Type	Modifier
id	integer	not null
nombre	text	
apellido	text	
cedula	varchar(16)	

```
Index: asistentes_pkey
```

Interfaces - monitor pgsql

```
ejemplo=# INSERT INTO asistentes VALUES (1, 'Ricardo',  
'Naranjo', '11.123.456');
```

```
INSERT 27503 1
```

```
ejemplo=# INSERT INTO asistentes VALUES (2, 'Manuel', 'Dávila',  
'22.333.444');
```

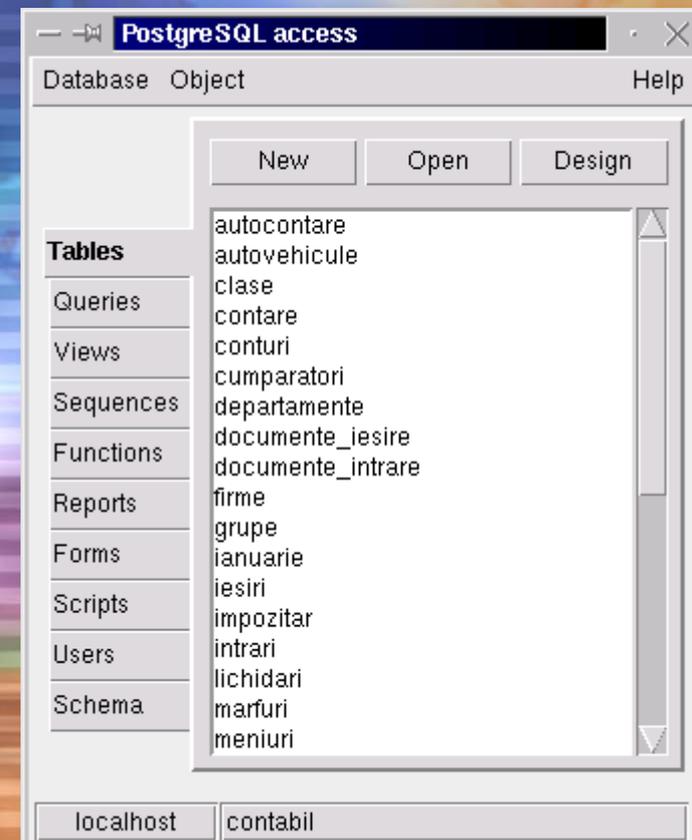
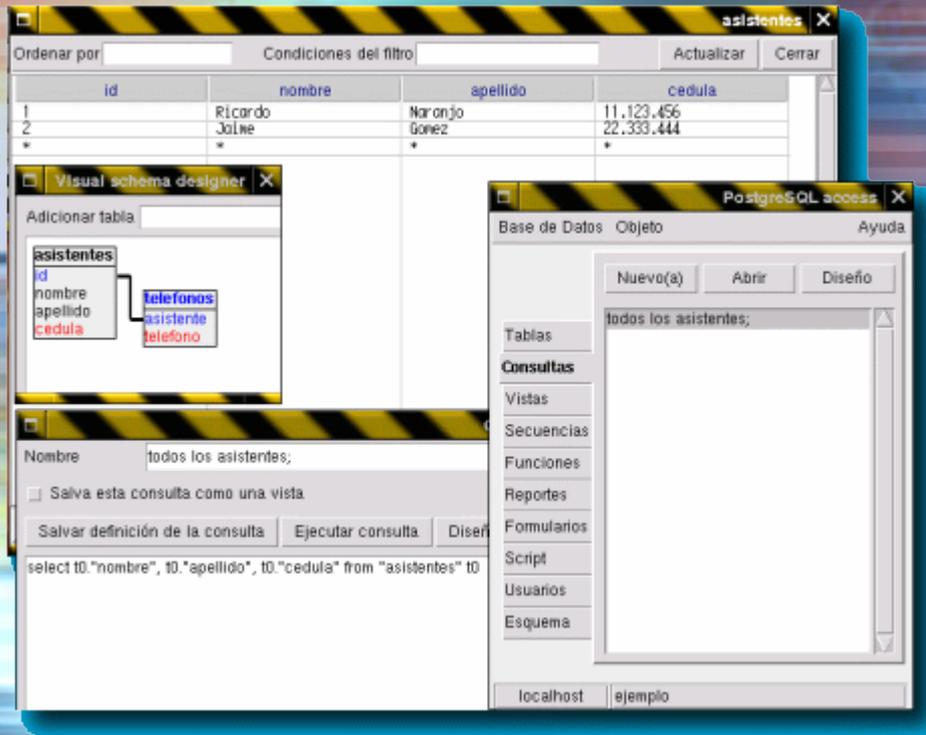
```
INSERT 27504 1
```

```
ejemplo=# SELECT * FROM asistentes ORDER BY apellido;
```

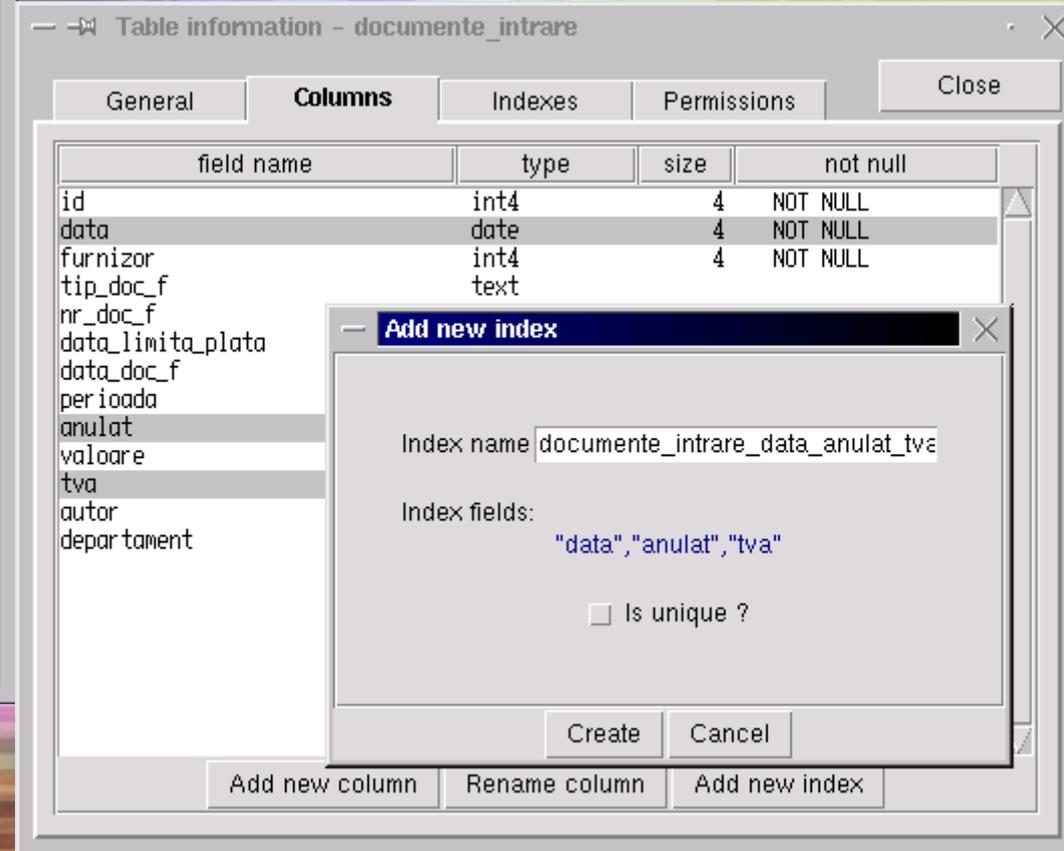
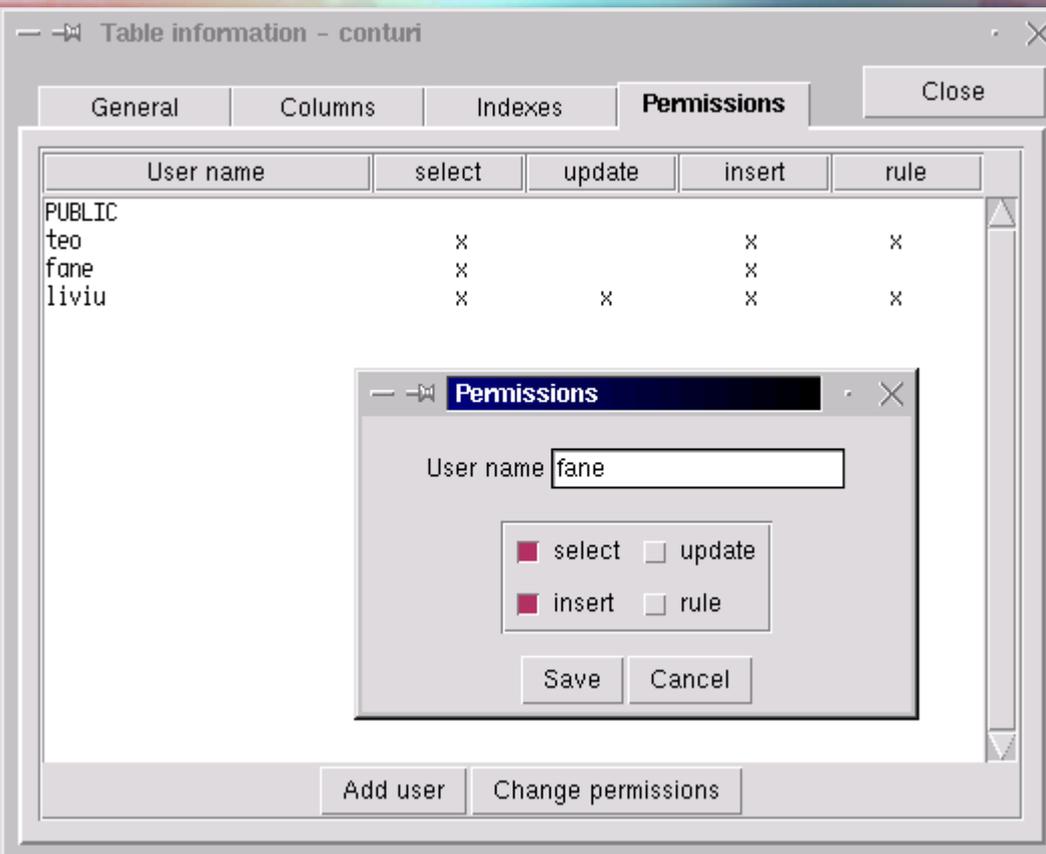
id	nombre	apellido	cedula
2	Manuel	Dávila	22.333.444
1	Ricardo	Naranjo	11.123.456

(2 rows)

Interfaces - PGACCESS



Interfaces - PGACCESS



Interfaces - PGACCESS

Visual query designer

Add table Show SQL Execute SQL Save to query builder Close

documente_intrare

- id
- data
- furnizor
- tip_doc_f
- nr_doc_f
- data limita plata
- data_doc_f
- perioada
- anulat
- valoare
- tva
- autor
- departament

intrari

- parinte
- marfa
- cantitate
- pret_intrare
- tva
- pret_va
- cont
- servicii

firmes

- id
- nume
- localitate
- adresa
- contact
- telefon
- fax
- email
- banca
- cont
- observatii
- sold
- cheie
- autor
- rulaje

marfuri

- cod
- grupa
- denumire
- pret_va
- data pretului
- stoc_minim
- puncte
- stoc_initial
- tva
- autor
- cod_bare
- stoc

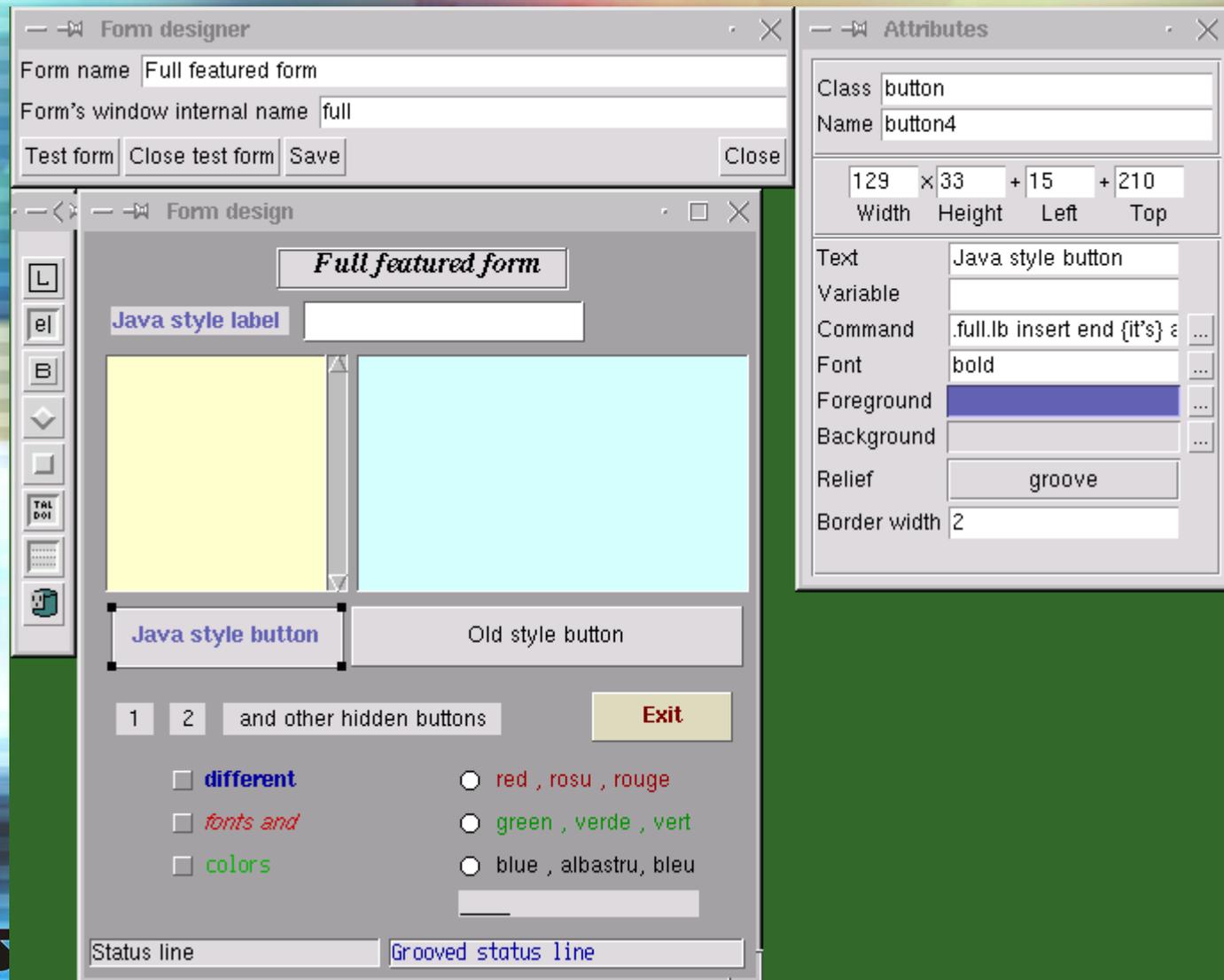
Warning

? Remove link ?

Yes No

Field	nr_doc_f	data limita plata	nume	denumire	cantitate
Table	documente_intrare	documente_intrare	firmes	marfuri	intrari
Sort	unsorted	unsorted	Ascending	unsorted	unsorted
Criteria		<'23.09.1999'	~* 'PAN'		>50
Return	Yes	Yes	Yes	Yes	No

Interfaces - PGACCESS



Interfaz WWW - MySQL

nuke running on localhost - phpMyAdmin 2.2.5-rc1 - Galeon

File Edit View Tab Settings Bookmarks Go Tools Help

Back Home Stop 100% https://thinkpad0.zawodny.com/phpmyadmin/index.php

Ars Tect x Linux To x kuro5hin x The US/ x WCNet I x Web Sei x Spread I x JitterBuç x phpMyA x nuke rur x

Home
nuke (60)

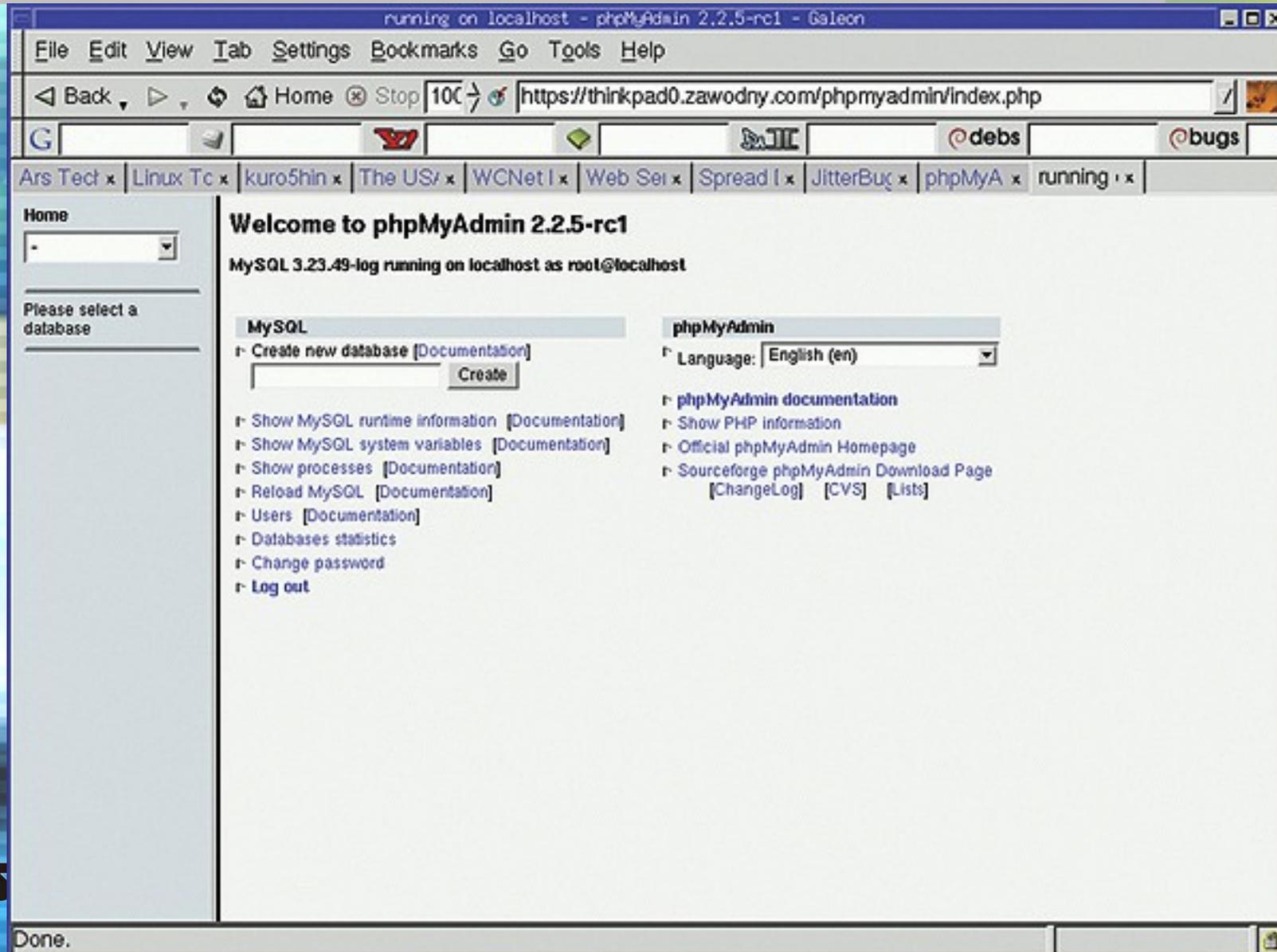
nuke

- nuke_autolinks
- nuke_autonews
- nuke_banner
- nuke_bannerclient
- nuke_bannerfinish
- nuke_blocks
- nuke_blocks_buttons
- nuke_comments
- nuke_counter
- nuke_downloads_categories
- nuke_downloads_downloads
- nuke_downloads_editorials
- nuke_downloads_modrequest
- nuke_downloads_newdownload
- nuke_downloads_subcategories
- nuke_downloads_votedata
- nuke_ephem
- nuke_faqsanswer
- nuke_faqscategories
- nuke_group_membership
- nuke_group_perms
- nuke_headlines
- nuke_languages_constants
- nuke_languages_file
- nuke_languages_translations
- nuke_links_categories
- nuke_links_editorials
- nuke_links_links
- nuke_links_modrequest
- nuke_links_newlink
- nuke_links_votedata

Database nuke running on localhost

Table	Action	Records	Type	Size
<input type="checkbox"/> nuke_autolinks	Browse Select Insert Properties Drop Empty	88	MyISAM	7.6 KB
<input type="checkbox"/> nuke_autonews	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_banner	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_bannerclient	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_bannerfinish	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_blocks	Browse Select Insert Properties Drop Empty	15	MyISAM	6.4 KB
<input type="checkbox"/> nuke_blocks_buttons	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_comments	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_counter	Browse Select Insert Properties Drop Empty	18	MyISAM	1.4 KB
<input type="checkbox"/> nuke_downloads_categories	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_downloads_downloads	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_downloads_editorials	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_downloads_modrequest	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_downloads_newdownload	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_downloads_subcategories	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_downloads_votedata	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_ephem	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_faqsanswer	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_faqscategories	Browse Select Insert Properties Drop Empty	0	MyISAM	1.0 KB
<input type="checkbox"/> nuke_group_membership	Browse Select Insert Properties Drop Empty	2	MyISAM	1.0 KB
<input type="checkbox"/> nuke_group_perms	Browse Select Insert Properties Drop Empty	5	MyISAM	2.2 KB

Interfaz WWW - MySQL



The screenshot shows a web browser window titled "running on localhost - phpMyAdmin 2.2.5-rc1 - Galeon". The address bar contains the URL "https://thinkpad0.zawodny.com/phpmyadmin/index.php". The browser's menu bar includes File, Edit, View, Tab, Settings, Bookmarks, Go, Tools, and Help. The address bar also shows navigation buttons (Back, Forward, Home, Stop) and search engines (G, Bing, debs, bugs). The browser's tab bar shows several open tabs: Ars Tect, Linux Tc, kuro5hin, The US/, WCNet I, Web Sei, Spread I, JitterBuç, phpMyA, and running. The main content area displays the phpMyAdmin interface. On the left, there is a "Home" section with a dropdown menu and a "Please select a database" prompt. The main content area is titled "Welcome to phpMyAdmin 2.2.5-rc1" and shows "MySQL 3.23.49-log running on localhost as root@localhost". Below this, there are two main sections: "MySQL" and "phpMyAdmin". The "MySQL" section includes links for "Create new database [Documentation]" (with a "Create" button), "Show MySQL runtime information [Documentation]", "Show MySQL system variables [Documentation]", "Show processes [Documentation]", "Reload MySQL [Documentation]", "Users [Documentation]", "Databases: statistics", "Change password", and "Log out". The "phpMyAdmin" section includes a "Language: English (en)" dropdown menu and links for "phpMyAdmin documentation", "Show PHP information", "Official phpMyAdmin Homepage", and "Sourceforge phpMyAdmin Download Page [ChangeLog] [CVS] [Lists]". The status bar at the bottom of the browser window shows "Done."

Interfaz WWW - MySQL

nuke.nuke_autolinks running on localhost - phpMyAdmin 2.2.5-rc1 - Galeon

File Edit View Tab Settings Bookmarks Go Tools Help

Back Home Stop 100 https://thinkpad0.zawodny.com/phpmyadmin/tbl_properties.php?lang=enk

Ars Tect x Linux Tc x kuro5hin x The US/ x WCNet I x Web Sei x Spread I x JitterBu x phpMyA x nuke.nu x

Home
nuke (60)

nuke
 nuke_autolinks
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 nuke_bannerclient
 nuke_bannerfinish
 nuke_blocks
 nuke_blocks_buttons
 nuke_comments
 nuke_counter
 nuke_downloads_category
 nuke_downloads_download
 nuke_downloads_editor
 nuke_downloads_moderequest
 nuke_downloads_newdownload
 nuke_downloads_subcategory
 nuke_downloads_votedownload
 nuke_ephem
 nuke_faqanswer
 nuke_faqcategories
 nuke_group_membership
 nuke_group_perms
 nuke_groups
 nuke_headlines
 nuke_languages_constant
 nuke_languages_file
 nuke_languages_translation
 nuke_links_categories
 nuke_links_editorials
 nuke_links_links
 nuke_links_moderequest
 nuke_links_newlink
 nuke_links_votedata
 nuke_message
 nuke_poll_check

Database nuke - table nuke_autolinks running on localhost

[Browse] [Select] [Insert] [Empty] [Drop]

Field	Type	Attributes	Null	Default	Extra	Action								
<input type="checkbox"/> id	int(11)		No		auto_increment	Change	Drop	Primary	Index	Unique	Fulltext			
<input type="checkbox"/> keyword	varchar(100)		No			Change	Drop	Primary	Index	Unique	Fulltext			
<input type="checkbox"/> title	varchar(100)		No			Change	Drop	Primary	Index	Unique	Fulltext			
<input type="checkbox"/> url	varchar(200)		No			Change	Drop	Primary	Index	Unique	Fulltext			
<input type="checkbox"/> comment	varchar(200)		Yes	NULL		Change	Drop	Primary	Index	Unique	Fulltext			

With selected: or

Indexes : [Documentation]

Keyname	Type	Cardinality	Action	Field
PRIMARY PRIMARY		88	Drop Edit	id
keyword UNIQUE		88	Drop Edit	keyword

Space usage :

Type	Usage
Data	4,736 Bytes
Index	3,072 Bytes
Total	7,808 Bytes

Row Statistic :

Statements	Value
Format	dynamic
Rows	88
Row length σ	53
Row size σ	89 Bytes
Next Autoindex	89

Create an index on columns

- Print view
- Run SQL query/queries on database nuke [Documentation] :

```
SELECT * FROM 'nuke_autolinks' WHERE 1
```

Interfaz WWW - MySQL

phpMyAdmin 2.2.5-rc1 - Galeon

File Edit View Tab Settings Bookmarks Go Tools Help

Back Home Stop 100% <https://thinkpad0.zawodny.com/phpmyadmin/index.php>

G debs bugs

Ars Tect x Linux Tc x kuro5hin x The US/ x WCNet I x Web Sei x Spread I x JitterBug x phpMyA x phpMyA x

Welcome to phpMyAdmin 2.2.5-rc1 - Login

Language:

Cookies must be enabled past this point.

Username:

Password:

Done.

Interfaz WWW - MySQL

running on localhost - phpMyAdmin 2.2.5-rc1 - Galeon

File Edit View Tab Settings Bookmarks Go Tools Help

Back Home Stop 100 https://thinkpad0.zawodny.com/phpmyadmin/db_stats.php?lang=en&serv...

debs bugs

Start Pa x kuro5hin x The Req x Slashdo x freshme x Linux Tc x Ars Tect x use Perl x The Dia x running x

Home
-

Please select a database

Databases statistics

Host : localhost
Generation Time : Apr 01, 2002 at 03:52 AM

Database	Table(s)	Data	Indexes	Total
<input type="checkbox"/> database	0	0 Bytes	0 Bytes	0 Bytes
<input type="checkbox"/> jzawodn	1	204.8 KB	6.0 KB	210.8 KB
<input type="checkbox"/> mysql	6	9.6 KB	13.0 KB	22.6 KB
<input type="checkbox"/> nuke	60	16.2 KB	74.0 KB	90.2 KB
<input type="checkbox"/> phplib	5	3.1 KB	11.0 KB	14.1 KB
<input type="checkbox"/> prout	1	4.2 KB	2.0 KB	6.2 KB
<input type="checkbox"/> test	60	13.1 KB	73.0 KB	86.1 KB
Sum: 7	133	250.9 KB	179.0 KB	429.9 KB

With selected:

Done.

Interfaz WWW - MySQL

running on localhost - phpMyAdmin 2.2.5-rc1 - Galeon

File Edit View Tab Settings Bookmarks Go Tools Help

Back Home Stop 100 phpmyadmin/user_details.php?lang=en&server=1&db=mysql&table=user

Start Pa x kuro5hin x The Rec x Slashdo x freshme x Linux Tc x Ars Tect x use Perl x The Dia x running x

Home
Please select a database

Any host - Any user

Note: MySQL privilege names are expressed in English

Action	Host	User	Password	Privileges
Edit Delete Grants	%	phplib	Yes	No Privileges
Edit Delete Grants	%	prout	Yes	No Privileges
Edit Delete Grants	localhost	Any	No	No Privileges
Edit Delete Grants	localhost	debian-sys-maint	Yes	Reload Shutdown
Edit Delete Grants	localhost	jzawodn	Yes	No Privileges
Edit Delete Grants	localhost	nuke	Yes	No Privileges
Edit Delete Grants	localhost	phplib	Yes	No Privileges
Edit Delete Grants	localhost	pma	Yes	No Privileges
Edit Delete Grants	localhost	prout	Yes	No Privileges
Edit Delete Grants	localhost	root	No	Select Insert Update Delete Create Drop Reload Shutdown Process File Grant References Index Alter
Edit Delete Grants	localhost	nuke	Yes	No Privileges
Edit Delete Grants	thinkpad0	Any	No	No Privileges
Edit Delete Grants	thinkpad0	root	No	Select Insert Update Delete Create Drop Reload Shutdown Process File Grant References Index Alter

- Reload MySQL [Documentation]
- Check Database Privileges
Database :
- Add a new User
 - Any host Host :
 - Any user User name :
 - No Password Password : Re-type :

Privileges :
 Select Insert

Interfaces de PostgreSQL

- UNIX
 - Entrada estándar (cat datos.txt | psql ejemplo)
 - Salida estándar (pg_dump)
- Monitor en texto
 - El monitor puede leer archivos texto (\i)
- Múltiples interfaces gráficos
 - Para MS-Windows
 - basado en TCL/TK (pgaccess)
- PHP - la integración con WWW
- SQL 96 Compliant
- JDBC / ODBC

Funcionalidades

```
CREATE TABLE ciudades (  
    ID SERIAL PRIMARY KEY UNIQUE NOT NULL ,  
    nombre varchar(128) ,  
    modificado timestamp DEFAULT CURRENT_TIMESTAMP ,  
    creado timestamp DEFAULT CURRENT_TIMESTAMP  
);  
  
REVOKE ALL ON ciudades FROM PUBLIC;  
GRANT ALL ON ciudades TO rnaranzo;  
GRANT ALL ON ciudades TO apache;  
REVOKE ALL ON ciudades_id_seq FROM PUBLIC;  
GRANT ALL ON ciudades_id_seq TO rnaranzo;  
GRANT ALL ON ciudades_id_seq TO apache;
```

Funcionalidades

```
insert into ciudades (nombre) values('Bogotá');
insert into ciudades (nombre) values('Barranquilla');
insert into ciudades (nombre) values('Cali');
insert into ciudades (nombre) values('Medellín');
select * from ciudades;
```

id	nombre	modificado	creado
1	Bogotá	2004-10-07 21:29:05.223244	2004-10-07 21:29:05.223244
2	Barranquilla	2004-10-07 21:29:05.276358	2004-10-07 21:29:05.276358
3	Cali	2004-10-07 21:29:05.285813	2004-10-07 21:29:05.285813
4	Medellín	2004-10-07 21:29:05.293132	2004-10-07 21:29:05.293132

(4 filas)

Funcionalidades

-- Ejemplo común: Un código zip de 5 dígitos,
-- que puede expresarse como un campo CHAR(5)
-- con valores entre 00210 y 99950.
-- Para hacerlo mas interesante, supongamos que en
-- lugar de permitir campos nulos (NULL) desea utilizar
-- el valor 00000 para indicar los faltantes

```
CREATE DOMAIN CodigoZip CHAR(5) NOT NULL
  DEFAULT '00000'
  CHECK ( VALUE ~ '^[0-9]{5}$'
    AND ( ( VALUE = '00000' )
      OR
        ( VALUE BETWEEN '00210' AND
'99950' ) ) )
);
```

Funcionalidades

```
CREATE TABLE personas (  
    ID SERIAL PRIMARY KEY UNIQUE NOT NULL ,  
    CIUDADNAC INTEGER REFERENCES ciudades ON UPDATE  
CASCADE ,  
    nombre varchar(64) ,  
    apellido varchar(64) ,  
    identificacion varchar(32) ,  
    sexo bool DEFAULT true ,  
    fechanac date ,  
    notas text ,  
    salario int ,  
    bono int ,  
    comision int ,  
    zip CodigoZip ,  
    modificado timestamp DEFAULT CURRENT_TIMESTAMP ,  
    creado timestamp DEFAULT CURRENT_TIMESTAMP
```

Funcionalidades

```

insert into personas (nombre, apellido, sexo)
values ('Ricardo','Naranjo', true);
insert into personas (nombre, apellido, sexo)
values ('María', 'Matallana',false);
insert into personas (nombre, apellido, sexo)
values ('Jorge', 'Cifuentes',true);
insert into personas (nombre, apellido, sexo)
values ('María Claudia','Diaz',false);
select id, ciudadnac, nombre, apellido, sexo,
zip
      from personas;

```

id	ciudadnac	nombre	apellido	sexo	zip
1		Ricardo	Naranjo	t	00000
2		María	Matallana	f	00000
3		Jorge	Cifuentes	t	00000
4		María Claudia	Diaz	f	00000

(4 filas)

Funcionalidades

```
update personas set ciudadnac=2 where id = 1;
update personas set ciudadnac=1 where id > 1;
select id, ciudadnac, nombre, apellido, sexo, zip
from personas;
```

id	ciudadnac	nombre	apellido	sexo	zip
1	2	Ricardo	Naranjo	t	00000
2	1	María	Matallana	f	00000
3	1	Jorge	Cifuentes	t	00000
4	1	María Claudia	Diaz	f	00000

(4 filas)

Funcionalidades

```
Select C.nombre as ciudad, P.nombre, P.apellido,
      P.sexo, P.zip
from ciudades AS C
left join personas AS P on P.ciudadnac=C.id;
```

ciudad	nombre	apellido	sexo	zip
Bogotá	María	Matallana	f	00000
Bogotá	Jorge	Cifuentes	t	00000
Bogotá	María Claudia	Diaz	f	00000
Barranquilla	Ricardo	Naranjo	t	00000
Cali				
Medellín				

(6 filas)

Funcionalidades

```
demopgsql=# update personas set zip='00001' where id =  
1;
```

```
ERROR: el valor para el dominio codigozip viola la  
restricción check "$1"
```

```
demopgsql=# update personas set zip='99999' where id =  
1;
```

```
ERROR: el valor para el dominio codigozip viola la  
restricción check "$1"
```

```
demopgsql=# update personas set zip='99111' where id =  
1;
```

```
UPDATE 1
```

Funcionalidades

ciudad	nombre	apellido	sexo	zip
Bogotá	María	Matallana	f	00000
Bogotá	Jorge	Cifuentes	t	00000
Bogotá	María Claudia	Diaz	f	00000
Barranquilla	Ricardo	Naranjo	t	99111
Cali				
Medellín				

(6 filas)

Funcionalidades

```
update personas set salario=1 where id = 1;  
update personas set salario=2 where id = 2;  
update personas set salario=3 where id = 3;  
update personas set salario=4 where id = 4;
```

```
update personas set bono=30 where id = 1;  
update personas set bono=10 where id = 2;  
update personas set bono=50 where id = 3;  
update personas set bono=75 where id = 4;
```

```
update personas set comision=400 where id = 1;  
update personas set comision=300 where id = 2;  
update personas set comision=200 where id = 3;  
update personas set comision=100 where id = 4;
```

Funcionalidades

nombre	apellido	salario	bono	comision
Ricardo	Naranjo	1	30	400
María	Matallana	2	10	300
Jorge	Cifuentes	3	50	200
María Claudia	Diaz	4	75	100

```
CREATE INDEX idx_compensacion
ON personas(
(salario + bono + comision) );
```

Funcionalidades

```
SELECT nombre, apellido,  
       (salario + bono + comision) AS compensacion  
FROM personas ORDER BY compensacion DESC LIMIT 10;
```

nombre	apellido	compensacion
Ricardo	Naranjo	431
María	Matallana	312
Jorge	Cifuentes	253
María Claudia	Diaz	179

(4 filas)

Funcionalidades

```
demopgsql=# SELECT ARRAY[2 * 3, 4 * 5, 6 * 7] as arreglo;
         arreglo
-----
```

```
{6,20,42}
```

```
demopgsql=# SELECT '{"hello world","happy birthday"}' as arreglo;
         arreglo
-----
```

```
{"hello world","happy birthday"}
```

```
demopgsql=# SELECT ARRAY['hello world','happy birthday'] as arreglo;
         arreglo
-----
```

```
{"hello world","happy birthday"}
```

Funcionalidades

```
ALTER TABLE personas ADD COLUMN ciudadres int[];
update personas set ciudadres=array[1,2,3] where id = 1;
update personas set ciudadres=array[1,3] where id = 2;
update personas set ciudadres=array[1] where id = 3;
update personas set ciudadres=array[1,4] where id = 4;
SELECT nombre, apellido, ciudadres
FROM personas;
```

nombre	apellido	ciudadres
Ricardo	Naranjo	{1,2,3}
María	Matallana	{1,3}
Jorge	Cifuentes	{1}
María Claudia	Diaz	{1,4}

Funcionalidades

```
SELECT P.nombre || ' ' || P.apellido AS persona,
       C.nombre, P.ciudades
FROM Personas as P, ciudades as C
WHERE C.id = any (P.ciudades);
```

persona	nombre	ciudades
Ricardo Naranjo	Bogotá	{1,2,3}
Ricardo Naranjo	Barranquilla	{1,2,3}
Ricardo Naranjo	Cali	{1,2,3}
María Matallana	Bogotá	{1,3}
María Matallana	Cali	{1,3}
Jorge Cifuentes	Bogotá	{1}
María Claudia Diaz	Bogotá	{1,4}
María Claudia Diaz	Medellín	{1,4}

Funcionalidades

```
CREATE OR REPLACE FUNCTION
  greatest(anyelement, anyelement)
RETURNS anyelement AS '
  SELECT CASE WHEN $1 > $2 THEN $1
    ELSE $2 END
' LANGUAGE SQL IMMUTABLE STRICT;

SELECT greatest(1,2);
SELECT greatest('a'::text,'b');
```

Fuentes de información

- Directamente desde los portales de postgresql y mysql
 - <http://www.postgresql.org>
 - <http://www.mysql.com>
- MEDIOS DE INSTALACIÓN
- Grupos de discusión
- Linux Magazine
 - http://www.linux-mag.com/2004-02/postgresql_01.html

Fuentes de información

- Revistas especializadas (Recomendación: Linux Magazine, Sección LAMP)

Índice de artículos

Artículo JPGraph

Administración Facil

