

Curs 4 (S7)

2021/2022

# Programarea aplicațiilor web

- Programarea aplicațiilor web
  - An V RC
    - 1.5C/1L/1P

# Program

- An V
  - Saptamana 1
    - Miercuri 15-17 Proiect (Intro)
    - Miercuri 17-20 Curs (HTML/CSS)
  - Saptamanile 2-8
    - Miercuri 16:30-18 Curs
    - Miercuri 18-20 Laborator
  - Saptamanile 9-14
    - Miercuri 16:30-18 Curs
    - Miercuri 18-20 Proiect

# Orar

- <https://orar.etti.tuiasi.ro/> : C->16:30, L/P -> 18



FACULTATEA DE ELECTRONICA, TELECOMUNICATII SI TEHNOLOGIA INFORMATIEI

55RC

ETTI

	1 8:00 - 8:50	2 9:00 - 9:50	3 10:00 - 10:50	4 11:00 - 11:50	5 12:00 - 12:50	6 13:00 - 13:50	7 14:00 - 14:50	8 15:00 - 15:50	9 16:00 - 16:50	10 17:00 - 17:50	11 18:00 - 18:50	12 19:00 - 19:50
L								RCALSC (C) Online_SL	Scripcariu L. RCALSC (C)		RCALSC (L) 2.13 TC (R)	
Ma							TEFO (C) Online_TrL	Trifina L.			TEFO (L) 3.25 TTI (L)	
Mi								PAW (L) Online_DaR	Damian R.		PAW (C) Online_DaR	
J								PAW (P) Online_DaR	Damian R.			
V									Sirbu A. POO (C) Online_SA		TEFO (L) 1.08 Practica	
Sa											Online_CBI	Online_CBI



# Nota

- An V
  - 33% E
  - 66% Aplicatii
    - 33% L
    - 33% P

# Acces

## ■ Personalizat



### Date:

Grupa	5304 (2015/2016)
Specializarea	Tehnologii si sisteme de telecomunicatii
Marca	5184

[Acceseaza ca acest student](#)

### Note obtinute

Disciplina	Tip	Data	Descriere	Nota	Puncte	Obs.
TW	Tehnologii Web					
	N	17/01/2014	Nota finala	10	-	
	A	17/01/2014	Colocviu Tehnologii Web 2013/2014	10	7.55	
	B	17/01/2014	Laborator Tehnologii Web 2013/2014	9	-	
	D	17/01/2014	Tema Tehnologii Web 2013/2014	9	-	

Nume

Email

Cod de verificare

Trimite

# Online

- acces la **examene** necesita **parola** primita prin email

English | Romana |

Start Didactic Master Colectiv Cercetare Studii

Note Lista Studenti Examene Fotografii

**POPESCU GOPO ION**

Fotografia nu exista

Date:

Grupa	5700 (2019/2020)
Specializarea	Inginerie electronica si telecomunicatii
Marca	7000021

Acceseaza ca acest student | [Iere acces la licente](#)

**Note obtinute**

Inca nu a fost notat.

Start Didactic Master Colectiv Colectiv

Note Lista Studenti Examene Fotografii

**Identificare**

Introduceti numele si adresa de email utilizata la inscriere

Nume  
POPESCU GOPO

**E-mail/Parola**

Introduceti codul afisat mai jos

**4db4457**

Trimite

# Online

- acces email/parola

[Start](#) [Didactic](#) [Master](#) [Colectiv](#)

[Note](#) [Lista Studenti](#) [Examene](#) [Fotografii](#)

**POPESCU GOPO ION**

Fotografia  
nu exista

**Date:**

Grupa	5700 (2019/2020)
Specializarea	Inginerie electronica
Marca	7000021

Se acceseaza site-ul **ca acest student!**

[Start](#) [Didactic](#) [Master](#) [Colectiv](#) [C](#)

[Note](#) [Lista Studenti](#) [Examene](#) [Fotografii](#)

**POPESCU GOPO ION**

Fotografia  
nu exista

**Date:**

Grupa	5700 (2019/2020)
Specializarea	Inginerie electronica s
Marca	7000021

Se acceseaza site-ul **ca acest student (inclusiv examene)!**

# Parola

## ■ primita prin email

Important message from RF-OPTO

Inbox x



Radu-Florin Damian

to me, POPESCU



Romanian

> English

[Translate message](#)



Laboratorul de Microunde si Optoelectronica  
Facultatea de Electronica, Telecomunicatii si Tehnologia Informatiei  
Universitatea Tehnica "Gh. Asachi" Iasi

In atentia: POPESCU GOPO ION

Parola pentru a accesa examenele pe server-ul **rf-opto** este

Parola: [REDACTED]

Identificati-va pe [server](#), cu parola, cat mai rapid, pentru confirmare.

**Memorati** acest mesaj intr-un loc sigur, pentru utilizare ulterioara

Attention: POPESCU GOPO ION

The password to access the exams on the **rf-opto** server is

Password: [REDACTED]

Login to the [server](#), with this password, as soon as possible, for confirmation.

**Save** this message in a safe place for later use

Reply

Reply all

Forward

Subject	Correspondents
Important message from RF-OPTO	POPESCU GOPO ION
Validation of MDCK exam from 02/05/2020	[REDACTED]
[REDACTED]	[REDACTED]

From: Me <rdamian@etti.tuiasi.ro>

Subject: Important message from RF-OPTO

To: [REDACTED]

Cc: Me <rdamian@etti.tuiasi.ro>

Laboratorul de Microunde si Optoelectronica  
Facultatea de Electronica, Telecomunicatii si Tehnologia Informatiei  
Universitatea Tehnica "Gh. Asachi" Iasi

In atentia: POPESCU GOPO ION

Parola pentru a accesa examenele pe server-ul **rf-opto** este

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Identificati-va pe [server](#), cu parola, cat mai rapid, pentru confirmare.

**Memorati** acest mesaj intr-un loc sigur, pentru utilizare ulterioara

Attention: POPESCU GOPO ION

The password to access the exams on the **rf-opto** server is

Password: [REDACTED]

Login to the [server](#), with this password, as soon as possible, for confirmation.

**Save** this message in a safe place for later use


# Manual examen online

- Aplicatia de examen online utilizata intens la:
  - curs (prezenta)
  - laborator
  - proiect
  - examen

## Materials

### Other data

[Manual examen on-line](#) (pdf, 2.65 MB, ro, )

[Simulare Examen](#) (video) (mp4, 65.12 MB, ro, )

## Microwave Devices and Circuits (Englis

MySql

# Accesul la metode externe de stocare eficiente a datelor

# MySQL

- Baza de date – instrument pentru stocarea si manipularea informatiei eficient si efectiv
  - datele sunt protejate de corupere sau pierderi accidentale
  - nu se utilizeaza mai multe resurse decat minimul necesar
  - datele pot fi accesate cu performanta acceptabila
- Baze de date relationale
  - model relational (matematic eficient) – Codd ~1970



# DBMS, RDBMS

- DBMS – database management system aplicatii incluse in baza de date pentru accesul la informatii
- RDBMS – Relational DBMS. Majoritatea sistemelor de baze de date tind la aceasta titulatura
  - ~300 de reguli trebuie respectate
  - nici un sistem actual nu implementeaza total aceste reguli

# Relatii

- Toate sistemele de baze de date sunt caracterizate de:
  - toate informatiile sunt reprezentate intr-o aranjare ordonata **bidimensionala** numita **relatie**
  - toate valorile (attribute) stocate sunt scalare (in orice celula din tabel se stocheaza **o singura** valoare)
  - toate operatiile se aplica asupra unei intregi relatii si rezulta o intreaga relatie
- Terminologii (**MySQL**)
  - tabel – **table** / recordset / **result set**
  - linie – record / **row**
  - coloana – field / **column**

# Relatii, chei

- toate informatiile sunt reprezentate intr-o aranjare bidimensionala numita relatie
  - aranzarile bidimensionale nu sunt ordonate implicit
  - datele trebuie stocate pentru a implementa o relatie in asa fel incat fiecare linie sa fie unica
- cheie candidata
  - exista cel putin o combinatie de attribute (coloane) care pot identifica in mod unic o linie
  - aceste combinatii de attribute se numesc chei candidate

# Chei

- Din toate combinatiile de coloane care pot fi utilizate pentru identificarea unica a unei linii se alege **macar** una utilizata intern de RDBMS pentru ordonarea datelor – **cheie primara**
  - Celelalte chei candidate devin **chei alternative** si pot fi folosite pentru eficientizarea prelucrarilor (crearea de “index” dupa aceste chei)
- In cazul in care nu exista o combinatie de coloane utilizabila ca si cheie cu utilitate practica se introduce artificial o cheie, cu numere intregi incrementate automat de DBMS (autoincrement)
  - de multe ori este recomandata o astfel de actiune, numerele intregi fiind mult mai usor de controlat, ordonat, cautat decat alte tipuri de date
  - cheile de tip autoincrement nu e **nevoie** sa contina informatie

# Normalizare

- Normalizarea asigura:
  - stocarea eficienta a datelor
  - prelucrarea eficienta a datelor
  - integritatea datelor
- Trei nivele de normalizare
- Eliminarea datelor redundante

	OrderID	CustomerID	OrderDate	Items	OrderTotal
	1	CACTU	1/1/1999	3 Zaanse koeken, 1 Tarte au sucre	\$89.70
	2	BSBEV	1/5/1999	4 Mozzarella di Giovanni	\$139.20
	3	SUPRD	5/2/1999	3 Ravioli Angelo, 6 Tofu	\$198.06

# Eliminarea datelor redundante

Order ID	SalesPerson	Hire Date	Phone	Company Name	Product Name	Quantity
10871	Dodsworth, Anne	15-Nov-1994	452	Bon app'	Alice Mutton	16
10747	Suyama, Michael	17-Oct-1993	428	Piccolo und mehr	Gorgonzola Telino	8
10258	Davolio, Nancy	01-May-1992	5467	Ernst Handel	Chef Anton's Gumbo Mix	65
11007	Callahan, Laura	05-Mar-1994	2344	Princesa Isabel Vinhos	Thüringer Rostbratwurst	10
10421	Callahan, Laura	05-Mar-1994	2344	Que Delicia	Perth Pasties	15
10558	Davolio, Nancy	01-May-1992	5467	Around the Horn	Perth Pasties	18
10431	Peacock, Margaret	03-May-1993	5176	Bottom-Dollar Markets	Alice Mutton	50
10659	King, Robert	02-Jan-1994	465	Queen Cozinha	Gorgonzola Telino	20
10273	Leverling, Janet	01-Apr-1992	3355	QUICK-Stop	Gorgonzola Telino	15
10382	Peacock, Margaret	03-May-1993	5176	Ernst Handel	Chef Anton's Gumbo Mix	32
10949	Fuller, Andrew	14-Aug-1992	3457	Bottom-Dollar Markets	Alice Mutton	6
10285	Davolio, Nancy	01-May-1992	5467	QUICK-Stop	Perth Pasties	36
10867	Suyama, Michael	17-Oct-1993	428	Lonesome Pine Restaut	Perth Pasties	3
10691	Fuller, Andrew	14-Aug-1992	3457	QUICK-Stop	Thüringer Rostbratwurst	40
10354	Callahan, Laura	05-Mar-1994	2344	Pericles Comidas clásic	Thüringer Rostbratwurst	4
10698	Peacock, Margaret	03-May-1993	5176	Ernst Handel	Thüringer Rostbratwurst	12
10962	Callahan, Laura	05-Mar-1994	2344	QUICK-Stop	Perth Pasties	20
10465	Davolio, Nancy	01-May-1992	5467	Vaffeljernet	Thüringer Rostbratwurst	18
10549	Buchanan, Steven	17-Oct-1993	3453	QUICK-Stop	Gorgonzola Telino	55

# Eliminarea datelor redundante

Customers Relation

Customer ID	Company Name	Phone
ALFKI	Alfreds Futterkiste	030-0074321
ANATR	Ana Trujillo Emparedados y helados	(5) 555-4729
ANTON	Antonio Moreno Taquería	(5) 555-3932
AROUT	Around the Horn	(171) 555-7788
BERGS	Berglunds snabbköp	0921-12 34 65
BLAUS	Blauer See Delikatessen	0621-08460
BLONP	Blondel père et fils	88.60.15.31
BOLID	Bólido Comidas preparadas	(91) 555 22 82
BONAP	Bon app'	91.24.45.40
BOTTM	Bottom-Dollar Markets	(604) 555-4729
BSBEV	B's Beverages	(171) 555-1212
CACTU	Cactus Comidas para llevar	(1) 135-5555
CENTC	Centro comercial Moctezuma	(5) 555-3392

Invoices Relation

Order ID	Company Name	Phone
10643	Alfreds Futterkiste	030-0074321
10692	Alfreds Futterkiste	030-0074321
10702	Alfreds Futterkiste	030-0074321
10835	Alfreds Futterkiste	030-0074321
10952	Alfreds Futterkiste	030-0074321
11011	Alfreds Futterkiste	030-0074321
10308	Ana Trujillo Emparedados y helados	(5) 555-4729
10625	Ana Trujillo Emparedados y helados	(5) 555-4729
10759	Ana Trujillo Emparedados y helados	(5) 555-4729
10926	Ana Trujillo Emparedados y helados	(5) 555-4729
10365	Antonio Moreno Taquería	(5) 555-3932
10507	Antonio Moreno Taquería	(5) 555-3932
10535	Antonio Moreno Taquería	(5) 555-3932
10573	Antonio Moreno Taquería	(5) 555-3932
10677	Antonio Moreno Taquería	(5) 555-3932

When was she hired?

Order ID	SalesPerson	Hire Date	Phone	Company Name	Product Name
10871	Dodsworth, Anne	15-Nov-1994	452	Bon app'	Alice Mutton
10747	Suyama, Michael	17-Oct-1993	428	Piccolo und mehr	Gorgonzola Telino
10258	Davolio, Nancy	01-May-1992	5467	Ernst Handel	Chef Anton's Gumbo Mix
11007	Callahan, Laura	05-Mar-1994	2344	Princesa Isabel Vinhos	Thüringer Rostbratwurst
10421	Callahan, Laura	05-Mar-1994	2344	Que Delicia	Perth Pasties
10558	Davolio, Nancy	01-May-1992	5467	Around the Horn	Perth Pasties
10431	Peacock, Margaret	03-May-1993	5176	Bottom-Dollar Markets	Alice Mutton

Product ID	Product Name	Unit Price
1	Chai	\$18.00
2	Chang	\$19.00
3	Aniseed Syrup	\$10.00
4	Chef Anton's Cajun Seasoning	\$22.00
5	Chef Anton's Gumbo Mix	\$21.35
6	Grandma's Boysenberry Spread	\$25.00
7	Uncle Bob's Organic Dried Pears	\$30.00
8	Northwoods Cranberry Sauce	\$40.00
9	Mishi Kobe Niku	\$97.00
10	Ikura	\$31.00
11	Queso Cabrales	\$21.00
12	Queso Manchego La Pastora	\$38.00
13	Konbu	\$6.00
14	Tofu	\$23.25

These are not the same value

Order ID	Product Name	Unit Price	Quantity	Unit Price
10248	Mozzarella di Giovanni	\$34.80	5	\$174.00
10248	Queso Cabrales	\$21.00	12	\$168.00
10248	Singaporean Hokkien Fried Mee	\$14.00	10	\$98.00
10249	Manjimup Dried Apples	\$53.00	40	\$1,696.00
10249	Tofu	\$23.25	9	\$167.40



# Prima forma normala

- toate valorile sunt scalare

OrderID	CustomerID	OrderDate	Items	OrderTotal
1	CACTU	1/1/1999	3 Zaanse koeken, 1 Tarte au sucre	\$89.70
2	BSBEV	1/5/1999	4 Mozzarella di Giovanni	\$139.20
3	SUPRD	5/2/1999	3 Ravioli Angelo, 6 Tofu	\$198.06

- nu toate rezolvarile sunt eficiente

OrderID	CustomerID	Item1	Qty1	Item2	Qty2	Item3	Qty3
1	ANTON	Queso Cabrales	4	Tofu	3	Ravioli Angelo	1
2	BLAUS	Chai	2		0		

Product	Year	TargetJan	ActualJan	TargetFeb	ActualFeb
Aniseed Syrup	2004	\$1,000.00	\$1,300.00	\$0.00	\$0.00
Chai	2004	\$4,000.00	\$2,000.00	\$0.00	\$0.00
Chang	2004	\$3,000.00	\$8,022.00	\$0.00	\$0.00



# A doua forma normala

- O relatie este in a **doua** forma normala cand este in **prima** forma normala si suplimentar attributele (valorile de pe coloana) depind de **intreaga cheie** candidata aleasa

 Product Name	 SupplierName	Category Name	SupplierPhoneNumber	
Chai	Exotic Liquids	Beverages	(171) 555-2222	
Chang	Exotic Liquids	Beverages	(171) 555-2222	
Guaraná Fantástica	Refrescos Americanas LTDA	Beverages	(11) 555 4640	
Sasquatch Ale	Bigfoot Breweries	Beverages	(503) 555-9931	
Steeleye Stout	Bigfoot Breweries	Beverages	(503) 555-9931	
Côte de Blaye	Aux joyeux ecclésiastiques	Beverages	(1) 03.83.00.68	
Chartreuse verte	Aux joyeux ecclésiastiques	Beverages	(1) 03.83.00.68	
Ipoh Coffee	Leka Trading	Beverages	555-8787	
Laughing Lumberjack Lager	Bigfoot Breweries	Beverages	(503) 555-9931	
Outback Lager	Paylova, Ltd.	Beverages	(03) 444-2343	

# A doua forma normala

	Product ID	Product Name	Category
	1	Chai	Beverages
	2	Chang	Beverages
	3	Aniseed Syrup	Condiments
	4	Chef Anton's Cajun Seasoning	Condiments
	5	Chef Anton's Gumbo Mix	Condiments
	6	Grandma's Boysenberry Spread	Condiments
	7	Uncle Bob's Organic Dried Pears	Produce

	Supplier ID	SupplierName	SupplierPhoneNumber
	1	Exotic Liquids	(171) 555-2222
	2	New Orleans Cajun Delights	(100) 555-4822
	3	Grandma Kelly's Homestead	(313) 555-5735
	4	Tokyo Traders	(03) 3555-5011
	5	Cooperativa de Quesos 'Las Cabras'	(98) 598 76 54
	6	Mayumi's	(06) 431-7877
	7	Pavlova, Ltd.	(03) 444-2343
	8	Specialty Biscuits, Ltd.	(161) 555-4448
	9	PB Knäckebröd AB	031-987 65 43

# A treia forma normala

- O relatie este in a **treia** forma normala cand este in a **doua** forma normala si suplimentar attributele (valorile de pe coloana) care nu fac parte din cheie sunt **mutual independente**



	Company Name	Address	City	Region	Postal Code
	Exotic Liquids	49 Gilbert St.	London		EC1 4SD
	New Orleans Cajun Delights	P.O. Box 78934	New Orleans	LA	70117
	Grandma Kelly's Homestead	707 Oxford Rd.	Ann Arbor	MI	48104
	Tokyo Traders	9-8 Sekimai	Tokyo		100
	Cooperativa de Quesos 'Las Cabras'	Calle del Rosal 4	Oviedo	Asturias	33007
	Mayumi's	92 Setsuko	Osaka		545
	Pavlova, Ltd.	74 Rose St.	Melbourne	Victoria	3058

# A treia forma normala

	Company Name	Address	City
	Exotic Liquids	49 Gilbert St.	London
	New Orleans Cajun Delights	P.O. Box 78934	New Orleans
	Grandma Kelly's Homestead	707 Oxford Rd.	Ann Arbor
	Tokyo Traders	9-8 Sekimai	Tokyo
	Cooperativa de Quesos 'Las Cabras'	Calle del Rosal 4	Oviedo
	Mayumi's	92 Setsuko	Osaka
	Pavlova, Ltd.	74 Rose St.	Melbourne

	City	Region	Postal Code
	Melbourne	Victoria	3058
	Ste-Hyacinthe	Québec	J2S 7S8
	Montréal	Québec	H1J 1C3
	Bend	OR	97101
	Sydney	NSW	2042
	Ann Arbor	MI	48104
	Boston	MA	02134
	New Orleans	LA	70117
	Oviedo	Asturias	33007

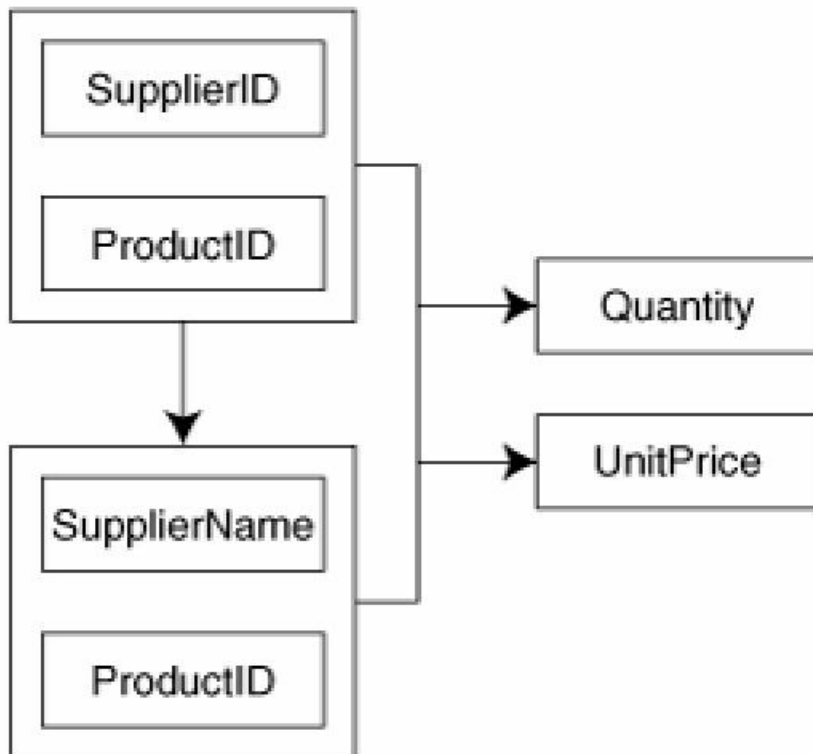
# Normalizare suplimentara

- Se tine cont si de eliminarea datelor redundante. Anumite redundante pot fi eliminate prin introducerea de relatii suplimentare
- Forma normala Boyce/Codd cere sa nu existe dependenta functionala intre cheile candidate



Supplier ID	SupplierName	Product	Quantity	Unit Price
5	Cooperativa de Quesos 'Las Cabras'	Queso Cabrales	12	\$14.00
20	Leka Trading	Singaporean Hokkien Fried Mee	10	\$9.80
14	Formaggi Fortini s.r.l.	Mozzarella di Giovanni	5	\$34.80
24	G'day, Mate	Manjimup Dried Apples	40	\$42.40
6	Mayumi's	Tofu	9	\$18.60
24	G'day, Mate	Manjimup Dried Apples	35	\$42.40
19	New England Seafood Cannery	Jack's New England Clam Chowder	10	\$7.70
2	New Orleans Cajun Delights	Louisiana Fiery Hot Pepper Sauce	15	\$16.80

# Normalizare suplimentara



	Supplier ID	SupplierName
	1	Exotic Liquids
	2	New Orleans Cajun Delights
	3	Grandma Kelly's Homestead
	4	Tokyo Traders
	5	Cooperativa de Quesos 'Las Cabras'
	6	Mayumi's

	SupplierID	ProductID	Quantity	UnitPrice
	2	65	15	\$21.05
	24	53	15	\$32.80
	8	20	40	\$81.00
	22	47	16	\$9.50
	6	14	9	\$23.25
	28	59	30	\$55.00
	28	60	40	\$34.00
	21	46	15	\$12.00

MySql

# Relatii in Bazele de date

# Relatii in Bazele de date

- Legaturile intre tabele pot fi
  - One to One
  - One to Many
  - Many to Many
    - Unare (auto referinta)



# One to One

- Fiecare tabel poate avea corespondenta **o singura linie (row) sau nici una** de cealalta parte a relatiei
- echivalent cu o relatie “bijectiva”
- analogie cu casatorie:
  - o persoana poate fi casatorita sau nu
  - daca este casatorita va fi casatorita cu o singura persoana din tabelul cu persoane de sex opus
  - persoana respectiva va fi caracterizata de aceeasi relatie “one to one” – primeste simultan un singur corespondent in tabelul initial

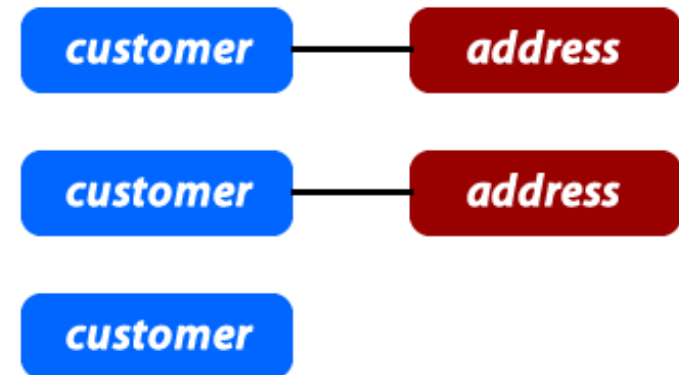
# One to One

- de multe ori legaturile "one to one" se bazeaza pe reguli externe
- de obicei se poate realiza usor si eficient gruparea ambelor tabele in unul singur

CUSTOMERS		
customer_id	customer_name	address_id
101	John Doe	301
102	Bruce Wayne	302

ADDRESSES	
address_id	address
301	12 Main St., Houston TX 77001
302	1007 Mountain Dr., Gotham NY 10286




CUSTOMERS		
customer_id	customer_name	customer_address
101	John Doe	12 Main St., Houston TX 77001
102	Bruce Wayne	1007 Mountain Dr., Gotham NY 10286

# One to Many


- O linie dintr-un tabel (row), identificata prin cheia primara, poate avea: **nici una, una sau mai multe linii corespondente** in celalalt tabel. In acesta o linie poate fi legata cu o **singura** linie din tabelul primar.
- Analogie cu relatii parinte/copil:
  - fiecare om are o singura mama
  - fiecare femeie poate avea nici unul, unul sau mai multi copii

# One to Many, Many to One

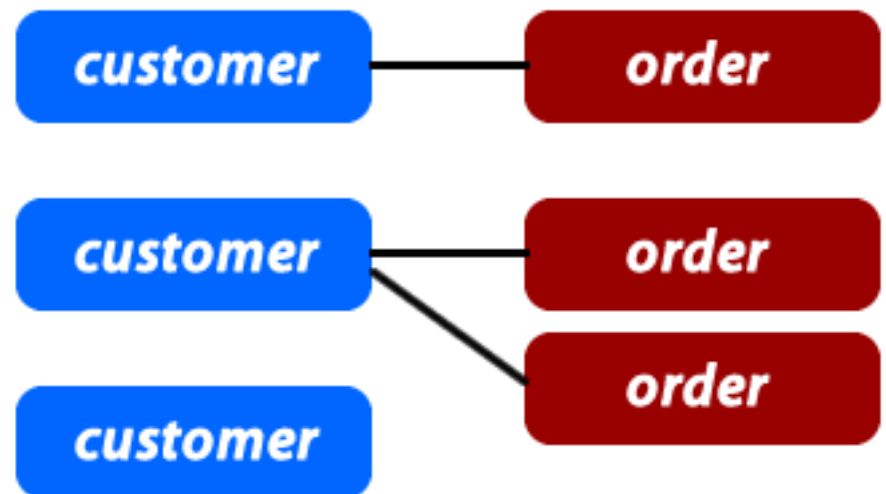
- de obicei aceste legaturi se implementeaza prin introducerea cheii primare din tabelul **One** in calitate de coloana in tabelul **Many** (cheie externa – foreign key)



CUSTOMERS	
customer_id	customer_name
101	John Doe
102	Bruce Wayne



ORDERS			
order_id	customer_id	order_date	amount
555	101	12/24/09	\$156.78
556	102	12/25/09	\$99.99
557	101	12/26/09	\$75.00



# Many to Many

- Fiecare linie (row) din **ambele tabele** implicate in legatura poate fi legat cu **oricate (niciuna, una sau mai multe) linii** din tabelul corespondent.
- Analogie cu relatii de rudenie (veri de exemplu), tabel 1 – barbati, tabel 2 – femei :
  - fiecare barbat poate fi ruda cu una sau mai multe femei
  - la randul ei fiecare femeie poate fi ruda cu unul sau mai multi barbati

# Many to Many

- de obicei aceste legaturi se implementeaza prin introducerea unui tabel **suplimentar** (numit tabel **asociat** sau de **legatura**) care sa memoreze legaturile

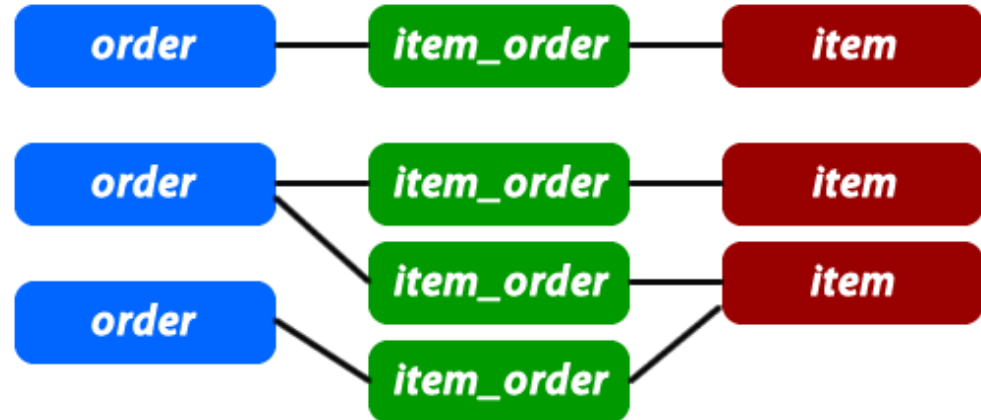
ORDERS			
order_id	customer_id	order_date	amount
555	101	12/24/09	\$156.78
556	102	12/25/09	\$99.99

ITEMS		
item_id	item_name	item_description
201	Tickle Me Elmo	It wants to be tickled
202	District 9 DVD	Awesome sci-fi movie
203	Batarang	It is very sharp

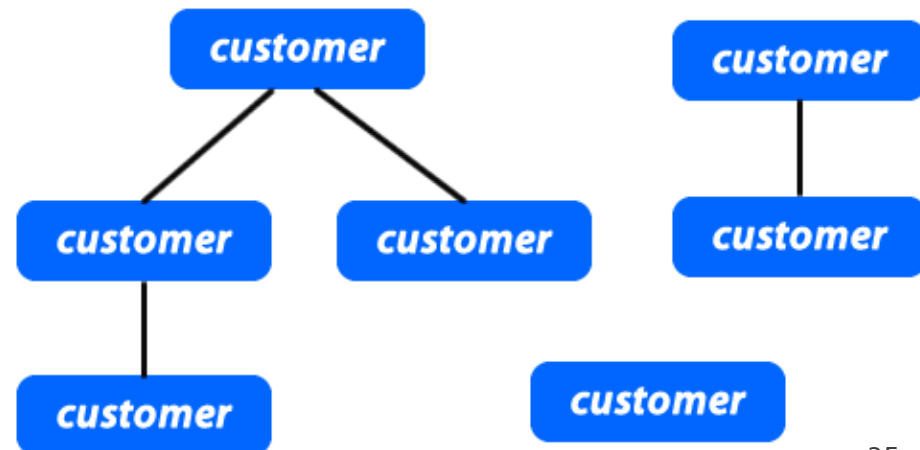
ITEMS_ORDERS	
order_id	item_id
555	201
555	202
556	202
556	203



# Self Referencing (unare)

- Un caz particular de legatura "one to many" in care legatura e in interiorul aceluiasi tabel
- rezolvarea este similara, introducerea unei coloane suplimentara, cu referinta la cheia primara din tabel
- analogie cu relatii parinte copil cand ambele persoane se regasesc in acelasi tabel

CUSTOMERS		
customer_id	customer_name	referrer_customer_id
101	John Doe	0
102	Bruce Wayne	101
103	James Smith	101



# Relatii in Bazele de date

- Respectarea formelor normale ale bazelor de date aduce nenumarate avantaje
- Efectul secundar este dat de necesitatea separarii datelor intre mai multe tabele
- In exemplul utilizat avem doua concepte diferite din punct de vedere logic
  - produs
  - categorie de produs

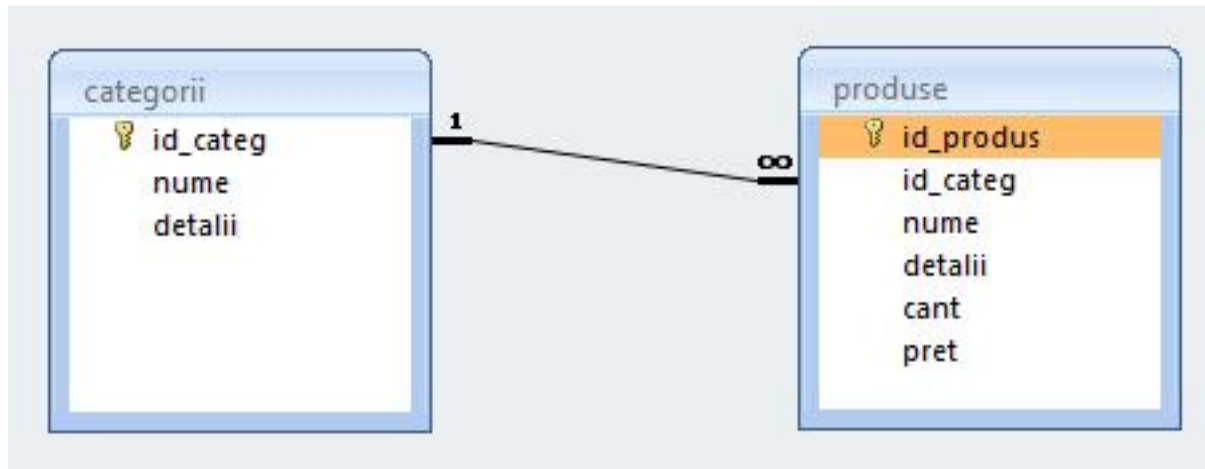


# Relatii in Bazele de date

- In exemplul utilizat avem doua concepte diferite din punct de vedere logic
  - produs
  - categorie de produs
- Cele doua tabele nu sunt independente
- Intre ele exista o legatura data de functionalitatea dorita pentru aplicatie: **un produs va apartine unei anumite categorii de produse**

# Relatii in Bazele de date

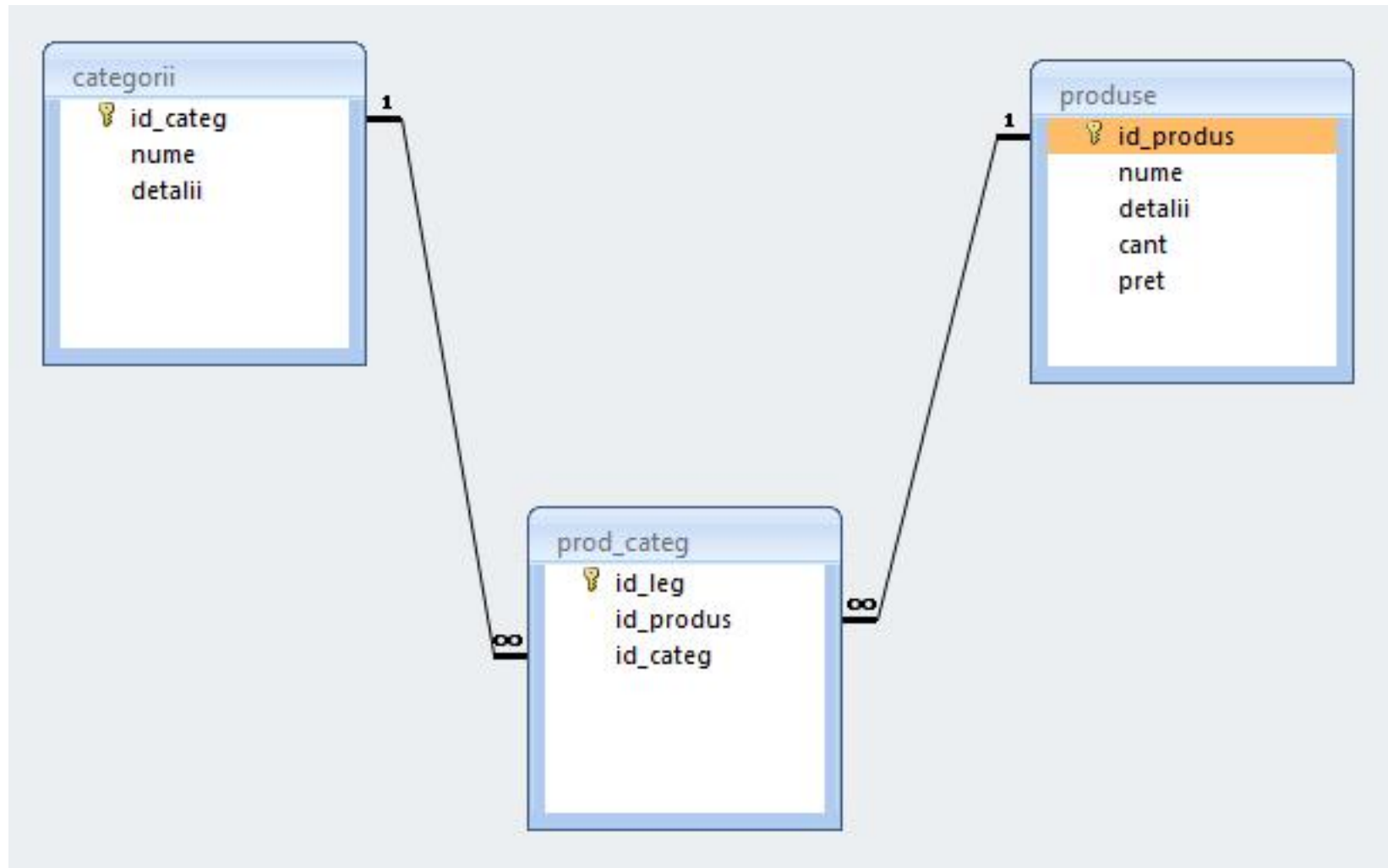
- Legaturile implementata
  - One to Many
  - in tabelul "produse" apare cheia externa (foreign key): "id\_categ"



# Relatii in Bazele de date

- Daca se doreste o situatie cand un produs poate apartine **mai multor categorii** (o carte cu CD poate fi inclusa si in "papetarie" si in "audio-video")
  - relatia devine de tipul **Many to Many**
  - e necesara introducerea unui tabel de legatura cu coloanele "id\_leg" (cheie primara), "id\_categorie" si "id\_produs" (chei externe)

# Relatii in Bazele de date



# Relatii

- Nu trebuie evitate relatiile
  - Many to Many
  - One to Many
- Prelucrarea cade in sarcina server-ului de baze de date (RDBMS)
  - JOIN – **esential** in aplicatii cu baze de date

# MySql – eficienta

- eficienta unei aplicatii web
  - 100% - **toate prelucrarile "mutate" in RDBMS**
  - PHP **doar** afisarea datelor
- eficienta unei aplicatii MySql
  - 25% **alegerea corecta a tipurilor de date**
  - 25% **crearea indecsilor necesari in aplicatii**
  - 25% **normalizarea corecta a bazei de date**
  - 20% **cresterea complexitatii interogarilor pentru a "muta" prelucrarile pe server-ul de baze de date**
  - 5% **scrierea corecta a interogarilor**

MySql

# Tipuri de date

# MySql – tipuri de date

- numeric
  - intregi
    - BIT (implicit 1 bit)
    - TINYINT (implicit 8 biti)
    - SMALLINT (implicit 16 biti)
    - INTEGER (implicit 32biti)
    - BIGINT (implicit 64biti)
  - real
    - FLOAT
    - DOUBLE
    - DECIMAL – fixed point



# MySql – tipuri de date

- data/timp
  - DATE ('YYYY-MM-DD')
    - '1000-01-01' pana la '9999-12-31'
  - DATETIME ('YYYY-MM-DD HH:MM:SS')
    - '1000-01-01 00:00:00' pana la '9999-12-31 23:59:59'
  - TIMESTAMP ('YYYY-MM-DD HH:MM:SS')
    - '1970-01-01 00:00:00' pana la partial 2037

# MySql – tipuri de date

- sir
  - CHAR (M)
    - sir de lungime constanta M,  $M < 255$
  - VARCHAR (M)
    - sir de lungime variabila, maxim M,  $M < 255$  ( $M < 65535$ )
- cantitati mari de date
  - TEXT
    - au alocat un set de caractere, operatiile tin cont de acesta
  - BLOB
    - sir de octeti, operatiile tin cont de valoarea numerica
  - TINYBLOB/TINYTEXT, BLOB/TEXT, MEDIUMBLOB/MEDIUMTEXT, LARGEBLOB/LARGETEXT
    - date  $2^8-1$ ,  $2^{16}-1$ ,  $2^{24}-1$ ,  $2^{32}-1 = 4\text{GB}$

# MySQL – tipuri de date

- enumerare

- ENUM('val1','val2',...)

- una singura din cele maxim 65535 valori distincte posibile

- SET('val1','val2',...)

- niciuna sau mai multe din cele maxim 64 valori distincte
    - echivalent cu “setare de biti” intr-un intreg pe 64 biti cu tabela asociata

# Metode de stocare

# Metode de stocare

- Metoda de stocare a datelor nu e o caracteristica a server-ului ci a fiecarui tabel in parte
- Exemplu ulterior CREATE: "ENGINE = InnoDB"
- MySql suporta diferite metode de stocare, fiecare cu avantajele/dezavantajele sale
- Implicit se foloseste metoda MyISAM, dar la instalarea server-ului (laborator 1) o anumita selectie poate schimba valoarea implicita in InnoDB
- **Alegerea metodei de stocare potrivita are implicatii majore asupra performantei aplicatiei**

# Metode de stocare

- MyISAM
- InnoDB
- Memory
- Merge
- Archive
- Federated
- NDBCLUSTER
- CSV
- Blackhole
- Example

# Metode de stocare

## ■ MyISAM

- metoda de stocare implicita in MySql
- performanta ridicata (resurse ocupate si viteza)
- posibilitatea cautarii in intregul text (index FULLTEXT)
- blocare acces la nivel de tabel
- nu accepta tranzactii
- nu accepta FOREIGN KEY
  - probleme relative la integritatea datelor

## ■ InnoDB

## ■ Memory

# Metode de stocare

- **MyISAM**

- **InnoDB**

- devine metoda de stocare implicita in MySql daca la instalare se alege model tranzactional
- performanta medie (resurse ocupate si viteza)
- blocare acces la nivel de linie
- **nu** accepta index FULLTEXT
  - incepand cu MySql 5.6.4 este introdus index FULLTEXT
- **accepta** tranzactii
- **accepta** FOREIGN KEY
  - probleme mai putine la integritatea datelor prin constrangeri intre tabele

- **Memory**



# Metode de stocare

- MyISAM
- InnoDB
- **Memory**
  - metoda de stocare recomandata pentru tabele temporare
  - performanta maxima (viteza – datele sunt stocate in RAM)
    - la oprirea server-ului datele se pierd, tabelul este pastrat dar va fi fara nici o linie
  - nu accepta tipuri de date mari (BLOB, TEXT) – maxim 255 octeti
  - nu accepta index FULLTEXT
  - nu accepta tranzactii
  - nu accepta FOREIGN KEY
    - probleme relative la integritatea datelor

# Lim baj SQL

# Referinta relativa

- Referinta la elementele unei baze de date se face prin utilizarea numelui elementului respectiv daca nu exista dubii (referinta relativa)
  - daca baza de date este selectata se poate utiliza numele tabelului pentru a identifica un tabel
    - `USE db_name;`  
`SELECT * FROM tbl_name;`
  - daca tabelul este identificat in instructiune se poate utiliza numele coloanei pentru a identifica coloana implicata
    - `SELECT col_name FROM tbl_name;`

# Referinta absoluta

- In cazul in care apare ambiguitate in identificarea unui element se poate indica descendenta sa pâna la disparitia ambiguitatii
- Astfel, o anumita coloana, `col_name`, care apartine tabelului `tbl_name` din baza de date (schema) `db_name` poate fi identificata in functie de necesitati ca:
  - `col_name`
  - `tbl_name.col_name`
  - `db_name.tbl_name.col_name`

# Nume de identificatori permise

- Numele de identificatori pot avea o lungime de reprezentare de maxim 64 octeti cu exceptia Alias care poate avea o lungime de 255 octeti
- Nu sunt permise:
  - caracterul NULL (ASCII 0x00) sau 255 (0xFF)
  - caracterul "/"
  - caracterul "\"
  - caracterul "."
- Numele nu se pot termina cu caracterul spatiu

# Nume de identificatori permise

- Numele de baze de date nu pot contine decat caractere permise in numele de directoare
- Numele de tabele nu pot contine decat caractere permise in numele de fisiere
- Anumite caractere utilizate vor impune necesitatea trecerii intre apostroafe a numelui
- Apostroful utilizat pentru nume de identificatori e apostroful invers (**backtick**) “`”
  - pentru a nu aparea confuzie cu variabilele sir
  - nu necesita aparitia apostrofului caracterele alfanumerice normale, “\_”, “\$”
- numele rezervate trebuie de asemenea cuprinse intre apostroafe pentru a fi utilizate

# Alias

- Orice identificator poate primi un nume asociat
  - **Alias**
    - pentru a elimina ambiguitati
    - pentru a usura scrierea
    - pentru a modifica numele coloanelor in rezultate
- Definirea unui alias se face in interiorul unei interogari SQL si are efect in aceeasi interogare
  - `SELECT `t`.* FROM `tbl_name` AS t;`
  - `SELECT `t`.* FROM `tbl_name` t;`

# Alias

- Desi utilizarea cuvintului cheie AS nu este obligatorie, obisnuinta utilizarii lui este recomandata, pentru a evita/identifica alocari eronate
  - `SELECT id, nume FROM produse;` ← doua coloane
  - `SELECT id nume FROM produse;` ← Alias "nume" creat pentru coloana "id"



# Alias

- Usurinta scrierii
  - `SELECT * FROM un_tabel_cu_numelung AS t WHERE t.col1 = 5 AND t.col2 = 'ceva'`
- Modificarea numelui de coloana, sau crearea unui nume pentru o coloana calculata in rezultate
  - `SELECT CONCAT(numelung, " ",prenume) AS numelung_intreg FROM studenti AS s;`
  - `SELECT 'n1' AS 'Nume', 'n2' AS 'Nota', 'n3' AS 'Numar matricol' FROM elevi AS e;`

# Alias

- Eliminarea ambiguitatilor
  - intalnita frecvent la relatii "many to many"
  - `SELECT p.*, c.`nume` AS `nume_categ` FROM  
`produse` AS p  
LEFT JOIN `categorii` AS c ON (c.`id_categ` =  
p.`id_categ`);`
  - tabelele c si p contin ambele coloanele "nume" si "id\_categ"
    - modificarea denumirii coloanei "nume" din categorii pentru evitarea confuziei cu coloana "nume" din produse
    - eventual se pot da nume diferite coloanelor "id\_categ" pentru a evita ambiguitatea in interiorul clauzei ON (desi si referinta absoluta rezolva aceasta problema)

# Interrogari SQL

# Interogari

- Interogările SQL pot fi
  - Pentru definirea datelor, crearea programatica de baze de date, tabele, coloane etc.
    - mai puțin utilizate în majoritatea aplicațiilor
    - ALTER, CREATE, DROP, RENAME
  - Pentru manipularea datelor
    - SELECT, INSERT, UPDATE, REPLACE etc.
  - Pentru control/administrare tranzacții/server
- De cele mai multe ori aplicațiile doar manipulează datele. Structura este definită în avans de asemenea și administrarea este mai facilă cu programe specializate
- Următoarele definiții sunt cele valabile pentru **MySQL 5.0**

# ALTER DATABASE

- ALTER {DATABASE | SCHEMA} [db\_name] alter\_specification ...
  - alter\_specification:
    - [DEFAULT] CHARACTER SET [=] charset\_name
    - [DEFAULT] COLLATE [=] collation\_name
- Modifica caracteristicile generale ale unei baze de date
- E necesar dreptul de acces (privilegiu) ALTER asupra respectivei baze de date

# ALTER TABLE

- ALTER TABLE {table\_option [, table\_option] ... | partitioning\_specification}
  - table\_option:
    - ADD [COLUMN] col\_name column\_definition [FIRST | AFTER col\_name ]
    - ADD {INDEX|KEY} [index\_name] [index\_type] (index\_col\_name,...) [index\_option] ...
    - ADD [CONSTRAINT [symbol]] PRIMARY KEY [index\_type] (index\_col\_name,...) [index\_option] ...
    - CHANGE [COLUMN] old\_col\_name new\_col\_name column\_definition [FIRST|AFTER col\_name]
    - MODIFY [COLUMN] col\_name column\_definition [FIRST | AFTER col\_name]
    - DROP [COLUMN] col\_name
    - DROP PRIMARY KEY
    - DROP {INDEX|KEY} index\_name
    - DISABLE KEYS
    - ENABLE KEYS
    - RENAME [TO] new\_tbl\_name
- permite modificarea unui tabel existent

# CREATE DATABASE

- `CREATE {DATABASE | SCHEMA} [IF NOT EXISTS] db_name [create_specification...]`
  - `create_specification:`
    - `[DEFAULT] CHARACTER SET charset_name`
    - `[DEFAULT] COLLATE collation_name`
- Crearea unei noi baze de date
- Necesara la instalarea unei aplicatii
- Fisierele SQL "backup" contin succesiunea `DROP...`, `CREATE...` pentru a inlocui datele in intregime

# CREATE INDEX

- CREATE [UNIQUE|FULLTEXT|SPATIAL]  
INDEX index\_name [USING index\_type] ON  
tbl\_name (index\_col\_name,...)
  - index\_col\_name:
    - col\_name [(length)] [ASC | DESC]
- Crearea unui index se face de obicei la crearea tabelului
- Interogarea CREATE INDEX ... se transpune in interogare ALTER TABLE ...



# CREATE TABLE

- `CREATE [TEMPORARY] TABLE [IF NOT EXISTS] tbl_name [(create_definition,...)] [table_options] [select_statement]`
- `CREATE [TEMPORARY] TABLE [IF NOT EXISTS] tbl_name [( ) LIKE old_tbl_name ( )]`
- Interogarea de creare a tabelului este memorata intern de server-ul MySql pentru utilizari ulterioare (in general in `ALTER TABLE` sa fie cunoscute specificatiile initiale)

# CREATE TABLE

- create\_definition – coloana impreuna cu eventualele caracteristici (in special chei - indecsi):
  - column\_definition
    - | [CONSTRAINT [symbol]] PRIMARY KEY [index\_type] (index\_col\_name,...)
    - | KEY [index\_name] [index\_type] (index\_col\_name,...)
    - | INDEX [index\_name] [index\_type] (index\_col\_name,...)
    - | [CONSTRAINT [symbol]] UNIQUE [INDEX] [index\_name] [index\_type] (index\_col\_name,...)
    - | [FULLTEXT|SPATIAL] [INDEX] [index\_name] (index\_col\_name,...)
    - | [CONSTRAINT [symbol]] FOREIGN KEY [index\_name] (index\_col\_name,...) [reference\_definition]
    - | CHECK (expr)
- column\_definition – nume si tipul de date (curs 8):
  - col\_name type [NOT NULL | NULL] [DEFAULT default\_value] [AUTO\_INCREMENT] [UNIQUE [KEY] | [PRIMARY] KEY] [COMMENT 'string'] [reference\_definition]

# CREATE TABLE

- Exemple

- CREATE TABLE test (a INT NOT NULL AUTO\_INCREMENT, PRIMARY KEY (a), KEY(b)) SELECT b,c FROM test2;
- CREATE TABLE IF NOT EXISTS `schema`.`Employee` (  
`idEmployee` VARCHAR(45) NOT NULL,  
`Name` VARCHAR(255) NULL,  
`idAddresses` VARCHAR(45) NULL,  
PRIMARY KEY (`idEmployee`),  
CONSTRAINT `fkEmployee\_Addresses`  
FOREIGN KEY `fkEmployee\_Addresses` (`idAddresses`)  
REFERENCES `schema`.`Addresses` (`idAddresses`)  
ON DELETE NO ACTION  
ON UPDATE NO ACTION)  
ENGINE = InnoDB  
DEFAULT CHARACTER SET = utf8  
COLLATE = utf8\_bin

# CREATE TABLE

- `CREATE ... LIKE ...` creaza un tabel fara date pe baza modelului unui tabel existent. Se pastreaza definitiile coloanelor si eventualele chei (index) definite in tabelul anterior
- `CREATE ... SELECT ...` creaza un tabel cu date pe baza modelului si datelor obtinute dintr-un alt tabel existent. Sunt obtinute anumite coloane (`SELECT`) cu tipul lor, dar fara crearea indecsilor
- `CREATE TEMPORARY TABLE` creaza un tabel temporar. Utilizat in cazul interogarilor complexe sau cu numar mare de rezultate

# DROP

- DROP {DATABASE | SCHEMA} [IF EXISTS]  
db\_name
- DROP INDEX index\_name ON tbl\_name
- DROP [TEMPORARY] TABLE [IF EXISTS]  
tbl\_name [, tbl\_name] ...
- Trebuie utilizate cu foarte mare atentie aceste interogari, stergerea datelor este ireversibila
- Fisierile SQL "backup" contin succesiunea DROP..., CREATE... pentru a inlocui datele in intregime

# Interrogari SQL

# Interogari

- Interogările SQL pot fi
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    - mai putin utilizate in majoritatea aplicatiilor
    - ALTER, CREATE, DROP, RENAME
  - **Pentru manipularea datelor**
    - SELECT, INSERT, UPDATE, REPLACE, DELETE etc.
  - Pentru control/administrare tranzactii/server
- De cele mai multe ori aplicatiile doar manipuleaza datele. Structura este definita in avans de asemenea si administrarea este mai facila cu programe specializate
- Urmatoarele definitii sunt cele valabile pentru **MySql 5.0**

# DELETE

- `DELETE [LOW_PRIORITY] [QUICK] [IGNORE]`  
`FROM table_name [WHERE where_condition]`  
`[ORDER BY ...] [LIMIT row_count]`
- Sterge linii din tabelul mentionat si returneaza  
numarul de linii sterse
- `[LOW_PRIORITY] [QUICK] [IGNORE]` sunt  
optiuni care instruiesc server-ul sa reactioneze  
diferit de varianta standard
- Exemplu:
  - `DELETE FROM somelog WHERE user = 'jcole'`  
`ORDER BY timestamp_column LIMIT 1;`



# DELETE

- [WHERE where\_condition] – folosit pentru a selecta liniile care trebuie sterse
  - In absenta conditiei se sterg **toate liniile** din tabel
- [LIMIT row\_count] sterge numai *row\_count* linii dupa care se opreste
  - In general pentru a limita ocuparea server-ului (recrearea indecsilor se face “on the fly”)
  - Operatia se poate repeta pana valoarea returnata e mai mica decat row\_count
- [ORDER BY ...] precizeaza ordinea in care se sterg liniile identificate prin conditie

# INSERT

- INSERT [LOW\_PRIORITY | DELAYED | HIGH\_PRIORITY] [IGNORE] [INTO] tbl\_name [(col\_name,...)] VALUES ({expr | DEFAULT},...),(...),... [ON DUPLICATE KEY UPDATE col\_name=expr, ... ]
- INSERT [LOW\_PRIORITY | DELAYED | HIGH\_PRIORITY] [IGNORE] [INTO] tbl\_name SET col\_name={expr | DEFAULT}, ... [ON DUPLICATE KEY UPDATE col\_name=expr, ... ]
- INSERT [LOW\_PRIORITY | HIGH\_PRIORITY] [IGNORE] [INTO] tbl\_name [(col\_name,...)] SELECT ... [ ON DUPLICATE KEY UPDATE col\_name=expr, ... ]

# INSERT

- Introduce linii noi intr-un tabel
- Primele doua forme introduc valori exprimate explicit
  - INSERT ... VALUES ...
  - INSERT ... SET ...
- INSERT ... SELECT ... introduce valori rezultate obtinute printr-o interogare SQL
- DELAYED – interogarea primeste raspuns de la server imediat, dar inserarea datelor se face efectiv cand tabelul implicat nu este folosit
  - valabil pentru metodele de stocare MyISAM, Memory, Archive

# INSERT

## ■ Exemple

- `INSERT INTO tbl_name (a,b,c) VALUES (1,2,3), (4,5,6), (7,8,9);`
- `INSERT INTO tbl_name (col1,col2) VALUES (15,col1*2);`
- `INSERT INTO table1 (field1,field3,field9) SELECT field3,field1,field4 FROM table2;`

# INSERT

- INSERT ... ON DUPLICATE KEY UPDATE ...
- Daca inserarea unei noi linii ar conduce la duplicarea unei chei primare sau unice, in loc sa se introduca o noua linie se modifica linia anterioara
- Exemple
  - INSERT INTO table (a,b,c) VALUES (1,2,3) ON DUPLICATE KEY UPDATE c=c+1;
  - INSERT INTO table (a,b,c) VALUES (1,2,3),(4,5,6) ON DUPLICATE KEY UPDATE c=VALUES(a)+VALUES(b);

# REPLACE

- REPLACE [LOW\_PRIORITY | DELAYED] [INTO] tbl\_name [(col\_name,...)] VALUES ({expr | DEFAULT},...),(...),...
- REPLACE [LOW\_PRIORITY | DELAYED] [INTO] tbl\_name SET col\_name={expr | DEFAULT}, ...
- REPLACE [LOW\_PRIORITY | DELAYED] [INTO] tbl\_name [(col\_name,...)] SELECT ...
- REPLACE functioneaza similar cu INSERT
  - daca noua linie nu realizeaza duplicarea unei chei primare sau unice se realizeaza insertie
  - daca noua linie realizeaza duplicarea unei chei primare sau unice se sterge linia anterioara dupa care se insereaza noua linie
- REPLACE e extensie MySql a limbajului SQL standard

# UPDATE

- UPDATE [LOW\_PRIORITY] [IGNORE] tbl\_name SET col\_name1=expr1 [, col\_name2=expr2 ...] [WHERE where\_condition] [ORDER BY ...] [LIMIT row\_count]
- Modificarea valorilor stocate intr-o linie
- Exemple
  - UPDATE persondata SET age=15 WHERE id=6;
  - UPDATE persondata SET age=age+1;

# SELECT

- SELECT [ALL | DISTINCT | DISTINCTROW ]  
[HIGH\_PRIORITY] [STRAIGHT\_JOIN]  
select\_expr, ... [FROM table\_references
  - [WHERE where\_condition]
  - [GROUP BY {col\_name | expr | position} [ASC | DESC],  
... [WITH ROLLUP]]
  - [HAVING where\_condition]
  - [ORDER BY {col\_name | expr | position} [ASC | DESC],  
...]
  - [LIMIT {[offset,] row\_count | row\_count OFFSET  
offset}]
- ]



# SELECT

- SELECT este **cea mai importanta** interogare SQL.
- Intelegerea setarilor si utilizarea inteligenta a indecsilor stau la baza eficientei unei aplicatii
- E absolut necesara realizarea interogarii in asa fel incat datele returnate sa fie exact cele dorite (prelucrarea sa se realizeze pe server-ul MySql)

# SELECT

- select\_expr: macar o expresie selectata trebuie sa apara
  - identifica ceea ce trebuie extras ca valori de iesire din baza de date
  - pot fi nume de coloana(e)
  - pot fi date de sinteza (rezultate din utilizarea unor functii MySql) – necesara atribuirea unui Alias
    - `SELECT CONCAT(last_name,', ',first_name) AS full_name FROM mytable ORDER BY full_name;`

# SELECT

- WHERE where\_condition, HAVING where\_condition sunt utilizate pentru a introduce criterii de selectie
  - in general au comportare similara si sunt interschimbabile
  - WHERE accepta orice operatori mai putin functii aggregate – de “sumare” (COUNT, MAX)
  - HAVING accepta functii aggregate, dar se aplica la sfarsit, exact inainte de a fi trimise datele clientului, **fara nici o optimizare** – utilizarea este recomandata doar cand nu exista echivalent WHERE

# SELECT

- ORDER BY {col\_name | expr | position} [ASC | DESC]
  - ordoneaza datele returnate dupa anumite criterii (valoarea unei anumite coloane sau functii).
    - Implicit ordonarea este crescatoare ASC, dar se poate specifica ordine descrescatoare DESC
- GROUP BY {col\_name | expr | position}
  - realizeaza gruparea liniilor returnate dupa anumite criterii
  - permite utilizarea functiilor aggregate (de sumare)

# SELECT

- GROUP BY – functii aggregate
  - AVG(expresie) – mediere valorilor
    - SELECT student\_name, AVG(test\_score) FROM student GROUP BY student\_name;
  - COUNT(expresie), COUNT(\*)
    - SELECT COUNT(\*) FROM student;
    - SELECT COUNT(DISTINCT results) FROM student;
    - SELECT student.student\_name, COUNT(\*) FROM student, course WHERE student.student\_id=course.student\_id GROUP BY student\_name;
    - SELECT columnname, COUNT(columnname) FROM tablename GROUP BY columnname HAVING COUNT(columnname)>1
- Cuvantul cheie DISTINCT este utilizat pentru a procesa doar liniile cu valori diferite
  - exemplu: 100 de note (rezultate) la examen
    - COUNT(results) va oferi raspunsul 100
    - COUNT(DISTINCT results) va oferi raspunsul 7 (notele diferite 4,5,6,7,8,9,10)

# SELECT

- GROUP BY – functii aggregate
  - MIN(expresie), MAX(expresie) – minim si maxim
    - SELECT student\_name, MIN(test\_score), MAX(test\_score) FROM student GROUP BY student\_name;
  - SUM(expresie) – sumarea valorilor
    - SELECT year, SUM(profit) FROM sales GROUP BY year;
- WITH ROLLUP – operatii de sumare super-aggregate (un nivel suplimentar de agregare)

# SELECT ... WITH ROLLUP

- `SELECT year, SUM(profit) FROM sales GROUP BY year;`
- `SELECT year, SUM(profit) FROM sales GROUP BY year WITH ROLLUP;`
  - se obtine un total general, linia "super-aggregate" este identificata dupa valoarea NULL a coloanei dupa care se face sumarea

year	SUM(profit)
2000	4525
2001	3010

year	SUM(profit)
2000	4525
2001	3010
NULL	7535

# SELECT

- LIMIT [offset,] row\_count | row\_count
  - se limiteaza numarul de linii returnate
  - utilizat frecvent in aplicatiile web
  - LIMIT 15 – returneaza doar primele 15 linii (1÷15)
  - LIMIT 10,15 – returneaza 15 linii dupa primele 10 linii (11÷25)



# JOIN

- Normalizarea si existenta relatiilor intre diversele tabele ale unei baze de date implica faptul ca pentru aflarea unor informatii utilizabile (complete), acestea trebuie extrase **simultan** din mai multe tabele
  - informatie inutilizabila: studentul cu id-ul 253 a luat nota 8 la examenul cu id-ul 35
- Uneori asamblarea informatiilor din mai multe tabele e necesara pentru obtinerea unor rapoarte complexe
  - Exemplu: tabel cu clienti, tabel cu comenzi, tabel cu produse; legatura produse-comenzi e implementata printr-un tabel suplimentar. Raspunsul la intrebarea cate produse x a cumparat clientul y cere tratarea unitara a celor 4 tabele implicate

# JOIN

- In general in SQL se poate descrie o astfel de unificare de date intre doua tabele:
  - `left_table JOIN_type right_table criteriu_unificare`
- JOIN\_type
  - JOIN – selecteaza toate liniile compuse in care criteriul este indeplinit pentru ambele tabele
  - LEFT JOIN – compune si selecteaza toate liniile din `left_table` chiar daca nu este gasit un corespondent in `right_table`
  - RIGHT JOIN – compune si selecteaza toate liniile din `right table` (similar)
  - FULL JOIN – compune si selecteaza toate liniile din `left_table` si `right_table` fie ca este indeplinit criteriul fie ca nu (nu este implementat in MySql, poate fi simulat)

# JOIN

- Clauza JOIN e utilizata pentru a realiza o unificare temporara, dupa anumite criterii, din punct de vedere logic, a doua tabele in vederea extragerii informatiei "suma" dorite
  - left\_table [INNER | CROSS] JOIN right\_table [join\_condition]
  - left\_table STRAIGHT\_JOIN right\_table
  - left\_table STRAIGHT\_JOIN right\_table ON condition
  - left\_table LEFT [OUTER] JOIN right\_table join\_condition
  - left\_table NATURAL [LEFT [OUTER]] JOIN right\_table
  - left\_table RIGHT [OUTER] JOIN right\_table join\_condition
  - left\_table NATURAL [RIGHT [OUTER]] JOIN right\_table
  - join\_condition: ON conditional\_expr | USING (column\_list)

# JOIN – Exemplu

- Tabel clienti
  - 4 clienti
- Tabel comenzi
  - client 1 – 2 comenzi
  - client 2 – 0 comenzi
  - client 3,4 – 1 comanda

```
CREATE TABLE `clienti` (  
  `id_client` int(10) unsigned NOT NULL auto_increment,  
  `nume` varchar(100) NOT NULL,  
  PRIMARY KEY (`id_client`)  
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

```
INSERT INTO `clienti` (`id_client`,`nume`) VALUES  
(1,'Ionescu'),  
(2,'Popescu'),  
(3,'Vasilescu'),  
(4,'Georgescu');
```

```
CREATE TABLE `comenzi` (  
  `id_comanda` int(10) unsigned NOT NULL auto_increment,  
  `id_client` int(10) unsigned NOT NULL,  
  `suma` double NOT NULL,  
  PRIMARY KEY (`id_comanda`)  
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

```
INSERT INTO `comenzi` (`id_comanda`,`id_client`,`suma`) VALUES  
(1,1,19.99),  
(2,1,35.15),  
(3,3,17.56),  
(4,4,12.34);
```

# INNER JOIN

- INNER JOIN sunt unificarile implicite, in care criteriul (join\_condition) trebuie indeplinit in ambele tabele (extensie a cuvintului cheie JOIN pentru evitarea ambiguitatii)
  - OUTER JOIN = {LEFT JOIN | RIGHT JOIN | FULL JOIN} – nu e obligatoriu sa fie indeplinit criteriul in ambele tabele
  - FULL JOIN nu e implementat in MySql, poate fi simulat ca UNION intre LEFT JOIN si RIGHT JOIN
- INNER JOIN sunt echivalente cu realizarea produsului cartezian intre cele doua tabele implicate urmata de verificarea criteriului, daca acesta exista

# CROSS JOIN

- In MySql INNER JOIN si CROSS JOIN sunt echivalente in totalitate
  - In SQL standard INNER este folosit in prezenta unui criteriu, CROSS in absenta sa
- INNER (CROSS) JOIN si “,” sunt echivalente cu produsul cartezian intre cele doua tabele implicate in conditiile lipsei criteriului de selectie: fiecare linie a unui tabel este alaturata fiecărei linii din al doilea tabel
  - (un tabel cu M linii si A coloane) CROSS JOIN (un tabel cu N linii si B coloane) → (un tabel cu  $M \times N$  linii si  $A+B$  coloane)

# CROSS JOIN

## SQL Query Area

```
1 SELECT * FROM clienti JOIN comenzi;  
2 SELECT * FROM clienti, comenzi;  
3 SELECT * FROM clienti INNER JOIN comenzi;  
4 SELECT * FROM clienti CROSS JOIN comenzi;
```

id_client	nume	id_comanda	id_client	suma
1	Ionescu	1	1	19.99
2	Popescu	1	1	19.99
3	Vasilescu	1	1	19.99
4	Georgescu	1	1	19.99
1	Ionescu	2	1	35.15
2	Popescu	2	1	35.15
3	Vasilescu	2	1	35.15
4	Georgescu	2	1	35.15
1	Ionescu	3	3	17.56
2	Popescu	3	3	17.56
3	Vasilescu	3	3	17.56
4	Georgescu	3	3	17.56
1	Ionescu	4	4	12.34
2	Popescu	4	4	12.34
3	Vasilescu	4	4	12.34
4	Georgescu	4	4	12.34

# INNER JOIN – criterii

- USING – trebuie sa aiba o coloana cu nume identic in cele doua tabele
  - coloana comuna este afisata o singura data
- ON – accepta orice conditie conditionala
  - chiar daca numele coloanelor din conditie sunt identice, sunt tratate ca entitati diferite (id\_client apare de doua ori provenind din cele doua tabele)

SQL Query Area				
1 SELECT * FROM clienti INNER JOIN comenzi USING (id_client);				
id_client	nume	id_comanda	suma	
1	Ionescu	1	19.99	
1	Ionescu	2	35.15	
3	Vasilescu	3	17.56	
4	Georgescu	4	12.34	

1 SELECT * FROM clienti INNER JOIN comenzi ON (clienti.id_client=comenzi.id_client);				
id_client	nume	id_comanda	id_client	suma
1	Ionescu	1	1	19.99
1	Ionescu	2	1	35.15
3	Vasilescu	3	3	17.56
4	Georgescu	4	4	12.34



# NATURAL JOIN

- NATURAL JOIN e echivalent cu o unificare INNER JOIN cu o clauza USING(...) care utilizeaza toate coloanele cu nume comun intre cele doua tabele

SQL Query Area				
1	<code>SELECT * FROM clienti NATURAL JOIN comenzi;</code>			
?	id_client	nume	id_comanda	suma
	1	Ionescu	1	19.99
	1	Ionescu	2	35.15
	3	Vasilescu	3	17.56
	4	Georgescu	4	12.34

# LEFT JOIN

- Unificare de tip OUTER JOIN
- Se returneaza linia din left\_table chiar daca nu exista corespondent in right\_table (se introduc valori NULL)
- Cuvantul cheie OUTER este optional

SQL Query Area			
1	SELECT * FROM clienti LEFT OUTER JOIN comenzi USING(id_client);		
id_client	nume	id_comanda	suma
1	Ionescu	1	19.99
1	Ionescu	2	35.15
2	Popescu	NULL	NULL
3	Vasilescu	3	17.56
4	Georgescu	4	12.34

# RIGHT JOIN

- Unificare de tip OUTER JOIN
- Se returneaza linia din right\_table chiar daca nu exista corespondent in left\_table
- Echivalent cu LEFT JOIN cu tabelele scrise in ordine inversa

SQL Query Area			
1 SELECT * FROM clienti RIGHT OUTER JOIN comenzi USING(id_client);			
id_client	id_comanda	suma	nume
1	1	19.99	Ionescu
1	2	35.15	Ionescu
3	3	17.56	Vasilescu
4	4	12.34	Georgescu

SQL Query Area			
1 SELECT * FROM comenzi RIGHT OUTER JOIN clienti USING(id_client);			
id_client	nume	id_comanda	suma
1	Ionescu	1	19.99
1	Ionescu	2	35.15
2	Popescu	NULL	NULL
3	Vasilescu	3	17.56
4	Georgescu	4	12.34

# JOIN

- `STRAIGHT_JOIN` – forteaza citirea mai intai a valorilor din `left_table` si apoi a celor din `right_table` (in anumite cazuri citirea se realizeaza invers)
- `USE_INDEX`, `IGNORE_INDEX`, `FORCE_INDEX` controlul index-ului utilizat pentru gasirea si selectia liniilor, poate aduce spor de viteza

# UNION

- Combina rezultatele mai multor interogari SELECT intr-un singur rezultat general
- SELECT ... UNION [ALL | DISTINCT]  
SELECT ... [UNION [ALL | DISTINCT]  
SELECT ...]
- Poate fi folosit pentru a realiza FULL JOIN

SQL Query Area				
1	SELECT	*	FROM	comenzi LEFT JOIN clienti ON (comenzi.id_client=clienti.id_client)
2	UNION			
3	SELECT	*	FROM	comenzi RIGHT JOIN clienti ON (comenzi.id_client=clienti.id_client)
4	WHERE	comenzi.id_client	IS	NULL

id_comanda	id_client	suma	id_client	nume
1	1	19.99	1	Ionescu
2	1	35.15	1	Ionescu
3	3	17.56	3	Vasilescu
4	4	12.34	4	Georgescu
NULL	NULL	NULL	2	Popescu

# Subquery

- O “subinterogare” este o interogare de tip SELECT utilizata ca operand intr-o alta interogare
- O “subinterogare” poate fi privit ca un tabel temporar si tratat ca atare (inclusiv cu JOIN) eventual cu atribuire de nume (Alias) daca este nevoie
- Exemple
  - `SELECT * FROM t1 WHERE column1 = (SELECT column1 FROM t2);`

# Subquery

- Subquery – un instrument foarte puternic
- permite selectii in doua sau mai multe etape
  - o prima selectie **dupa un criteriu**
  - urmata de o doua selectie **dupa un alt criteriu** in **rezultatele primei selectii**
  - ... samd
- Exista restrictii asupra tabelelor implicate pentru evitarea prelucrarilor recursive (bucle potential infinite)
  - ex: UPDATE tabel1 SET ... SELECT ... FROM tabel1 nu este permis

# Subquery

- Subquery – un instrument foarte puternic
- Permite evitarea multor prelucrari PHP si trimiterea lor spre server-ul MySql
  - `INSERT INTO tabel1 ... SELECT ... FROM tabel2` permite inserarea printr-o singura interogare a mai multor linii in tabel1 (in functie de numarul de linii rezultate din tabel2)



# Laborator 2 / 2011-2012

- Se recomanda aplicarea exercitiilor din laboratorul 2 / 2011-2012, pentru exemple de interogari, JOIN, subquery, JOIN cu subquery

MySQL – Server Windows 2000

# **Mini – Indrumar practic**

## **Lucru cu bazele de date**

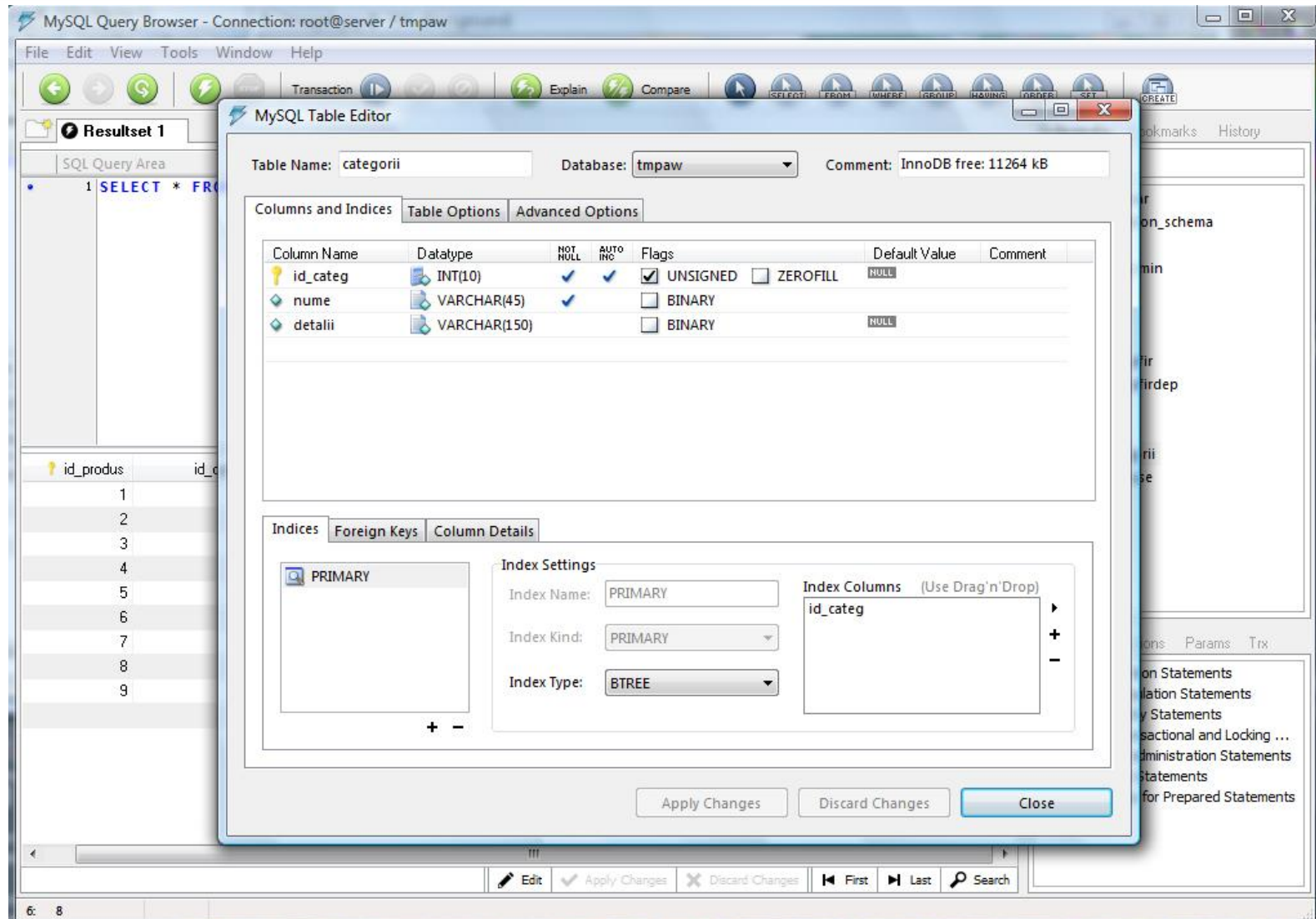
# Realizarea bazei de date

- Se recomanda utilizarea utilitarului **MySQL Query Browser** sau un altul echivalent pentru crearea scheletului de baza de date (detalii – laborator 1)
- Se initializeaza aplicatia cu drepturi depline (“root” si parola)
  - se creaza o noua baza de date:
    - in lista “Schemata” – Right click – Create New Schema
  - se activeaza ca baza de date curenta noua “schema” – Dublu click pe numele ales

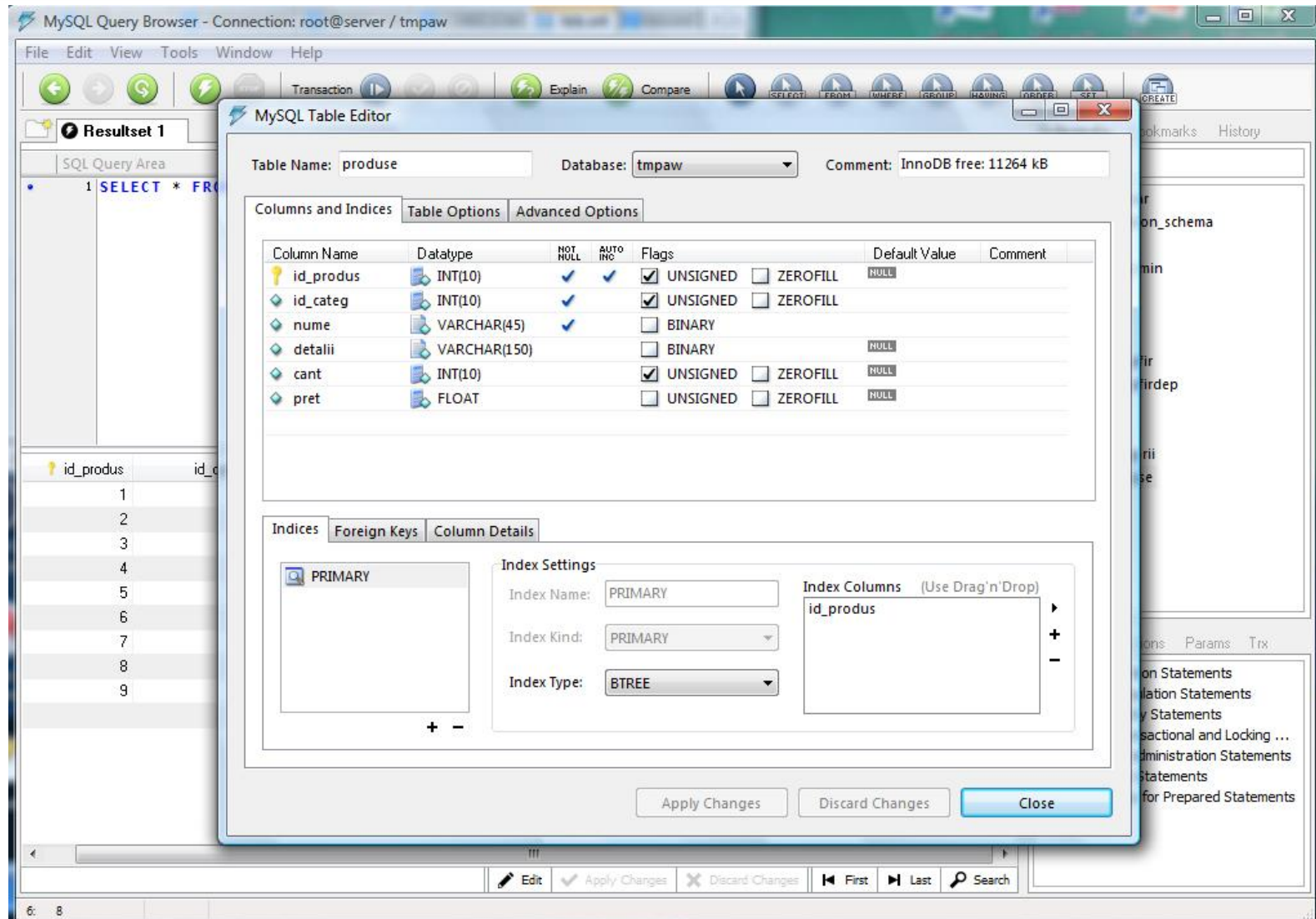
# Introducere tabele

- Introducere tabel – Click dreapta pe numele bazei de date aleasa – Create New Table
- se defineste structura tabelului
  - nume coloane
  - tip de date
  - NOT NULL – daca se accepta ca acea coloana sa ramana fara date (NULL) sau nu
  - AUTOINC – daca acea coloana va fi de tip intreg si va fi incrementata automat de server (util pentru crearea cheilor primare)
  - Default value – valoarea implicita care va fi inserata daca la introducerea unei linii noi nu se mentioneaza valoare pentru acea coloana (legat de optiunea NOT NULL)


# Tabel Categorii

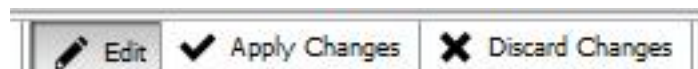


# Tabel Prognose



# Introducere date initiale

- Dublu click pe tabel → In zona "SQL Query Area" se completeaza interogarea de selectie totala
  - `SELECT * FROM produse p;`
- Executia interogarii SQL
  - Meniu → Query → Execute
  - Bara de butoane 
- Lista rezultata
  - initial vida
  - poate fi editata – butoanele "Edit", "Apply Changes", "Discard Changes" din partea de jos a listei



# Introdúcere date initiale

MySQL Query Browser - Connection: root@server / tmpaw

File Edit View Query Script Tools Window Help

Transaction Explain Compare

Resultset 1

SQL Query Area

```
1 SELECT * FROM produse p;
```

id_produs	id_categ	nume	detalii	cant	pret
1	1	carte	mai multe pagini scrise legate	0	100
2	1	caiet	mai multe pagini goale legate	0	75
3	1	hartie scris	mai multe pagini goale NElegate	0	50
4	2	penar	loc de depozitat instrumente de scris	0	150
5	2	stilou	instrument de scris albastru	0	125
6	2	creion	instrument de scris gri	0	25
ALL	3	cd	canta	0	50
ALL	3	dvd	vizual	0	100
ALL	3	blue ray	vizual extrem	0	500

Schemata Bookmarks History

tmpaw

- categoria
- produse
- world

Syntax Functions Params Trx

- Data Definition Statements
- Data Manipulation Statements
- MySQL Utility Statements
- MySQL Transactional and Locking ...
- Database Administration Statements
- Replication Statements
- SQL Syntax for Prepared Statements

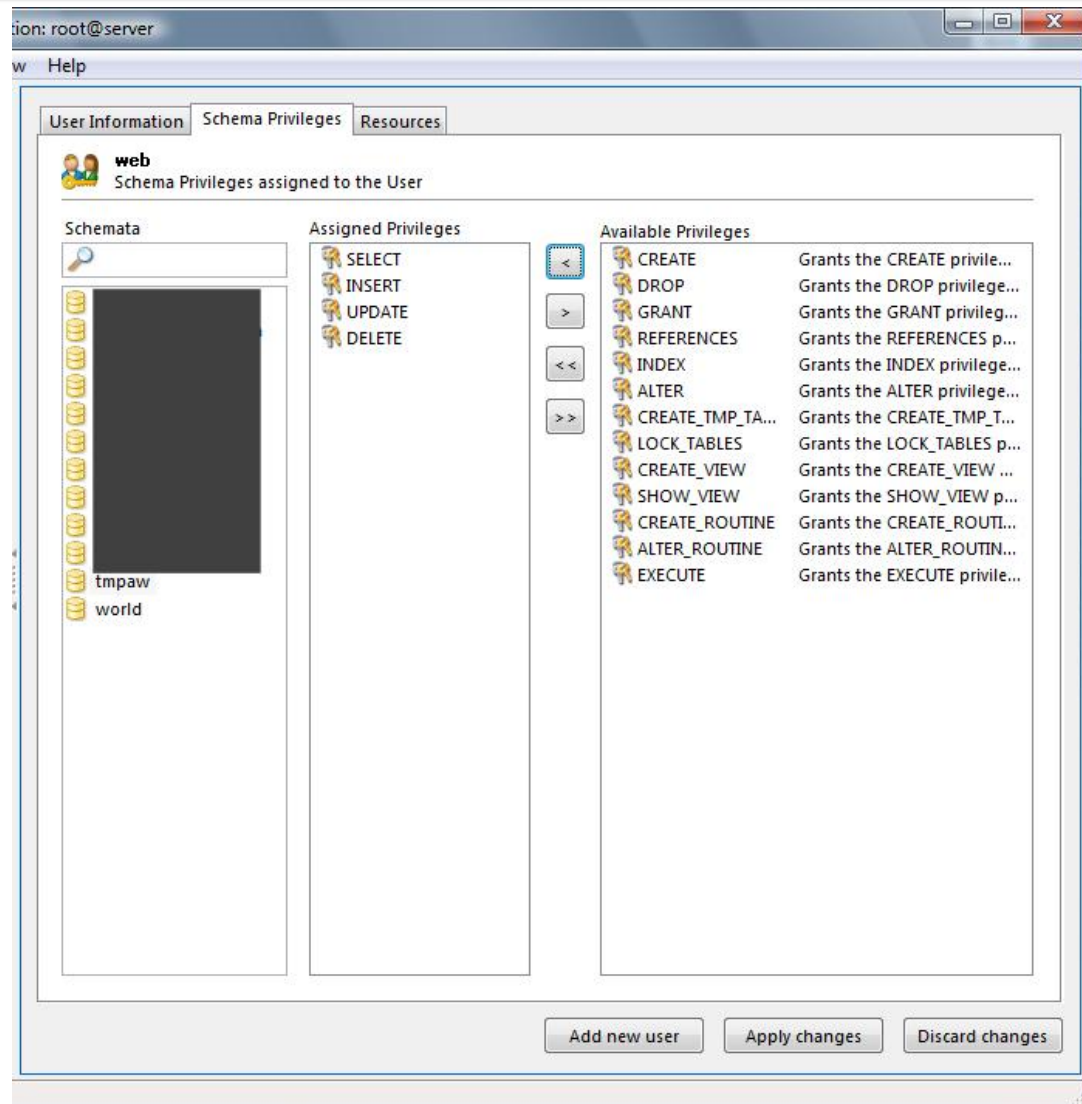
Edit Apply Changes Discard Changes First Last Search



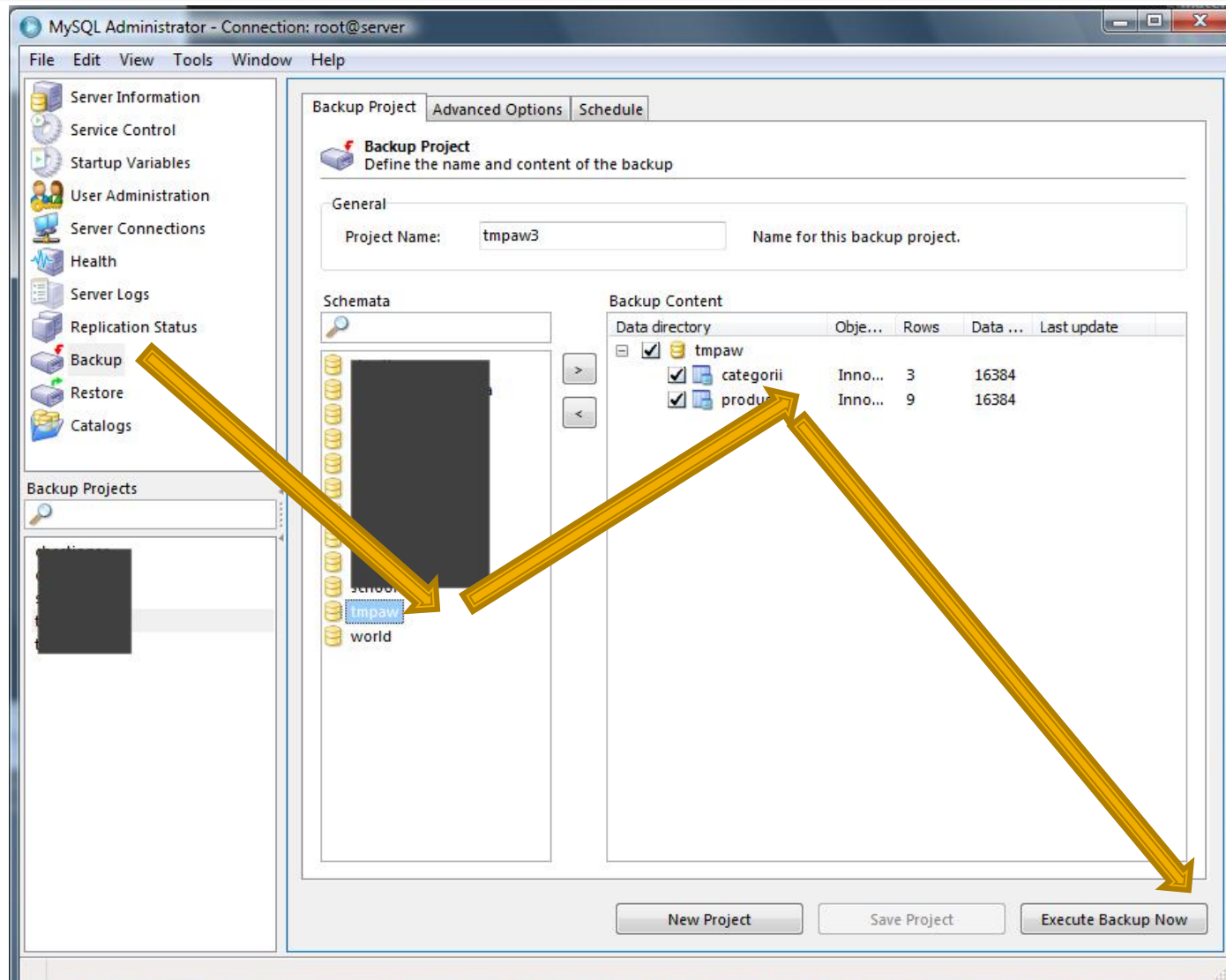
# Backup, Restore, drepturi de acces

- Se recomanda utilizarea utilitarului **MySQL Administrator** sau un altul echivalent (detalii – laborator 1)
- Se initializeaza aplicatia cu drepturi depline ("root" si parola)
- Se creaza un utilizator limitat (detalii – laborator 1)
- Se alocă drepturile "SELECT" + "INSERT" + "UPDATE" asupra bazei de date create (sau mai multe daca aplicatia o cere)


# Drepturi de acces



# Backup



# Restaurarea bazei de date

- Din **MySql Administrator**
  - Sectiunea Restore → “Open Backup File”
- Din **MySql Query Browser**
  - Meniu → File → Open Script
  - Executie script SQL
    - Meniu → Script → Execute
    - Bara de butoane 
- Scriptul SQL rezultat contine comenzile/interogariile SQL necesare pentru crearea bazei de date si popularea ei cu date

# Script SQL Backup - utilitate

- Poate fi folosit ca un model extrem de bun pentru comenzile necesare pentru crearea programatica (din PHP de exemplu) a bazei de date

```
CREATE DATABASE IF NOT EXISTS tmpaw;  
USE tmpaw;  
  
DROP TABLE IF EXISTS `categorii`;  
CREATE TABLE `categorii` (  
  `id_categ` int(10) unsigned NOT NULL auto_increment,  
  `nume` varchar(45) NOT NULL,  
  `detalii` varchar(150) default NULL,  
  PRIMARY KEY (`id_categ`)  
) ENGINE=InnoDB DEFAULT CHARSET=latin1;  
  
INSERT INTO `categorii` (`id_categ`,`nume`,`detalii`) VALUES  
(1,'papetarie',NULL),  
(2,'instrumente',NULL),  
(3,'audio-video',NULL);
```

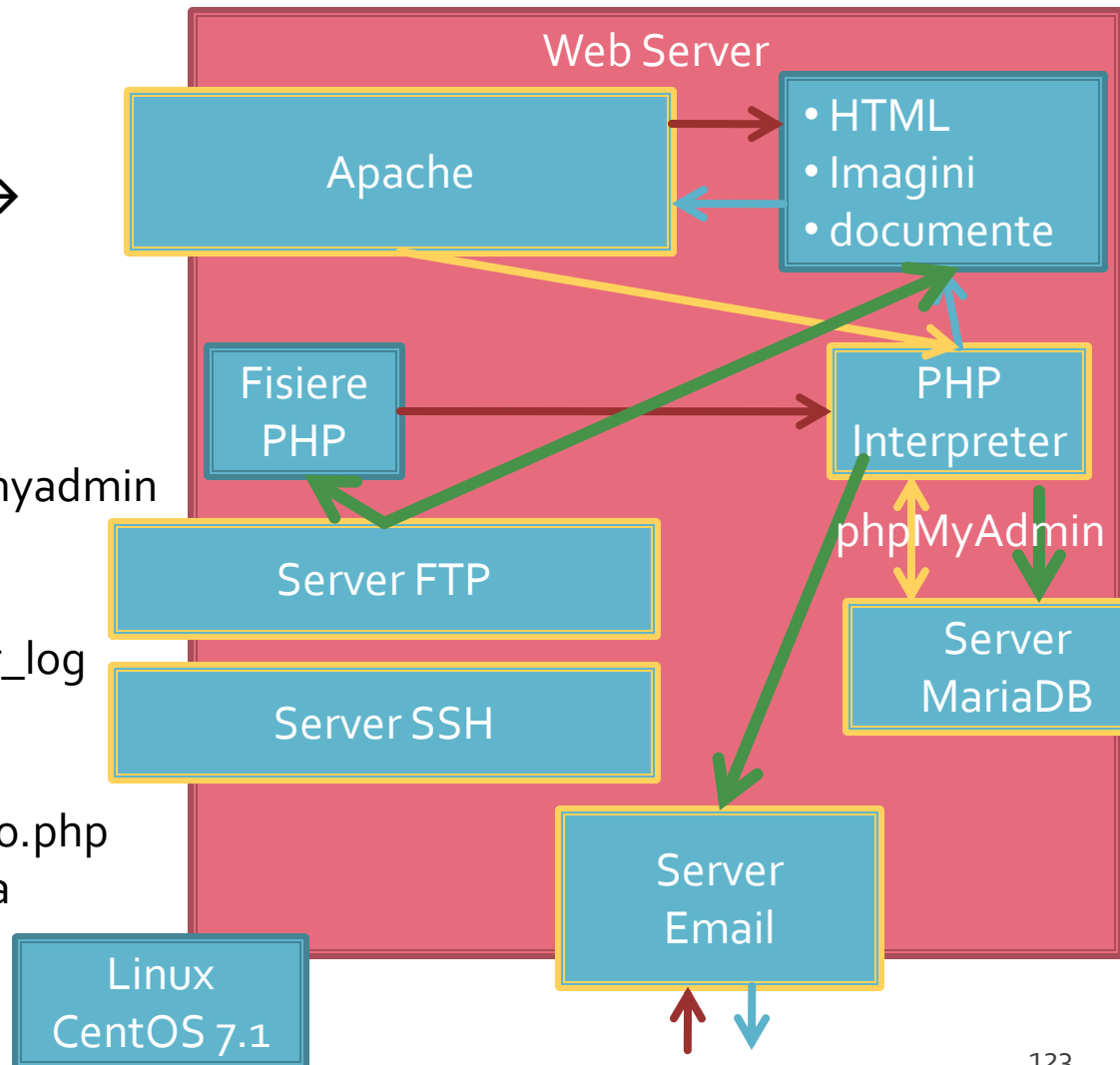
MySQL – Server Centos 7.1

# Mini – Indrumar practic

## Lucru cu bazele de date

# Utilizare LAMP

1. login → root:masterc
2. ifconfig → 192.168.30.5
3. putty.exe → 192.168.30.5 → SSH → root:masterc (remote login)
4. [alte comenzi linux dorite]
5. FTP → Winscp → SFTP → student:masterc@192.168.30.5
6. MySql → http://192.168.30.5/phpmyadmin → root:masterc
7. Apache Error Log →
  - 7a. putty → nano /var/log/httpd/error\_log
  - 7b. http://192.168.30.5/logfile.php (nonstandard)
8. PHP info → http://192.168.30.5/info.php
9. daca serviciul DHCP duce la oprirea Apache: service httpd restart



# PhpMyAdmin

- <http://192.168.30.5/phpmyadmin>
  - root
  - parola administrator **MySQL/MariaDB** (masterrc)





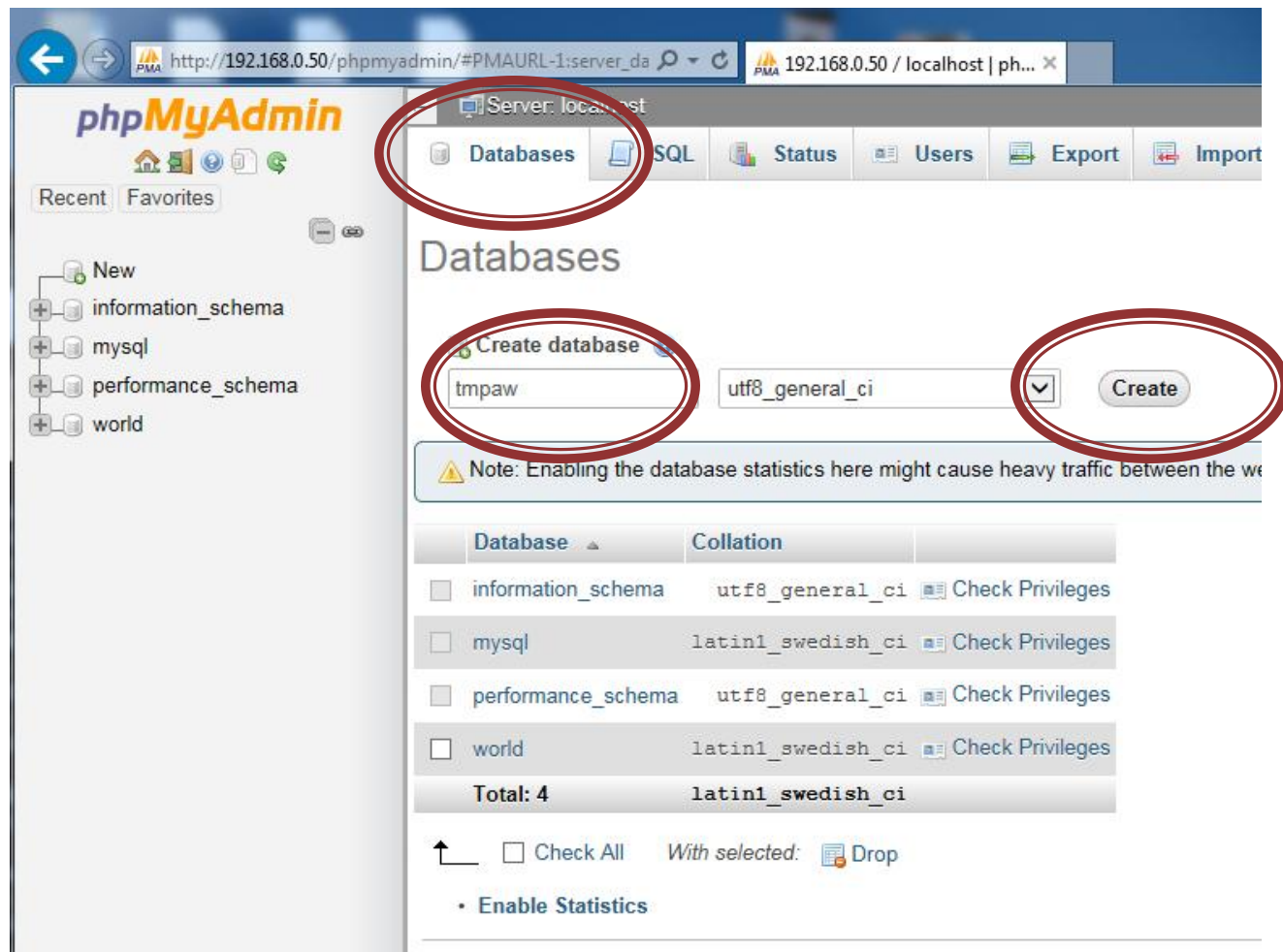
# PhpMyAdmin

The screenshot displays the PhpMyAdmin web interface in a browser window. The address bar shows the URL `http://192.168.0.50/phpmyadmin/#PMAURL-0:index.php`. The interface includes a top navigation bar with tabs for Databases, SQL, Status, Users, Export, Import, Settings, Replication, Variables, Charsets, and Engines. The left sidebar shows a tree view of databases: information\_schema, mysql, performance\_schema, and world. The main content area is divided into several panels:

- General Settings:** Includes a "Change password" link and a "Server connection collation" dropdown set to "utf8mb4\_unicode\_ci".
- Appearance Settings:** Includes a "Language" dropdown set to "English", a "Theme" dropdown set to "pmahomme", and a "Font size" dropdown set to "82%". A "More settings" link is also present.
- Database server:** Lists server details:
  - Server: Localhost via UNIX socket
  - Server type: MariaDB
  - Server version: 5.5.44-MariaDB - MariaDB Server
  - Protocol version: 10
  - User: root@localhost
  - Server charset: UTF-8 Unicode (utf8)
- Web server:** Lists web server details:
  - Apache/2.4.6 (CentOS) OpenSSL/1.0.1e-fips mod\_fcgid/2.3.9
  - PHP/5.4.16 mod\_python/3.5.0- Python/2.7.5
  - Database client version: libmysql - 5.5.44-MariaDB
  - PHP extension: mysqli
  - PHP version: 5.4.16
- phpMyAdmin:** Lists version information and links:
  - Version information: 4.4.15.1
  - Documentation
  - Wiki
  - Official Homepage
  - Contribute
  - Get support
  - List of changes

# Creare Baza de Date

- Databases → "nume" → Create



The screenshot shows the phpMyAdmin web interface. The 'Databases' tab is selected and circled in red. Below it, the 'Create database' form is visible, with the database name 'tmpaw' entered in the text field, 'utf8\_general\_ci' selected in the collation dropdown, and the 'Create' button circled in red. A list of existing databases is shown below the form, including 'information\_schema', 'mysql', 'performance\_schema', and 'world'. The interface also includes a left sidebar with a tree view of databases and a top navigation bar with various tools like SQL, Status, Users, Export, and Import.

phpMyAdmin

Server: localhost

Databases SQL Status Users Export Import

Databases

Create database

tmpaw utf8\_general\_ci [v] Create

Note: Enabling the database statistics here might cause heavy traffic between the we

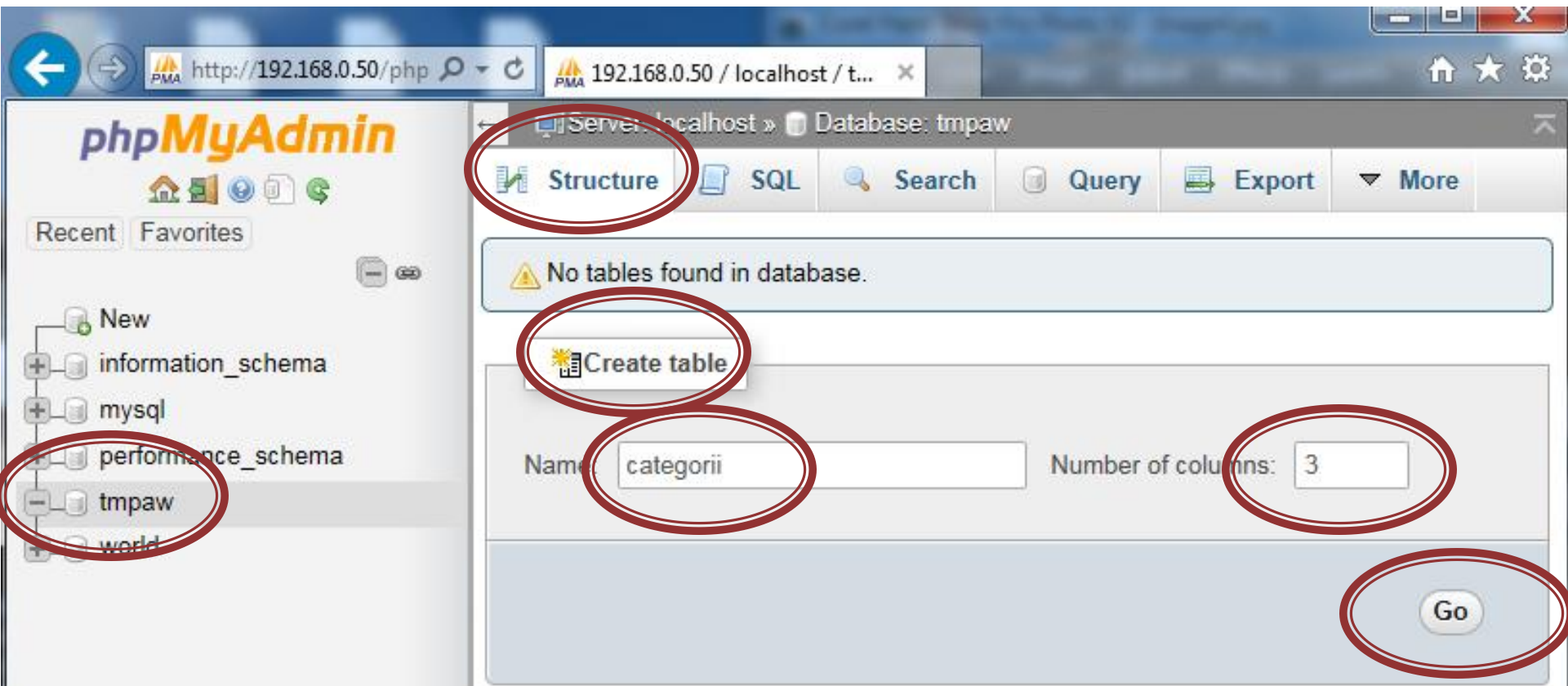
Database	Collation	
<input type="checkbox"/> information_schema	utf8_general_ci	<a href="#">Check Privileges</a>
<input type="checkbox"/> mysql	latin1_swedish_ci	<a href="#">Check Privileges</a>
<input type="checkbox"/> performance_schema	utf8_general_ci	<a href="#">Check Privileges</a>
<input type="checkbox"/> world	latin1_swedish_ci	<a href="#">Check Privileges</a>
Total: 4	latin1_swedish_ci	

↑ ☐ Check All With selected: [Drop](#)

• Enable Statistics

# Creare tabelle in baza de date

- Baza de date (in lista) → Structure → div Create Table → nume/coloane → Go



# Introducere coloane, tabel categorii

- (eventual ) Adaugare coloane / Stabilire nume
- Name / Type / Length / Default

The screenshot shows the phpMyAdmin interface for a table named 'categorii' in the 'tmpaw' database. The table structure is displayed with the following columns:

Name	Type	Length/Values	Default	Collation
id_categ	INT		None	
nume	VARCHAR	45	None	
detalii	VARCHAR	150	None	

The interface also includes a 'Table comments:' field and a 'Collation:' dropdown menu. The 'Storage Engine' is set to 'InnoDB'.

# Introducere coloane

- (eventual) NOT NULL / Index / Auto Increment
  - in functie de “necesitatile” coloanei respective

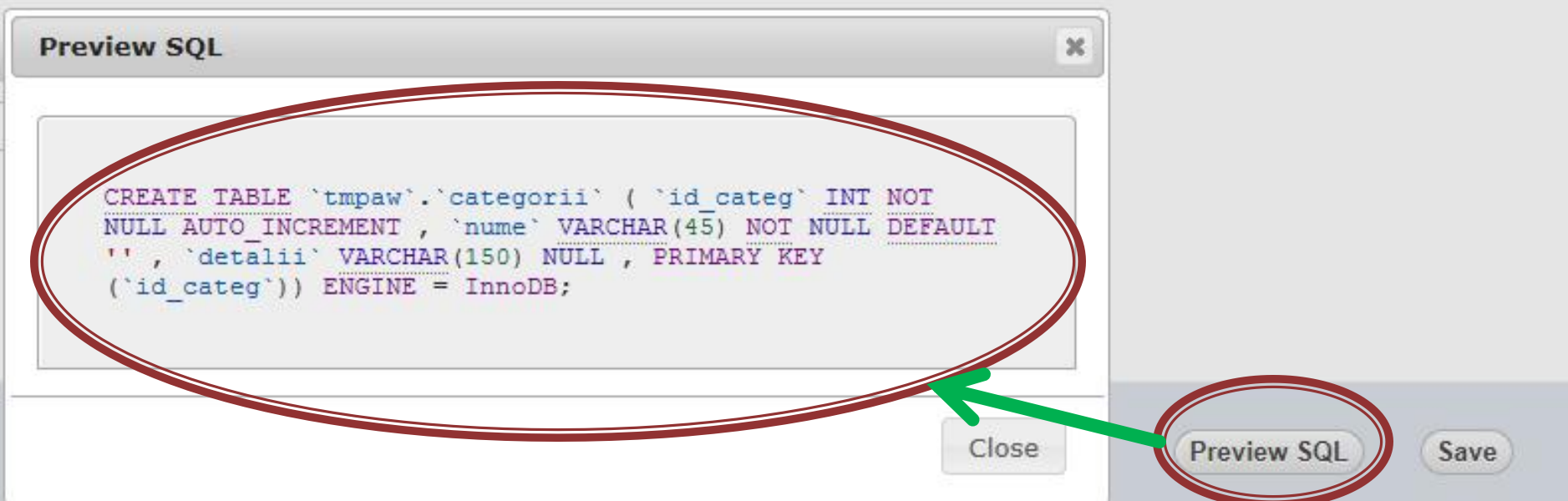
Table name:  Add  column(s)

Structure

Name	Type	Length/Values	Default	Collation	Attributes	Null	Index	A_I	Comments
id_categ	INT		None			<input type="checkbox"/>	PRIMARY	<input checked="" type="checkbox"/>	
nume	VARCHAR	45	As defined:			<input type="checkbox"/>	---	<input type="checkbox"/>	
detalii	VARCHAR	150	None			<input checked="" type="checkbox"/>	---	<input type="checkbox"/>	

# Preview SQL

- in aproape toate etapele in PhpMyAdmin
  - exemplu de cod SQL/schelet utilizabil (copy/paste) in aplicatia PHP
  - modificari de finete absente din interfata
    - copy → Sectiune "SQL" in interfata → paste → modificare





# Introducere coloane, tabel produse

- New → Nume → Add Columns → ...

The screenshot shows the phpMyAdmin interface. On the left, the 'Database: tmpaw' is selected in the sidebar. The main area displays the 'Add Columns' form for the table 'produse'. The 'Table name' field is 'produse', and the 'Add' button is set to '1' column(s). The 'Go' button is visible. Below the form, the table structure is shown with columns: id\_produs (INT, PRIMARY), id\_categ (INT), nume (VARCHAR, 45), detalii (VARCHAR, 150), cant (INT), and pret (FLOAT). The 'Type' dropdown for 'pret' is set to 'FLOAT'.

Name	Type	Length/Values	Default	Collation	Attributes	Null	Index	A_I
id_produs	INT		None			<input type="checkbox"/>	PRIMARY	<input checked="" type="checkbox"/>
id_categ	INT		None			<input type="checkbox"/>	---	<input type="checkbox"/>
nume	VARCHAR	45	As defined:			<input type="checkbox"/>	---	<input type="checkbox"/>
detalii	VARCHAR	150	None			<input checked="" type="checkbox"/>	---	<input type="checkbox"/>
cant	INT		None			<input checked="" type="checkbox"/>	---	<input type="checkbox"/>
pret	FLOAT		None			<input checked="" type="checkbox"/>	---	<input type="checkbox"/>

# Introducere date initiale (interfata)

- Tabel → Insert → Completare → Go

The screenshot shows the phpMyAdmin interface for a database named 'tmpaw'. The left sidebar shows the database structure, with 'categorii' selected under 'tmpaw'. The main area displays the 'Insert' form for the 'categorii' table. The form has columns: 'id\_categ' (int(11)), 'nume' (varchar(45)), and 'detalii' (varchar(150)). The 'nume' field contains the value 'papetarie'. The 'Go' button is at the bottom right. Below the form, there are options to 'insert as new row' and 'Go back to previous page'. At the bottom, it says 'Continue insertion with 1 row'.

Column	Type	Function	Null	Value
id_categ	int(11)			
nume	varchar(45)			papetarie
detalii	varchar(150)		<input checked="" type="checkbox"/>	

Insert as new row and then Go back to previous page

Continue insertion with 1 row



# Vizualizare date existente

- Tabel → Browse → salt la pagina (numar de linii pe pagina)

The screenshot shows the phpMyAdmin interface. The left sidebar displays the database structure, with 'tmpaw' selected and 'categorii' highlighted. The main panel shows the 'Browse' tab for the 'categorii' table. The table structure is displayed, showing columns: id\_categ, nume, and detalii. The table contains three rows of data. The 'id\_categ' column is highlighted with a red circle. The 'nume' column contains the values 'papetarie', 'instrumente', and 'audio-video'. The 'detalii' column contains 'NULL' for all rows. The 'Showing rows' status bar indicates 2 rows shown out of 3 total. The 'Query results operations' section at the bottom provides options for printing, exporting, and displaying the data as a chart.

id_categ	nume	detalii
1	papetarie	NULL
2	instrumente	NULL
3	audio-video	NULL

# Introducere date initiale (SQL)

- Tabel → SQL → completare → Go

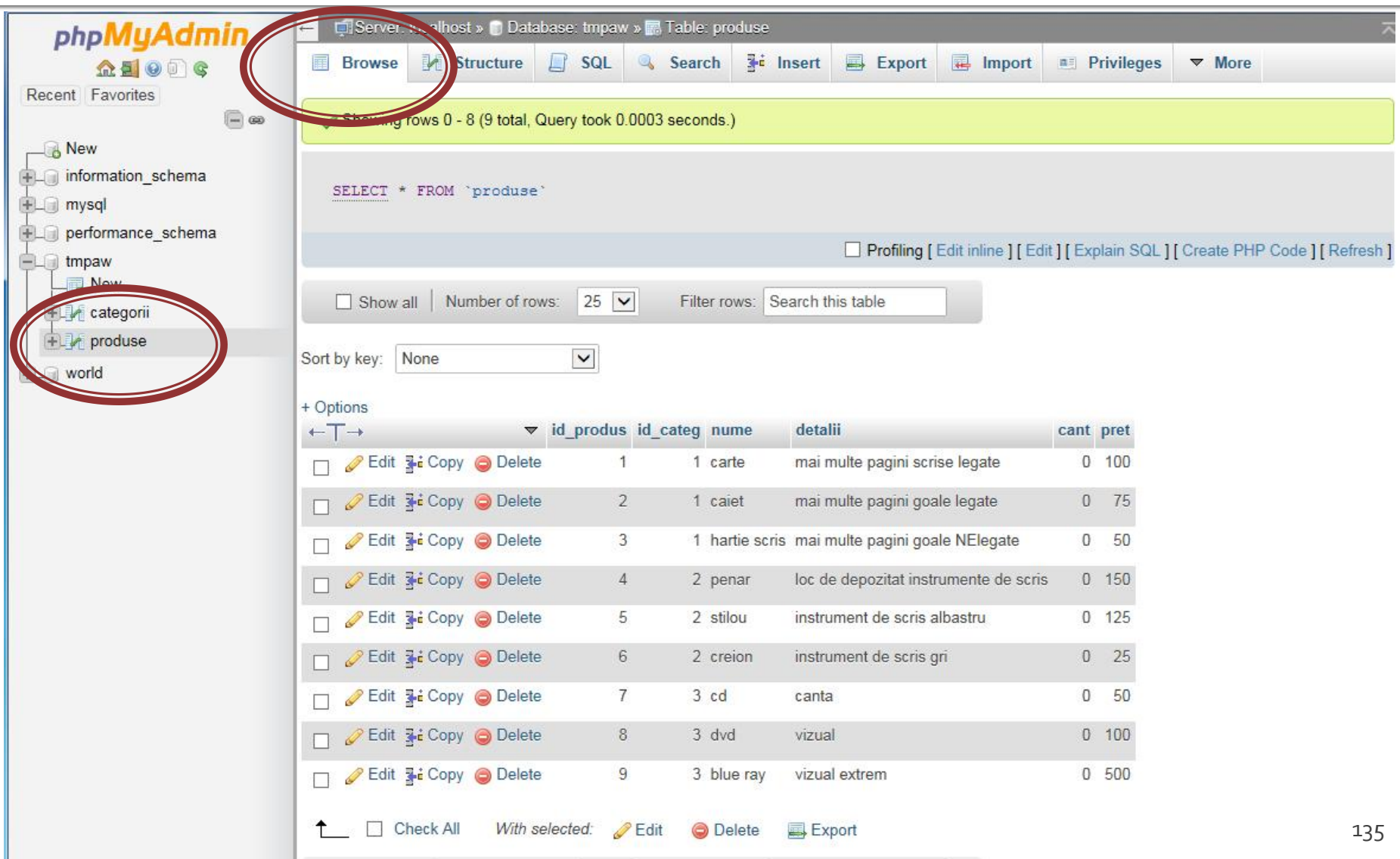
The screenshot shows the phpMyAdmin web interface. In the left sidebar, the 'produse' table under the 'tmpaw' database is selected. The top menu bar has the 'SQL' tab highlighted. The main area contains a text editor with an SQL INSERT query. Below the editor are buttons for 'SELECT \*', 'SELECT', 'INSERT', 'UPDATE', 'DELETE', 'Clear', and 'Format'. At the bottom right, there is a 'Go' button. The query text is as follows:

```
1 INSERT INTO `produse` (`id_produș`, `id_categ`, `nume`, `detalii`, `cant`, `pret`)
2 VALUES
3 (1,1,'carte','mai multe pagini scrise legate',0,100),
4 (2,1,'caiet','mai multe pagini goale legate',0,75),
5 (3,1,'hartie scris','mai multe pagini goale NElegate',0,50),
6 (4,2,'penar','loc de depozitat instrumente de scris',0,150),
7 (5,2,'stilou','instrument de scris albastru',0,125),
8 (6,2,'creion','instrument de scris gri',0,25),
9 (7,3,'cd','canta',0,50),
10 (8,3,'dvd','vizual',0,100),
11 (9,3,'blue ray','vizual extrem',0,500);|
```

Columns listed on the right:

- id\_produș
- id\_categ
- nume
- detalii
- cant
- pret

# Tabel produse



phpMyAdmin

Server: localhost » Database: tmpaw » Table: produse

Structure SQL Search Insert Export Import Privileges More

Showing rows 0 - 8 (9 total, Query took 0.0003 seconds.)

```
SELECT * FROM `produse`
```

☐ Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP Code ] [ Refresh ]

☐ Show all | Number of rows: 25 | Filter rows: Search this table

Sort by key: None

+ Options

				id_produc	id_categ	nume	detalii	cant	pret
<input type="checkbox"/>	Edit	Copy	Delete	1	1	carte	mai multe pagini scrise legate	0	100
<input type="checkbox"/>	Edit	Copy	Delete	2	1	caiet	mai multe pagini goale legate	0	75
<input type="checkbox"/>	Edit	Copy	Delete	3	1	hartie scris	mai multe pagini goale NElegate	0	50
<input type="checkbox"/>	Edit	Copy	Delete	4	2	penar	loc de depozitat instrumente de scris	0	150
<input type="checkbox"/>	Edit	Copy	Delete	5	2	stilou	instrument de scris albastru	0	125
<input type="checkbox"/>	Edit	Copy	Delete	6	2	creion	instrument de scris gri	0	25
<input type="checkbox"/>	Edit	Copy	Delete	7	3	cd	canta	0	50
<input type="checkbox"/>	Edit	Copy	Delete	8	3	dvd	vizual	0	100
<input type="checkbox"/>	Edit	Copy	Delete	9	3	blue ray	vizual extrem	0	500

☐ Check All With selected: Edit Delete Export

# Adaugare utilizator

- Server → Users → Add user

The screenshot shows the phpMyAdmin interface. The top navigation bar includes 'Server: localhost', 'Database: tmpaw', and 'Table: produse'. The 'Server: localhost' link is circled in red. Below this, the 'Users' tab in the main navigation bar is also circled in red. The 'Users overview' table lists existing users. At the bottom, the 'New' button is circled in red, and the 'Add user' link is highlighted.

Server: localhost » Database: tmpaw » Table: produse

phpMyAdmin

Recent Favorites

New  
+ information\_schema  
+ mysql  
+ performance\_schema  
- tmpaw  
  + New  
  + categorii  
  + produse  
+ world

Server: localhost

Databases SQL Status Users Export Import Settings

### Users overview

	User name	Host	Password	Global privileges	Grant	Action
<input type="checkbox"/>	root	127.0.0.1	Yes	ALL PRIVILEGES	Yes	Edit Privileges Export
<input type="checkbox"/>	root	::1	Yes	ALL PRIVILEGES	Yes	Edit Privileges Export
<input type="checkbox"/>	root	localhost	Yes	ALL PRIVILEGES	Yes	Edit Privileges Export
<input type="checkbox"/>	root	tmpaw.etti	Yes	ALL PRIVILEGES	Yes	Edit Privileges Export
<input type="checkbox"/>	web	%	Yes	USAGE	No	Edit Privileges Export

↑ ☐ Check All With selected: Export

New

Add user

# Adaugare utilizator

- Nu e recomandabil/**posibil** sa se utilizeze user-ul MySql "root" pentru aplicatii

The screenshot shows the phpMyAdmin interface for adding a new user. The left sidebar displays a tree view of databases, including 'information\_schema', 'mysql', 'performance\_schema', 'tmpaw', 'categorii', 'produse', and 'world'. The main panel is titled 'Add user' and contains a 'Login Information' section. This section has four rows of input fields: 'User name:' with a text field containing 'web\_user'; 'Host:' with a dropdown menu showing 'Any host'; 'Password:' with a text field containing masked characters; and 'Re-type:' with another masked text field. A 'Generate password:' button is located at the bottom. Four red circles are drawn around the 'web\_user' text field, the 'Any host' dropdown, and both the password and re-type password fields, highlighting the fields that are being filled out.



# Drepturi de acces

- Server → Users → Edit Privileges

The screenshot shows the phpMyAdmin interface. The top navigation bar includes links for Databases, SQL, Status, Users, Export, Import, and Settings. The 'Users' link is circled in red. Below the navigation bar, the 'Users overview' table is displayed. The table has columns for User name, Host, Password, Global privileges, Grant, and Action. The 'Action' column contains links for 'Edit Privileges' and 'Export'. The 'Edit Privileges' link for the 'web\_user' row is circled in red. The left sidebar shows the database structure with a tree view.

phpMyAdmin

Recent Favorites

Server: localhost

Databases SQL Status Users Export Import Settings

Users overview

	User name	Host	Password	Global privileges	Grant	Action
<input type="checkbox"/>	root	127.0.0.1	Yes	ALL PRIVILEGES	Yes	Edit Privileges  Export
<input type="checkbox"/>	root	:::1	Yes	ALL PRIVILEGES	Yes	Edit Privileges  Export
<input type="checkbox"/>	root	localhost	Yes	ALL PRIVILEGES	Yes	Edit Privileges  Export
<input type="checkbox"/>	root	tmpaw.etti	Yes	ALL PRIVILEGES	Yes	Edit Privileges  Export
<input type="checkbox"/>	web	%	Yes	USAGE	No	Edit Privileges  Export
<input type="checkbox"/>	web_user	%	Yes	USAGE	No	Edit Privileges  Export

# Drepturi de acces

- Database → nume → Go

The screenshot shows the phpMyAdmin interface for a MySQL server on localhost. The left sidebar displays a tree of databases, including 'information\_schema', 'mysql', 'performance\_schema', 'tmpaw', and 'world'. The main panel is titled 'Edit Privileges: User 'web\_user'@'%''. The 'Database' tab is selected and circled in red. Below the title, there is a section for 'Database-specific privileges' with a table showing no privileges. At the bottom, a list of databases is provided for selection, with 'mysql', 'tmpaw', and 'world' circled in red. The 'Add privileges on the following database(s):' label is also visible.

Server: localhost

Databases SQL Status Users Export Import Settings

Global Database Change password Login Information

Edit Privileges: User 'web\_user'@'%'

Database-specific privileges

Database	Privileges	Grant	Table-specific privileges	Action
None				

mysql  
tmpaw  
world

Add privileges on the following database(s):

# Drepturi de acces

- Se alocă drepturile SELECT + INSERT + UPDATE + DELETE asupra bazei de date create

The screenshot shows the phpMyAdmin interface for a MySQL server on localhost. The left sidebar displays a tree of databases, including 'tmpaw' which is expanded to show tables 'categorii' and 'produse'. The main panel is titled 'Edit Privileges: User **'web\_user'@'%'** - Database **tmpaw**'. Below the title, there is a section for 'Database-specific privileges' with a 'Check All' button. A note states: 'Note: MySQL privilege names are expressed in English.' There are three columns of checkboxes: 'Data', 'Structure', and 'Administration'. The 'Data' column has four checked items: SELECT, INSERT, UPDATE, and DELETE. The 'Structure' column has several unchecked items: CREATE, ALTER, INDEX, DROP, CREATE TEMPORARY TABLES, and SHOW VIEW. The 'Administration' column has three unchecked items: GRANT, LOCK TABLES, and REFERENCES. Red circles are drawn around the 'Data' column and the user/database text in the title.

phpMyAdmin

Recent Favorites

Server: localhost

Databases SQL Status Users Export Import Settings Replication

Database Table

Edit Privileges: User **'web\_user'@'%'** - Database **tmpaw**

Database-specific privileges ☒ Check All

Note: MySQL privilege names are expressed in English.

Data	Structure	Administration
<input checked="" type="checkbox"/> SELECT	<input type="checkbox"/> CREATE	<input type="checkbox"/> GRANT
<input checked="" type="checkbox"/> INSERT	<input type="checkbox"/> ALTER	<input type="checkbox"/> LOCK TABLES
<input checked="" type="checkbox"/> UPDATE	<input type="checkbox"/> INDEX	<input type="checkbox"/> REFERENCES
<input checked="" type="checkbox"/> DELETE	<input type="checkbox"/> DROP	
	<input type="checkbox"/> CREATE TEMPORARY TABLES	
	<input type="checkbox"/> SHOW VIEW	



# Drepturi de acces, verificare

- Nume → Privileges
- Marea majoritate a aplicatiilor **nu** au nevoie de drepturi de acces la structura/administrare

The screenshot shows the phpMyAdmin interface. On the left, the database 'tmpaw' is selected in the sidebar. The main panel displays the 'Privileges' tab for the 'tmpaw' database. The table lists users and their privileges. The 'tmpaw.etti' user is highlighted with a red circle, and its privileges are also circled. The 'web\_user' user has database-specific privileges for SELECT, INSERT, UPDATE, and DELETE.

User	Host	Type	Privileges	Grant	Action
<input type="checkbox"/> root	127.0.0.1	global	ALL PRIVILEGES	Yes	Edit Privileges
<input type="checkbox"/> root	:::1	global	ALL PRIVILEGES	Yes	Edit Privileges
<input type="checkbox"/> root	localhost	global	ALL PRIVILEGES	Yes	Edit Privileges
<input type="checkbox"/> root	tmpaw.etti	global	ALL PRIVILEGES	Yes	Edit Privileges
<input type="checkbox"/> web_user	%	database-specific	SELECT, INSERT, UPDATE, DELETE	No	Edit Privileges

Check All With selected: Export

# Index

- Adaugare index e esentiala pentru viteza
  - exemplu, produse grupate pe categorii, selectia produselor dintr-o categorie se face cu :
    - `SELECT * FROM `produse` WHERE `id_categ` = 1`
- Tabel → Structure → Index / Selectare + Index

The screenshot shows the phpMyAdmin interface. On the left, the database structure tree is visible, with 'produse' selected under the 'categorieii' database. The main panel shows the 'Table structure' view for the 'produse' table. The table has the following columns:

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	id_produs	int(11)			No	None	AUTO_INCREMENT	Change Drop Primary Unique Index Spatial Fulltext Distinct values
2	id_categ	int(11)			No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
3	nume	varchar(45)	utf8_general_ci		No			Change Drop Primary Unique Index Spatial Fulltext Distinct values
4	detalii	varchar(150)	utf8_general_ci		Yes	NULL		Change Drop Primary Unique Index Spatial Fulltext Distinct values
5	cant	int(11)			Yes	NULL		Change Drop Primary Unique Index Spatial Fulltext Distinct values
6	pret	float			Yes	NULL		Change Drop Primary Unique Index Spatial Fulltext Distinct values

The 'Index' tab is selected, showing the following index:

Index name	Index type	Index columns	Index options
PRIMARY	PRIMARY	id_produs	

The 'Index' tab is also selected in the bottom right corner of the interface.

# Verificare/Stergere index

- Apasare +Indexes, se deschide lista de indecsi
- Apasare -Indexes, se inchide lista de indecsi

- Indexes

Indexes ?

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit  Drop	PRIMARY	BTREE	Yes	No	id_produ	9	A	No	
Edit  Drop	id_categ	BTREE	No	No	id_categ	9	A	No	

Create an index on  columns

# Backup, Restore

- Ca si in cazul Windows 2000 facilitatea de Backup realizeaza un script SQL care contine structura si datele exprimate sub forma de interogari SQL
- O deosebire intre PhpMyAdmin si aplicatiile specifice MySql (aceleasi de pe Windows 2000 sau MySql Workbench) este absenta liniilor de creare a bazei de date
  - CREATE DATABASE IF NOT EXISTS tmpaw;
  - USE tmpaw;
- La utilizarea PhpMyAdmin trebuie sa se creeze manual inaintea restaurarii baza de date

# Backup

- Nume (tabel sau baza de date) → Export

The screenshot displays the phpMyAdmin web interface. On the left sidebar, the database 'tmpaw' is selected and highlighted with a red circle. The main panel shows the 'Export' tab, also highlighted with a red circle. The title of the page is 'Exporting tables from "tmpaw" database'. Under the 'Export Method:' section, the 'Quick' option is selected. Under the 'Output:' section, the 'Save on server in the directory /var/lib/phpMyAdmin/save/' option is checked. Under the 'Format:' section, 'SQL' is selected in the dropdown menu. A 'Go' button is located at the bottom of the form.

Server: localhost » Database: tmpaw

Structure SQL Search Query **Export** Import Operations

### Exporting tables from "tmpaw" database

**Export Method:**

- ☒ Quick - display only the minimal options
- ☐ Custom - display all possible options

**Output:**

- ☒ Save on server in the directory /var/lib/phpMyAdmin/save/
- ☐ Overwrite existing file(s)

**Format:**

SQL

Go

# Restore

- Se creaza in avans baza de date
- Nume → Import → Browse (alegere fisier backup)
- fisierele SQL pot fi compresate gzip, bzip2, zip

The screenshot shows the phpMyAdmin interface. On the left sidebar, the database 'tmpaw' is selected and circled in red. The main panel shows the 'Import' tab, also circled in red. The title is 'Importing into the database "tmpaw"'. Under 'File to Import:', there is a text area for the file name and a 'Browse...' button, both circled in red. Below this, there are radio buttons for 'Browse your computer' and 'Select from the web server upload directory'. The 'Character set of the file:' is set to 'utf-8'. Under 'Partial Import:', there is a checked checkbox for 'Allow the interruption of an import...' and a text input for 'Skip this number of queries...' set to '0'.

phpMyAdmin

Server: localhost » Database: tmpaw

Structure SQL Search Query Export Import Operations Privileges Routines

Importing into the database "tmpaw"

**File to Import:**

File may be compressed (gzip, bzip2, zip) or uncompressed.  
A compressed file's name must end in `.[format].[compression]`. Example: `example.sql.gz`

☐ Browse your computer:  **Browse...** (Max: 2048KiB)

You may also drag and drop a file on any page.

☐ Select from the web server upload directory `/var/lib/phpMyAdmin/upload/`: *There are no files to upload!*

Character set of the file:

**Partial Import:**

☒ Allow the interruption of an import in case the script detects it is close to the PHP timeout limit. *(This might be a good way to import large file)*

Skip this number of queries (for SQL) or lines (for other formats), starting from the first one:

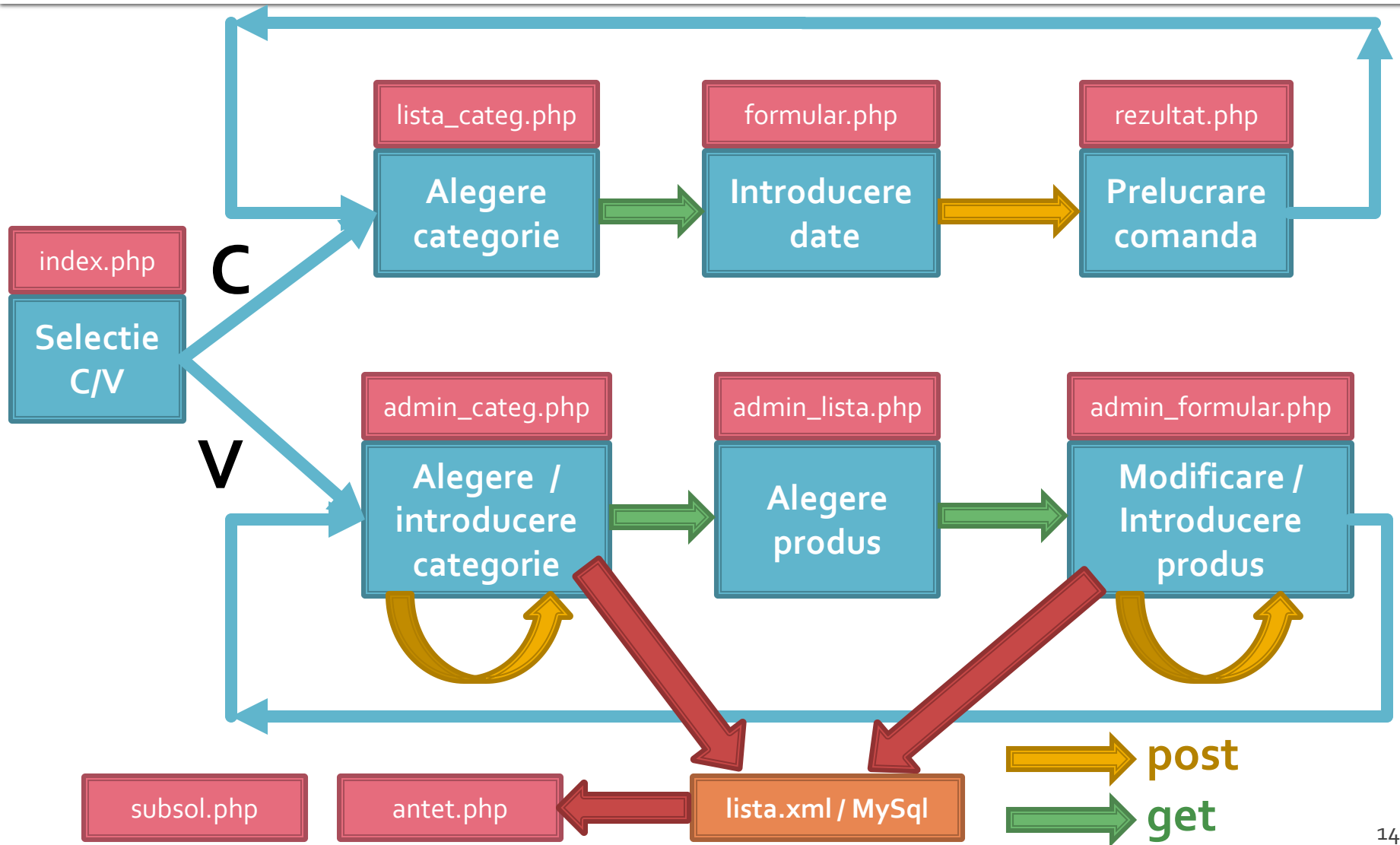
# Laborator 6

# Laborator 6+7

- Sa se continue magazinul virtual cu:
  - produsele sunt grupate pe categorii de produse
  - sa prezinte utilizatorului o lista de grupe de produse pentru a alege
  - sa prezinte utilizatorului o lista de produse si preturi in grupa aleasa
  - lista de produse si preturi se citeste dintr-o baza de date **MySQL**
  - se preia comanda si se calculeaza suma totala
  - **se creaza o pagina prin care vanzatorul poate modifica preturile si produsele**



# Plan aplicatie



# Rezultat (comparator)

**Categorii Produse**

Alegeti categoria:

Nr.	Categorie	Total Produse
1	<a href="#">Papetarie</a>	3
2	<a href="#">Instrumente</a>	3
3	<a href="#">Audio-video</a>	3
4	<a href="#">Calculatoare</a>	3
5	<a href="#">Jucarii</a>	2

Total produse: 14

**Magazin online Firma X SRL**

Finalizati comanda

Nr.	Produs	Pret	Cantitate
1	Carti	100	<input type="text" value="1"/>
2	Caiete	50	<input type="text" value="2"/>
3	Penare	150	<input type="text" value="1"/>
4	Stilouri	125	<input type="text" value="0"/>
5	Creioane	25	<input type="text" value="0"/>

**Magazin online Firma X SRL**

**Rezultate comanda**

Pret total (fara TVA): 350

Pret total (cu TVA): 416.5

Comanda receptionata la data: 17/03/2010 ora 08:24



# Rezultat (vanzator)

**Magazin** Firma X

[Inceput](#) | [Inapoi](#)

## Magazin online Firma X SRL

Alegeti:

- [Cumparator](#)
- [Vanzator](#)

### Categorii Produse

Alegeti categoria:

Nr.	Categorie	Total Produse
1	<a href="#">Papetarie</a>	3
2	<a href="#">Instrumente</a>	3
3	<a href="#">Audio-video</a>	3
4	<a href="#">Calculatoare</a>	3
5	<a href="#">Jucarii</a>	2

Total produse: 14

Categorie noua de produse:

### Lista produse in categoria Calculatoare

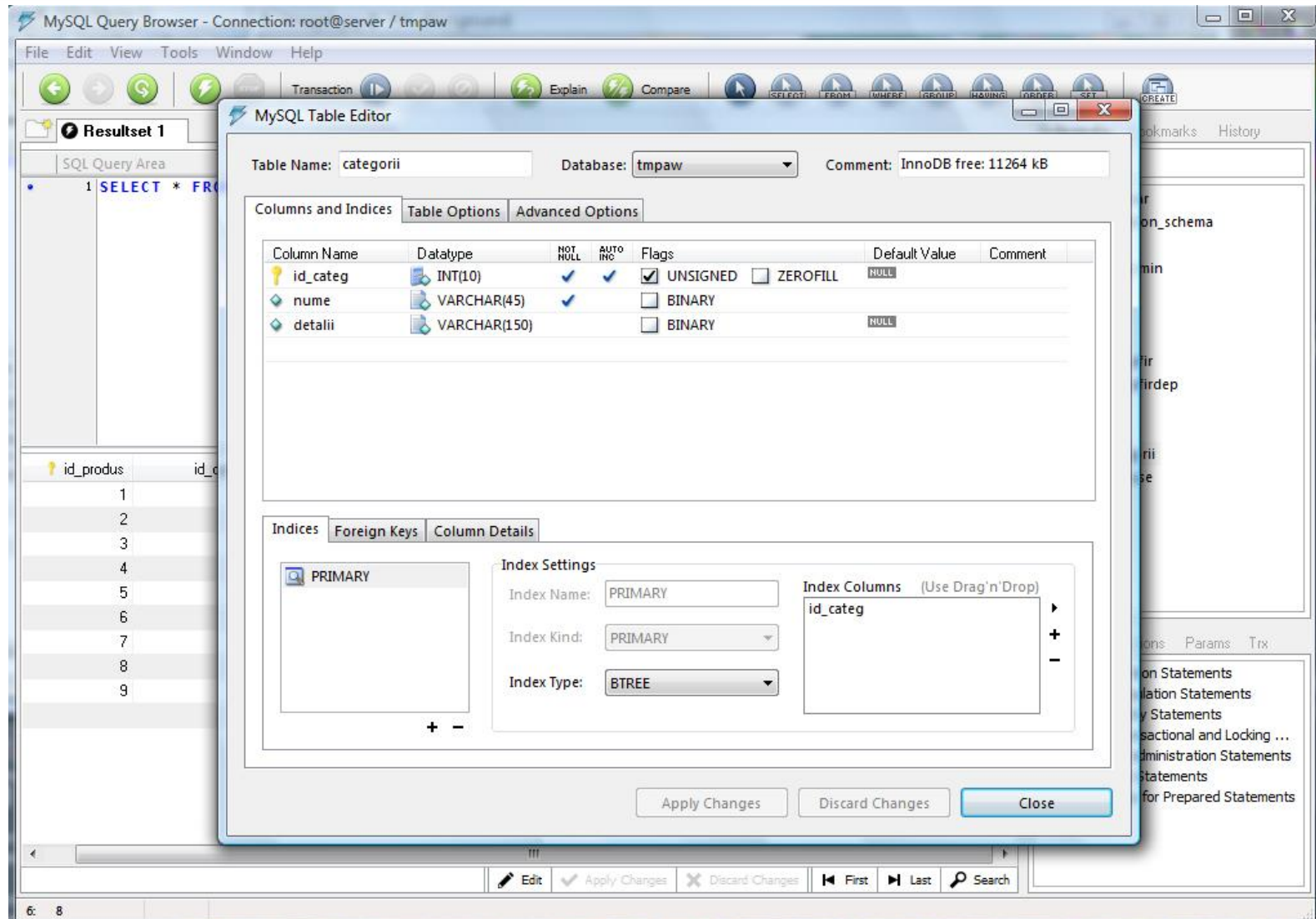
Nr.	Produs	Descriere	Pret	Cantitate	Actiuni
1	Laptop	calculator mic	2000	2	<a href="#">modifica</a>
2	Desktop	calculator mare	1000	5	<a href="#">modifica</a>
3	Imprimanta	prn	200	2	<a href="#">modifica</a>
-	Produs nou				<a href="#">adauga</a>

### Produs in categoria Calculatoare

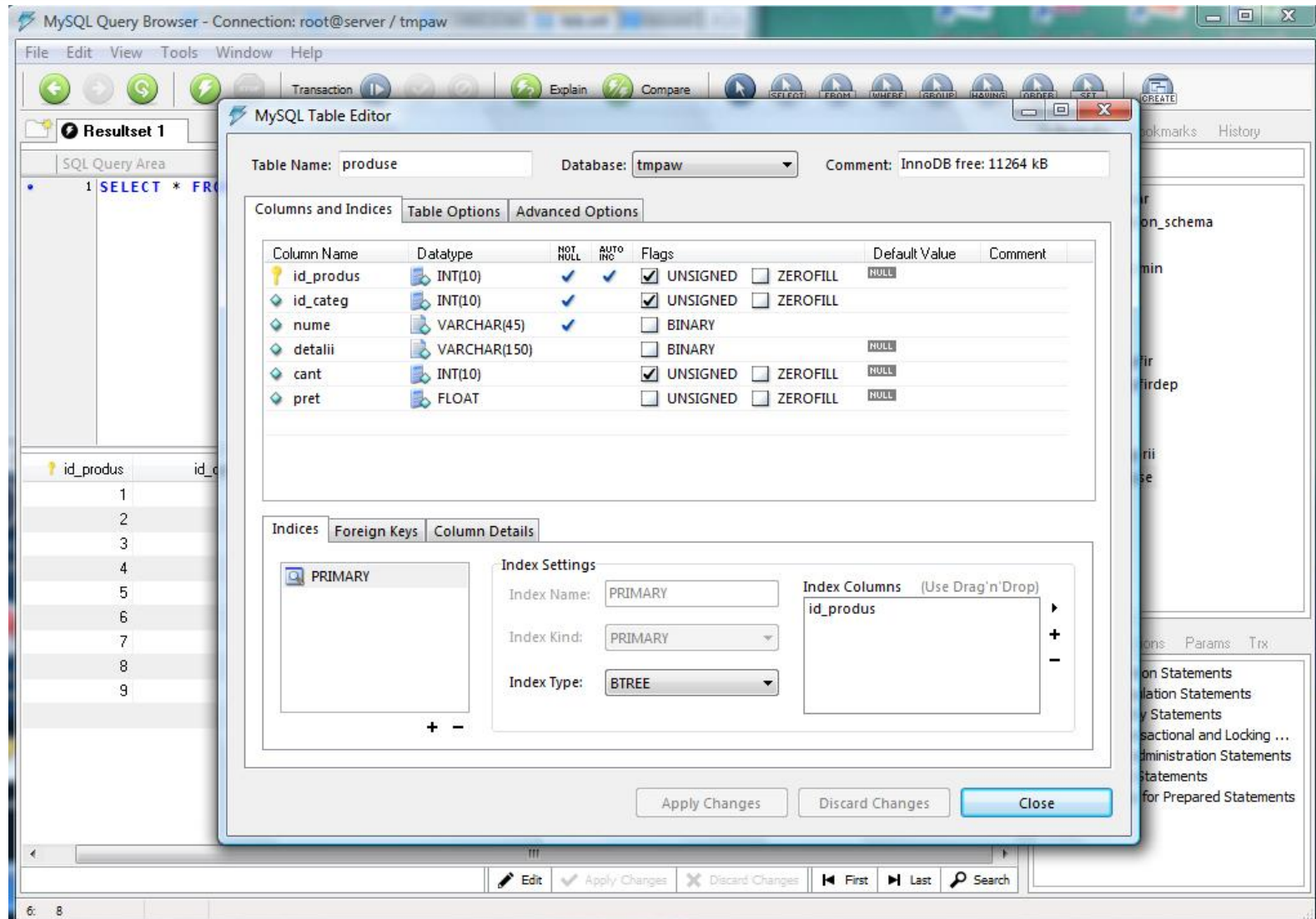
Produs	<input type="text" value="laptop"/>
Descriere	<input type="text" value="calculator mic"/>
Pret	<input type="text" value="2000"/>
Cantitate	<input type="text" value="2"/>



# Tabel Categorii



# Tabel Prognose



# Laborator 6/7 – Mod de lucru

- Se continua lucrul la aplicatie (L5)
- Se recomanda laboratorul **asincron** – S2
- Se poate folosi fisierul cu surse cpypaste.txt  
(site-<http://rf-opto.etti.tuiasi.ro>)

# Laborator 6/7 – Mod de lucru

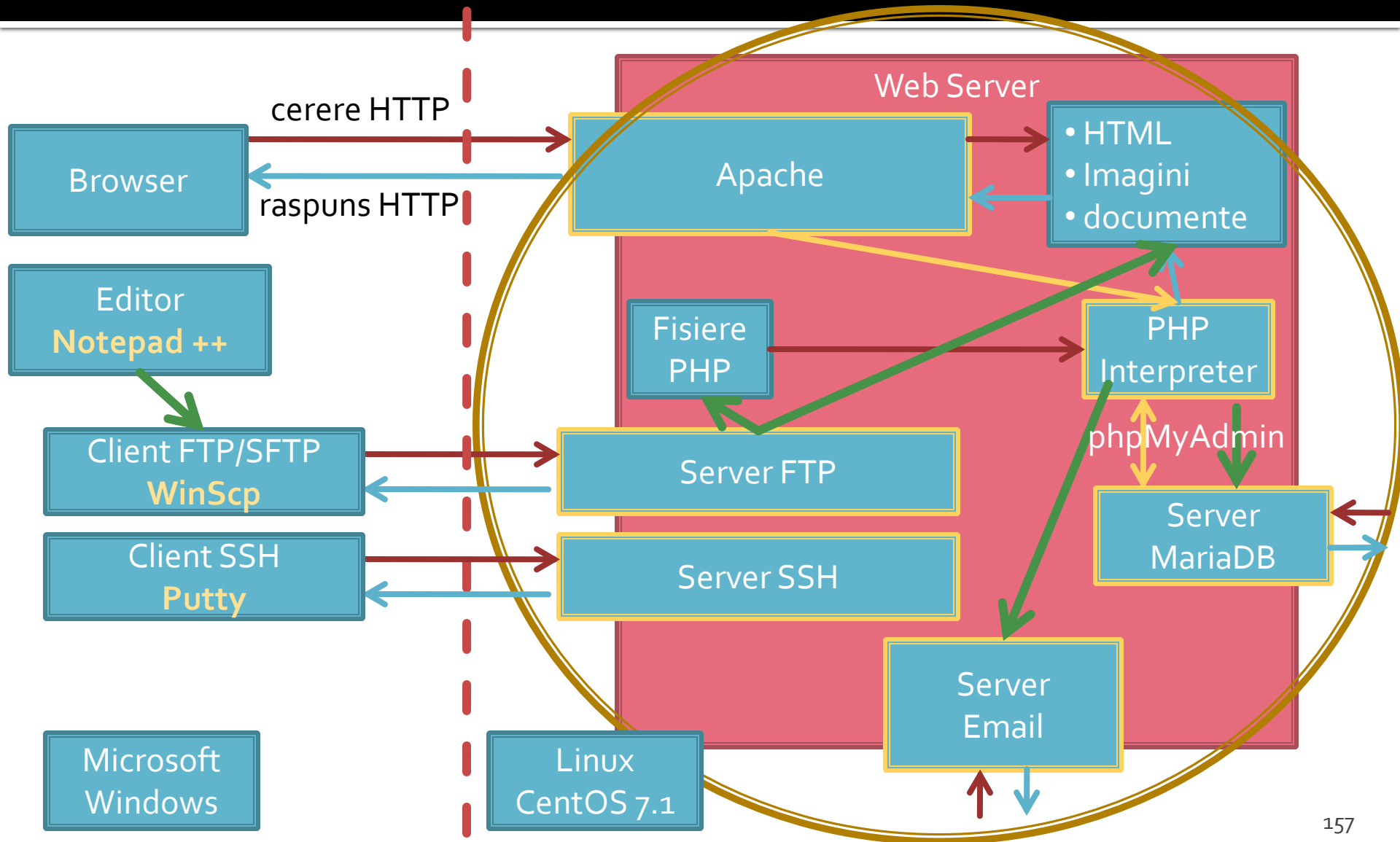
- Se ia o decizie relativ la relatia dintre produse si categorii (S63-S67)
  - One to Many
  - Many to Many
- Se creaza cele 2(3) tabele corespunzatoare
- Se populeaza cu date
- Se actualizeaza planul aplicatiei pentru a corespunde cu aplicatia proprie
  - nume de fisiere, tipuri de transfer a datelor

# Laborator 6/7 – Mod de lucru

- Se creaza firul de executie paralel pentru vanzator
  - fisierele pentru cumparator reprezinta o buna cale de pornire (Save As, Copy/Paste) pentru 2 din cele 3 fisiere
- Se lucreaza cat mai mult la conversia text -> MySQL
  - activitatea se continua la laboratorul 7

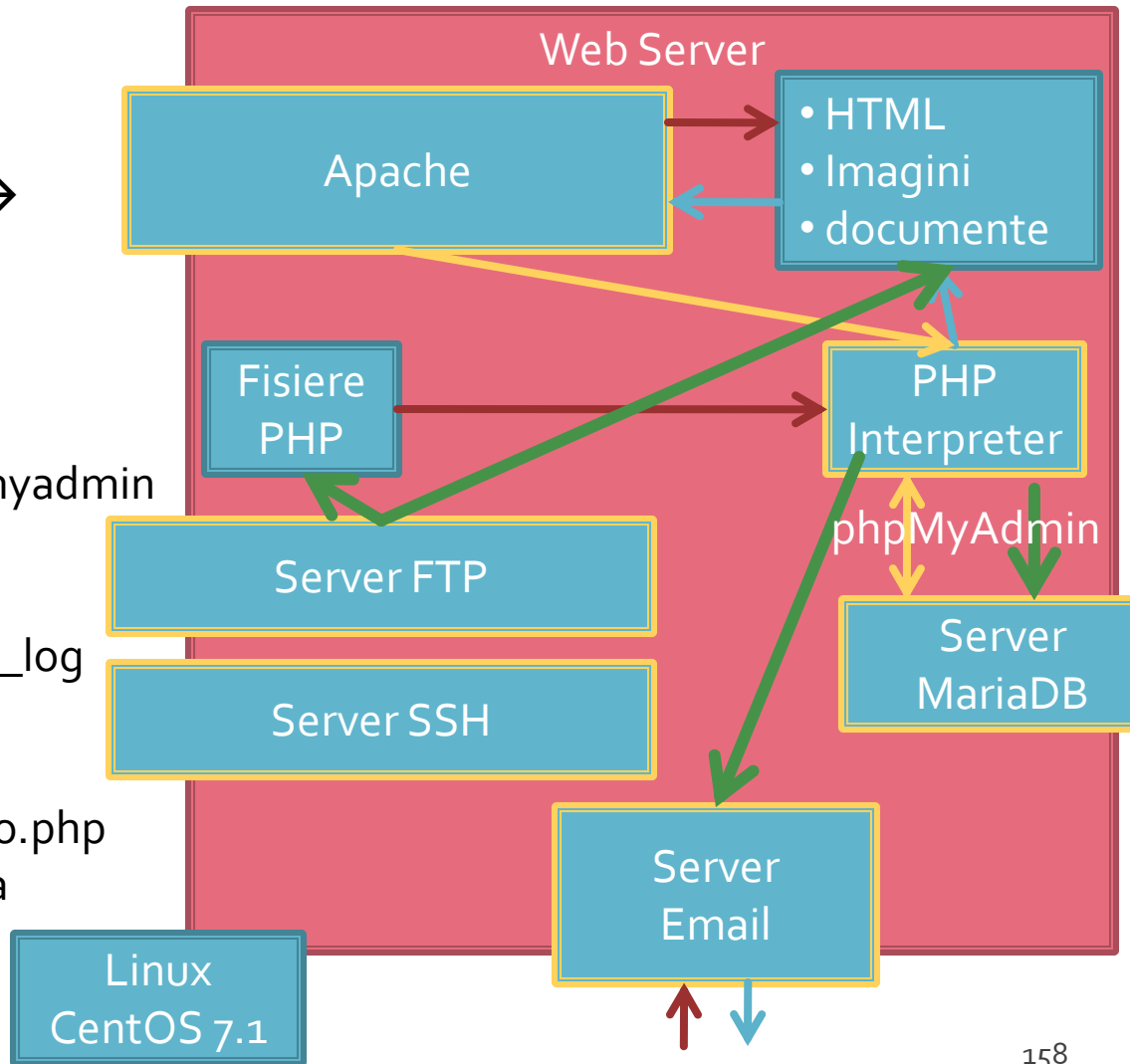


# Utilizare LAMP



# Utilizzare LAMP

1. login → root:masterrc
2. ifconfig → 192.168.30.5
3. putty.exe → 192.168.30.5 → SSH → root:masterrc (remote login)
4. [alte comenzi linux dorite]
5. FTP → Winscp → SFTP → student:masterrc@192.168.30.5
6. MySql → http://192.168.30.5/phpmyadmin → root:masterrc
7. Apache Error Log →
  - 7a. putty → nano /var/log/httpd/error\_log
  - 7b. http://192.168.30.5/logfile.php (nonstandard)
8. PHP info → http://192.168.30.5/info.php
9. daca serviciul DHCP duce la oprirea Apache: service httpd restart



# Faza de verificare/depanare

- Se recomanda utilizarea posibilitatii vizualizarii matricilor
  - In fisierul care receptioneaza datele
  - temporar pina la definitivarea codului
- utilizarea de cod "verbose" (manual) in etapele initiale de scriere a surselor PHP poate fi extinsa si la alte tipuri de date
  - singura (aproape) metoda de depanare(debug) in PHP
  - `<p>temp <?php echo "a=";echo $a; ?> </p>`

```
echo "<pre>";  
print_r($_POST);  
echo "</pre>";
```

# Depanare

```
echo "<pre>";  
print_r($_POST);  
echo "</pre>";
```

```
<p>temp <?php echo  
"a=";echo $a; ?> </p>
```

# Contact

- Laboratorul de microunde si optoelectronica
- <http://rf-opto.etti.tuiasi.ro>
- [rdamian@etti.tuiasi.ro](mailto:rdamian@etti.tuiasi.ro)