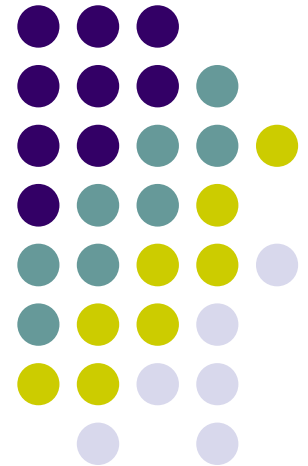


Linux
Apache
MySQL
PHP

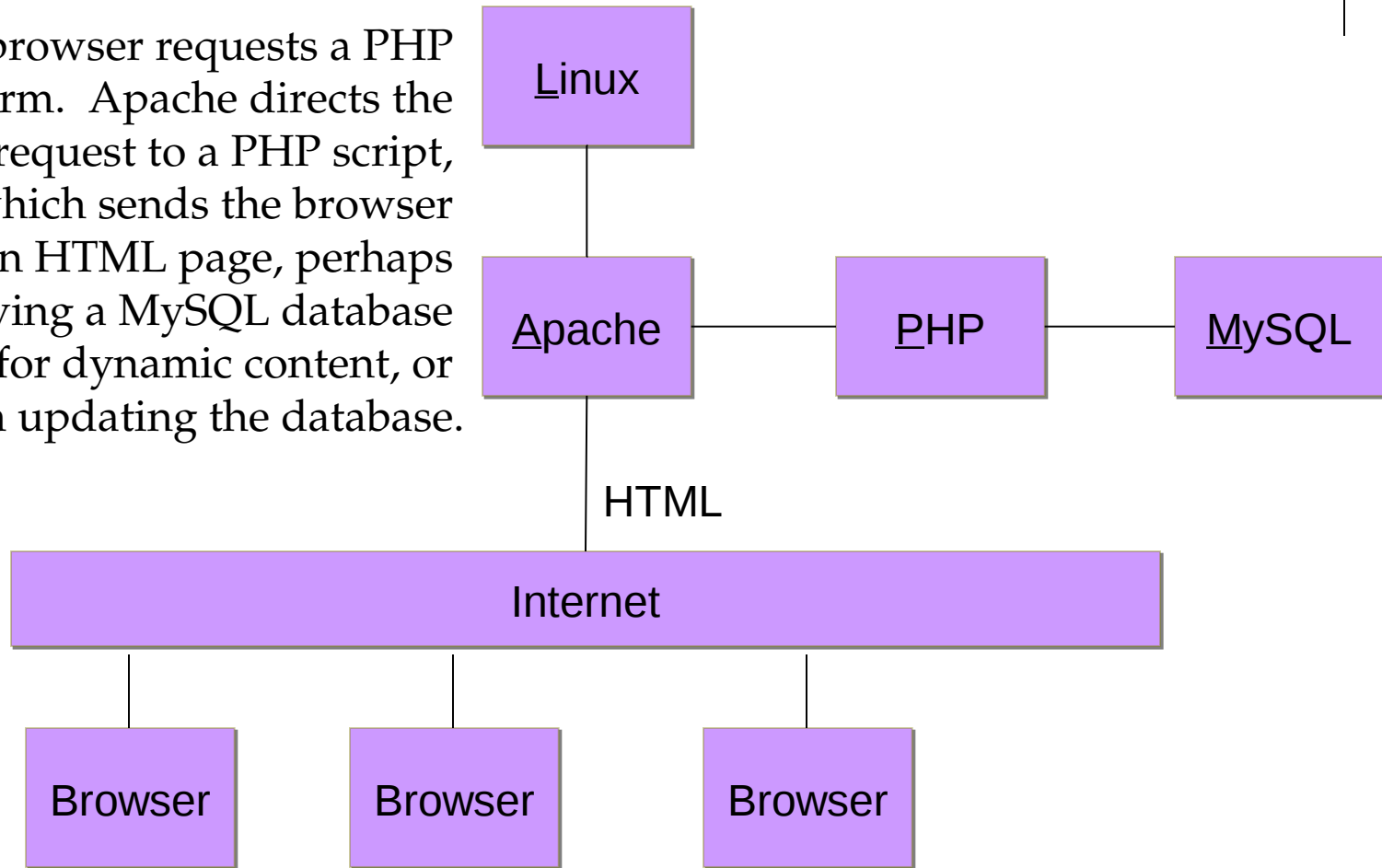
Part 1: SQL



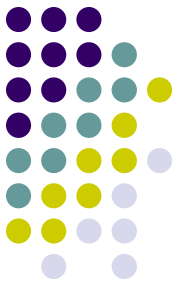
A LAMP dynamic web server



A browser requests a PHP form. Apache directs the request to a PHP script, which sends the browser an HTML page, perhaps querying a MySQL database for dynamic content, or even updating the database.

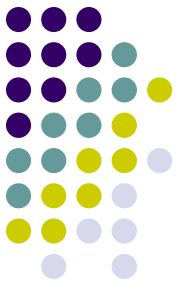


The (free) LAMP package



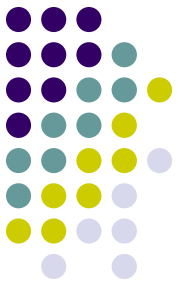
- Installs
 - or updates your existing:
- MySQL: An SQL database system
- PHP: A programming language for web pages.
- Apache: A web server
- A control panel for Apache & MySQL servers.
- PhpMyAdmin: A PHP forms interface to MySQL

Structured Query Language



- SQL is a “Database Sub-Language”
 - It needs to be embedded in some other language
- Data is stored in tables with a “fixed” number of columns, and as many rows as needed
 - Each row represents one object
 - Columns specify properties
- Allows definition of tables, columns, etc.
- Allows queries to retrieve data from tables.
- Allows updates to insert, delete, or change rows.
- Controls user access rights (using passwords, etc.)

Rows need unique identifiers



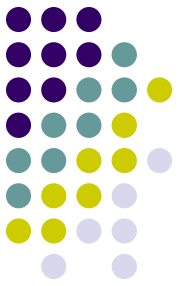
- Every table should have a *primary key*
 - No two rows can have the same key value
 - The primary key of Customers is Account
 - The primary key of Products is Item
 - The primary key of Orders is Order_No

Customers
<u>Account</u>
Name
Street
Suburb
State
Postcode
Balance

Orders
<u>Order_No</u>
Item
Account
Qty

Products
<u>Item</u>
Description
Stock
Price

Querying a Table



The following query displays the value of all products that have more than 10 items in stock.

```
select item, description, stock, qty, cost=qty*price
  from products
 where stock > 10;
```

Customers

Account

Name

Street

Suburb

State

Postcode

Balance

Orders

Order_No

Item

Account

Qty

Products

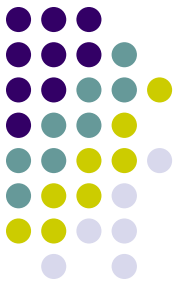
Item

Description

Stock

Price

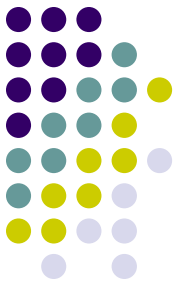
Linking Tables



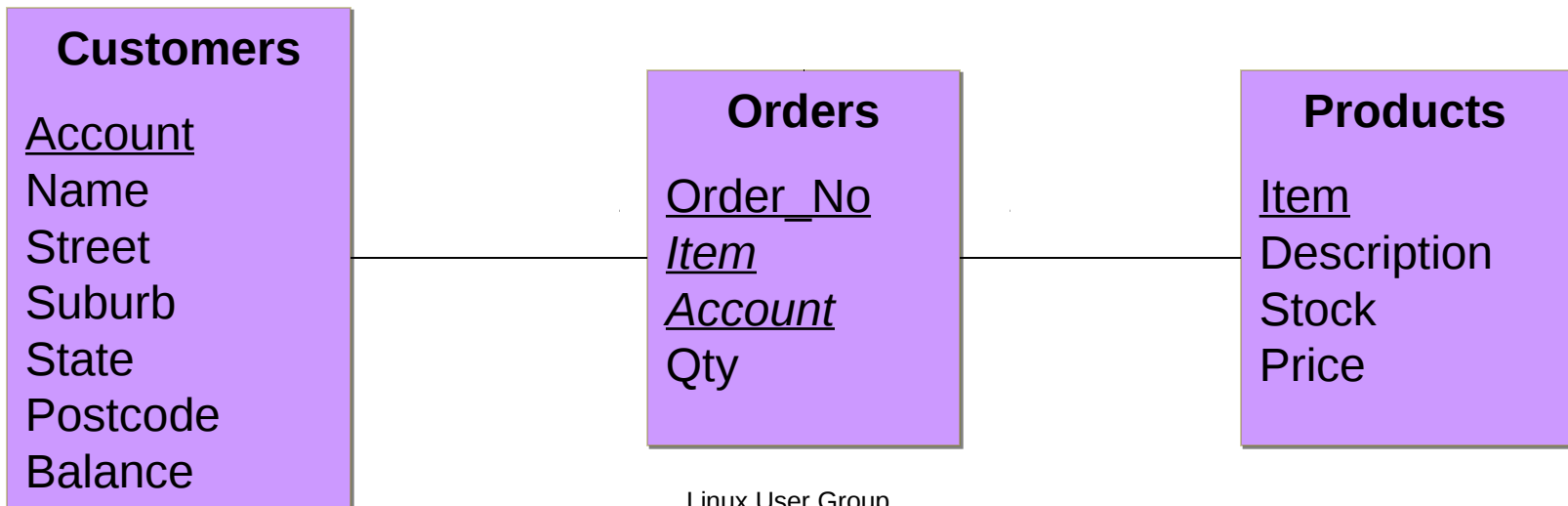
- We do *not* store everything in one table.
 - The *Customers* and *Products* tables are “static”.
 - When customer orders an item, the order is linked to the other tables using *Item* and *Account*.
 - *Item* & *Account* are **foreign keys** in *Orders*



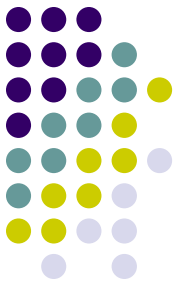
Querying Linked Tables



```
select order_no, name, street, suburb, description,  
stock, qty, cost=qty*price  
from customers, orders, products  
where orders.item = products.item  
       and orders.account = customers.account;
```

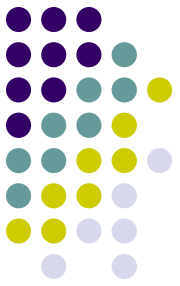


Design Process



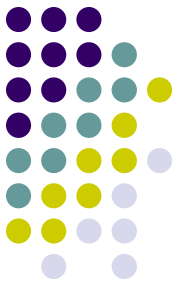
- Design the tables
 - No datum should appear twice, except links
 - If you feel like using an array, use another table!
- Use *phpmyadmin* to set up table structure
 - Choose the *innodb* engine rather than *myisam*!
 - Link the tables (foreign key constraints)
- Insert or import data from CSV files
- Check queries using *phpmyadmin*
- Use PHP to create special forms (*a later talk*)

Column Types



- Character types
 - Fixed-length: *char* (*n*)
 - Variable-length: *varchar* (*n*), *n*=1...255
 - Long: *text*, up to 64KB.
- Number types
 - Integers: *int* (*n*), 32-bit signed or *unsigned*.
 - Decimal: *decimal* (*n*, *d*), 1234.56 has *d*=2, *n*=7.
- Others:
 - *date* (yyyy-mm-dd), *time* (hh:mm:ss)
 - *set* ('SA' , 'WA' , 'NT' , 'QLD' , 'NSW' , 'ACT' , 'VIC' , 'TAS')

Indexes



- Indexes give fast access to a given value
 - Always used for *primary keys*
 - Every table should have a primary key
 - Even if it is just a timestamp or an auto-increment serial no.
 - Can be used to enforce *unique* constraint
 - Needed to set up *foreign keys*
 - Child's foreign key references its parent's primary key
 - The child's foreign key must be indexed

Products Table Definition



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phpMyAdmin

localhost ▶ retrotech ▶ products

Browse Structure SQL Search Insert Export Import Operations Empty Drop

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	Item	char(6)	ascii_general_ci		No	None		
<input type="checkbox"/>	Description	varchar(40)	ascii_general_ci		No	None		
<input type="checkbox"/>	Stock	decimal(4,0)			No	None		
<input type="checkbox"/>	Price	decimal(6,2)			No	None		

↑ Check All / Uncheck All With selected:

Print view Relation view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After Item Go

- Details...

Indexes: ?

Action	Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
	PRIMARY	BTREE	Yes	No	Item	45	A		

Create an index on 1 columns Go

Space usage		Row Statistics	
Type	Usage	Statements	Value
Data	16,384 B	Format	Compact
Index	0 B	Collation	ascii_general_ci
Total	16,384 B	Creation	Apr 05, 2010 at 02:22 PM

Customers Table Definition



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MAMP

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phpMyAdmin

localhost ▶ retrotech ▶ customers

Browse Structure SQL Search Insert Export Import Operations Empty Drop

	Field	Type	Collation	Attributes	Null	Default	Extra
<input type="checkbox"/>	Account	char(4)	ascii_general_ci		No	None	
<input type="checkbox"/>	Name	varchar(30)	ascii_general_ci		No	None	
<input type="checkbox"/>	Street	varchar(30)	ascii_general_ci		No	None	
<input type="checkbox"/>	Suburb	varchar(20)	ascii_general_ci		No	None	
<input type="checkbox"/>	State	set('SA','NSW','VIC','WA','TAS','QLD','ACT','NT')	ascii_general_ci		No	None	
<input type="checkbox"/>	Postcode	decimal(4,0)			No	None	
<input type="checkbox"/>	Balance	decimal(8,2)			No	None	

Check All / Uncheck All With selected:

Print view Relation view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After Account Go

- Details...

Indexes:

Action	Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
		PRIMARY	BTREE	Yes	No	Account	27	A	

Create an index on 1 columns Go

Space usage Row Statistics

Type	Usage	Statements	Value
------	-------	------------	-------

Orders Table Definition



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MAMP

http://localhost:8888/MAMP/?language=English

MAMP

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phpMyAdmin

localhost > retrotech > orders

Browse Structure SQL Search Insert Export Import Operations Empty Drop

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	Order No	int(6)			No	None	auto_increment	
<input type="checkbox"/>	Account	char(4)	ascii_general_ci		No	None		
<input type="checkbox"/>	Item	char(6)	ascii_general_ci		No	None		
<input type="checkbox"/>	Qty	decimal(4,0)			No	None		

↑ Check All / Uncheck All With selected:

Print view Relation view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After Order_No Go

- Details...

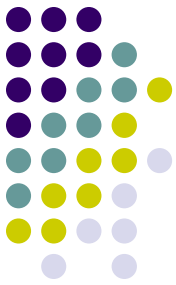
Indexes: ?

Action	Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
	PRIMARY	BTREE	Yes	No	Order_No	14	A		
	Account	BTREE	No	No	Account	14	A		
	Item	BTREE	No	No	Item	14	A		

Create an index on 1 columns Go

Space usage			Row Statistics	
Type	Usage		Statements	Value
Data	16,384 B		Format	Compact
Index	32,768 B		Collation	ascii_general_ci

Extended_Orders View Definition



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phpMyAdmin

Database: retrotech (4)

retrotech (4)

- customers
- Extended_Orders
- orders
- products

localhost ▶ retrotech ▶ Extended_Orders

Browse Structure SQL Search Insert Export Drop

	Field	Type	Collation	Attributes	Null	Default	Extra	View
<input type="checkbox"/>	Order_No	int(6)			No	0		
<input type="checkbox"/>	Customer	varchar(30)	ascii_general_ci		No	None		
<input type="checkbox"/>	Product	varchar(40)	ascii_general_ci		No	None		
<input type="checkbox"/>	Stock	decimal(4,0)			No	None		
<input type="checkbox"/>	Qty	decimal(4,0)			No	None		
<input type="checkbox"/>	Price	decimal(6,2)			No	None		
<input type="checkbox"/>	Value	decimal(10,2)			No	0.00		

↑ Check All / Uncheck All With selected:

Print view + Details...