

A Brain-Friendly Guide

# Head First SQL



Help Greg  
improve his data  
relationships



Stop misplacing  
your primary  
and foreign keys



Finally be  
able to explain  
what's normal



Load important SQL  
query concepts directly  
into your brain



Avoid  
embarrassing  
ALTER  
scenarios



Put your SQL knowledge  
to the test with dozens  
of exercises



O'REILLY®

Lynn Beighley

# Head First SQL

by Lynn Beighley

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Printed in the United States of America.

Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

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<b>Series Editor:</b>	Brett D. McLaughlin
<b>Editor:</b>	Catherine Nolan
<b>Design Editor:</b>	Louise Barr
<b>Cover Designers:</b>	Louise Barr, Karen Montgomery
<b>Production Editor:</b>	Sanders Kleinfeld
<b>Indexer:</b>	Julie Hawks
<b>Page Viewer:</b>	Andrew Fader

## Printing History:

August 2007: First Edition.

He's incredibly patient.



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No clowns, doughnuts, or Girl Sprouts were harmed in the making of this book. Just my car, but it's been fixed.



This book uses RepKover™, a durable and flexible lay-flat binding.

ISBN-10: 0-596-52684-9

ISBN-13: 978-0-596-52684-9

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# Table of Contents (the real thing)

## Intro

**Your brain on SQL.** Here *you* are trying to *learn* something, while here your *brain* is doing you a favor by making sure the learning doesn't *stick*. Your brain's thinking, "Better leave room for more important things, like which wild animals to avoid and whether naked snowboarding is a bad idea." So how *do* you trick your brain into thinking that your life depends on knowing SQL?

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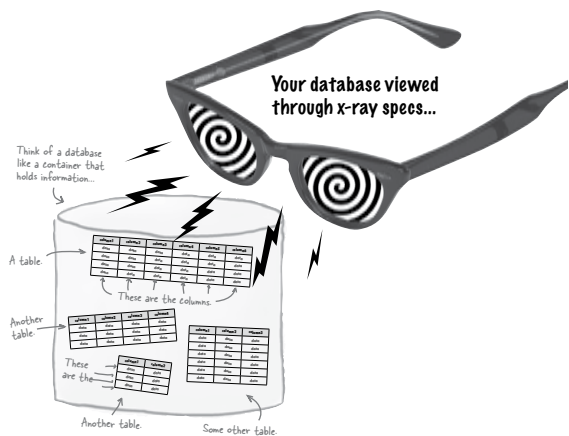
# data and tables

# 1

## A place for everything

**Don't you just hate losing things?** Whether it's your car keys, that 25% off coupon for Urban Outfitters, or your application's data, there's nothing worse than not being able to **keep up with what you need...** when you need it. And when it comes to your applications, there's no better place to store your important information than in a **table**. So turn the page, come on in, and take a walk through the world of **relational databases**.

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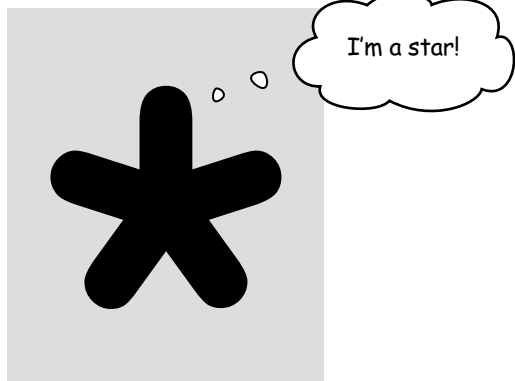


the *SELECT* statement**Gifted data retrieval**

## 2

**Is it really better to give than retrieve?** When it comes to databases, chances are you'll need to **retrieve your data** as often than you'll need to insert it. That's where this chapter comes in: you'll meet the powerful **SELECT** statement and learn how to **gain access to that important information** you've been putting in your tables. You'll even learn how to use **WHERE**, **AND**, and **OR** to selectively get to your data and even avoid displaying the data that you *don't* need.

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## DELETE and UPDATE

# 3

### A change will do you good

**Keep changing your mind? Now it's OK!** With the commands you're about to learn—**DELETE** and **UPDATE**—you're no longer stuck with a decision you made six months ago, when you first inserted that data about mullets coming back into style soon. With **UPDATE**, you **can change data**, and **DELETE** lets you **get rid of data** that you don't need anymore. But we're not just giving you the tools; in this chapter, you'll learn how to be selective with your new powers and avoid dumping data that you really do need.

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Do we scare you?

## smart table design

**Why be normal?**

## 4

You've been creating tables without giving much thought to them. And that's fine, they work. You can `SELECT`, `INSERT`, `DELETE`, and `UPDATE` with them. But as you **get more data**, you start seeing **things you wish you'd done** to make your `WHERE` clauses simpler. What you need is to make your tables more *normal*.

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Wait a second. I already have a table full of data. You can't seriously expect me to use the `DROP TABLE` command like I did in chapter 1 and type in all that data again, just to create a primary key for each record...



## ALTER

# 5

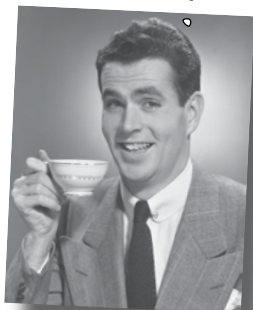
### Rewriting the Past

#### Ever wished you could correct the mistakes of your past?

Well, now is your chance. By using the **ALTER command**, you can apply all the lessons you've been learning to tables you designed days, months, even years ago. Even better, you can do it without affecting your data. By the time you're through here, you'll know what **normal** really means, and you'll be able to apply it to all your tables, past and present.



It's time to turn your tired old hooptie table into a date magnet and take it to a level of table pimpification you never knew existed.



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advanced *SELECT*

## 6

**Seeing your data with new eyes**

**It's time to add a little finesse to your toolbox.** You already know how to *SELECT* data and use *WHERE* clauses. But sometimes you need more **precision** than *SELECT* and *WHERE* provide. In this chapter, you'll learn about how to **order and group** your data, as well as how to **perform math operations** on your results.

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**DATAVILLE  
Video**

## multi-table database design

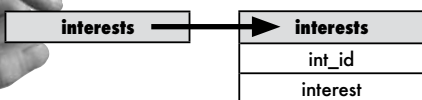
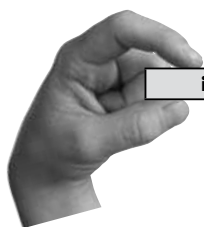
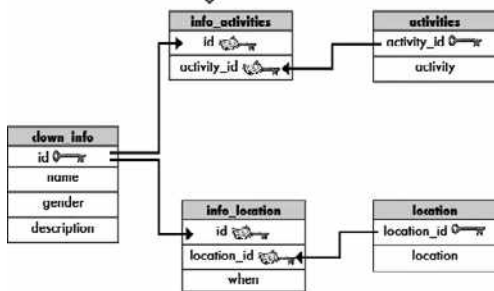
# 7 Outgrowing your table

Sometimes your single table isn't big enough anymore.

Your data has become more complex, and that **one table** you've been using just **isn't cutting it**. Your single table is full of redundant data, wasting space and slowing down your queries. You've gone as far as you can go with a single table. It's a big world out there, and sometimes you need **more than one table** to contain your data, control it, and ultimately, be the master of your own database.

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And so, Regis (and gregslis) lived happily ever after	339
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CLOWN TRACKING			
name	when	info	activity
Flora	2009-08-01	Flora, 1000, 1000, 1000, 1000	Flora, 1000
Flora	2009-08-01	Flora, 1000, 1000, 1000, 1000	Flora, 1000
Flora	2009-08-01	Flora, 1000, 1000, 1000, 1000	Flora, 1000



## joins and multi-table operations

## 8

**Can't we all just get along?**

**Welcome to a multi-table world.** It's great to have **more than one table** in your database, but you'll need to learn some **new tools and techniques** to work with them. With multiple tables comes confusion, so you'll need **aliases** to keep your tables straight. And **joins** help you connect your tables, so that you can get at all the data you've spread out. Get ready, it's time to **take control of your database** again.

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CREATE, SELECT and INSERT at the same time	353
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...and that's where  
little result tables  
really come from.



## subqueries

# 9

### Queries within queries

**Yes, Jack, I'd like a two-part question, please.** Joins are great, but sometimes you need to *ask your database more than one question*. Or *take the result of one query and use it as the input to another query*. That's where **subqueries** come in. They'll help you **avoid duplicate data, make your queries more dynamic**, and even get you in to all those high-end concert afterparties. (Well, not really, but two out of three ain't bad!)

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OUTER query

INNER query

Outer query

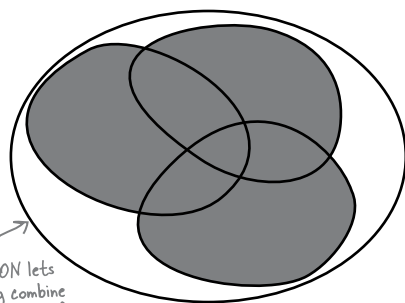
```
SELECT some_column, another_column
FROM table
WHERE column = (SELECT column FROM table);
```

Inner query

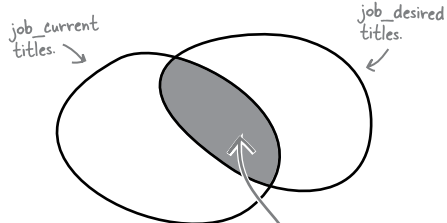
## outer joins, self-joins, and unions

**New maneuvers****10**

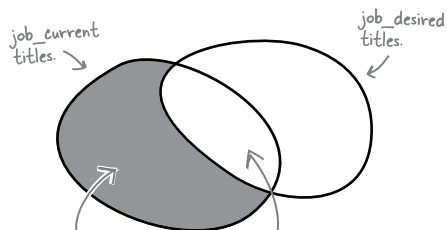
**You only know half of the story about joins.** You've seen cross joins that return every possible row, and inner joins that return rows from both tables where there is a match. But what you haven't seen are **outer joins** that give you back rows that *don't have matching counterparts in the other table*, **self-joins** which (strangely enough) *join a single table to itself*, and **unions** that *combine the results of queries*. Once you learn these tricks, you'll be able to get at all your data exactly the way you need to. (And we haven't forgotten about exposing the truth about subqueries, either!)



UNION lets Greg combine the results from these three separate queries into one table of results.



Titles must be in both tables to show up



Only titles that are NOT in the table specified by the EXCEPT show up.

Any titles that are in both tables will be excluded from the results.

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## constraints, views, and transactions

# 11

### Too many cooks spoil the database

**Your database has grown and other people need to use it.**

The problem is that some of them won't be as skilled at SQL as you are. You need ways to **keep them from entering the wrong data**, techniques for allowing them to **only see part of the data**, and ways to **stop them from stepping on each other when they try entering data at the same time**. In this chapter we begin protecting our data from the mistakes of others. Welcome to Defensive Databases, Part 1.

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security

**Protecting your assets****12**

**You've put an enormous amount of time and energy into creating your database.** And you'd be devastated if anything happened to it. You've also had to give other people **access to your data**, and you're worried that they might insert or update something incorrectly, or even worse, **delete the wrong data**. You're about to learn how databases and the objects in them can be made more **secure**, and how you can have complete control over **who can do what with your data**.

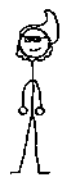
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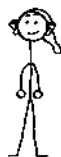
root



bashful



doc



dopey



grumpy



happy



sleepy



sneezy

## The Top Ten Topics (we didn't cover)



Even after all that, there's a bit more. There are just a few more things we think you need to know. We wouldn't feel right about ignoring them, even though they only need a brief mention. So before you put the book down, take a read through these **short but important SQL tidbits**.

Besides, once you're done here, all that's left is another appendix... and the index... and maybe some ads... and then you're really done. We promise!

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A	ABSOLUTE ACTION ADD ADMIN AFTER AGGREGATE ALIAS ALL ALLOCATE ALTER AND ANY ARE ARRAY AS ASC ASSERTION AT AUTHORIZATION
B	BEFORE BEGIN BINARY BIT BLOB BOOLEAN BOTH BREADTH BY
C	CALL CASCADE CASCADED CASE CAST CATALOG CHAR CHARACTER CHECK CLASS CLOB CLOSE COLLATE COLLATION COLUMN COMMIT COMPLETION CONNECT CONNECTION CONSTRAINT CONSTRAINTS CONSTRUCTOR CONTINUE CORRESPONDING CREATE CROSS CUBE CURRENT CURRENT_DATE CURRENT_PATH CURRENT_ROLE CURRENT_TIME CURRENT_TIMESTAMP CURRENT_USER CURSOR CYCLE
D	DATA DATE DAY DEALLOCATE DEC DECIMAL DECLARE DEFAULT DEFERRABLE DEFERRED DELETE DEPTH DEREK DESC DESCRIBE DESCRIPTOR DESTROY DESTRUCTOR DETERMINISTIC DICTIONARY DIAGNOSTICS DISCONNECT DISTINCT DOMAIN DOUBLE DROP DYNAMIC
E	EACH ELSE END END_EXEC EQUALS ESCAPE EVERY EXCEPT EXCEPTION EXEC EXECUTE EXTERNAL
F	FALSE FETCH FIRST FLOAT FOR FOREIGN FOUND FROM FREE FULL FUNCTION
G	GENERAL GET GLOBAL GO GOTO GRANT GROUP GROUPING
H	HAVING HOST HOUR
I	IDENTITY IGNORE IMMEDIATE IN INDICATOR INITIALIZE INITIALLY INNER INOUT INPUT INSERT INT INTEGER INTERSECT INTERVAL INTO IS ISOLATION ITERATE
J	JOIN
K	KEY
L	LANGUAGE LARGE LAST LATERAL LEADING LEFT LESS LEVEL LIKE LIMIT LOCAL LOCALTIME LOCALTIMESTAMP LOCATOR
M	MAP MATCH MINUTE MODIFIES MODIFY MODULE MONTH
N	NAMES NATIONAL NATURAL NCHAR NCLOB NEW NEXT NO NONE NOT NULL NUMERIC
O	OBJECT OF OFF OLD ON ONLY OPEN OPERATION OPTION OR ORDER ORDINALITY OUT OUTER OUTPUT
P	PAD PARAMETER PARAMETERS PARTIAL PATH POSTFIX PRECISION PREFIX PREORDER PREPARE PRESERVE PRIMARY PRIOR PRIVILEGES PROCEDURE PUBLIC
Q	
R	READ READS REAL RECURSIVE REF REFERENCES REFERENCING RELATIVE RESTRICT RESULT RETURN RETURNS REVOKE RIGHT ROLE ROLLBACK ROLLUP ROUTINE ROW ROWS
S	SAVEPOINT SCHEMA SCROLL SCOPE SEARCH SECOND SECTION SELECT SEQUENCE SESSION SESSION_USER SET SETS SIZE SMALLINT SOME SPACE SPECIFIC SPECIFICTYPE SQL SQLEXCEPTION SQUATITE SQLNAMING START STATE STATEMENT STATIC STRUCTURE SYSTEM USER
T	TABLE TEMPORARY TERMINATE THAN THEN TIME TIMESTAMP TIMEZONE_HOUR TIMEZONE_MINUTE TO TRAILING TRANSACTION TRANSLATION TREAT TRIGGER TRUE
U	UNDER UNION UNIQUE UNKNOWN UNNEST UPDATE USAGE USER USING
V	VALUE VALUES VARCHAR VARIABLE VARYING VIEW
W	WHEN WHEREWHERE WITH WITHOUT WORK WRITE
X	
Y	YEAR
Z	ZONE

```
File Edit Window Help
> SELECT CURRENT_DATE;
+-----+
| CURRENT_DATE |
+-----+
| 2007-07-26   |
+-----+
1 row in set (0.00 sec)
```

```
File Edit Window Help
> SELECT CURRENT_TIME;
+-----+
| CURRENT_TIME |
+-----+
| 11:26:48     |
+-----+
1 row in set (0.00 sec)
```

```
File Edit Window Help
SELECT CURRENT_USER;
+-----+
| CURRENT_USER |
+-----+
| root@localhost |
+-----+
1 row in set (0.00 sec)
```



# MySQL installation

## Try it out for yourself



All your new SQL skills won't do you much good without a place to apply them. This appendix contains instructions for getting your very own MySQL RDBMS for you to work with.

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# tools roundup

## All your new SQL tools



Here are all your SQL tools in one place for the first time, for one night only (kidding)! This is a roundup of all the SQL tools we've covered. Take a moment to survey the list and feel *great*—you learned them all!



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## Advance Praise for *Head First SQL*

“There are books you buy, books you keep, books you keep on your desk, and thanks to O’Reilly and the Head First crew, there is the penultimate category, Head First books. They’re the ones that are dog-eared, mangled, and carried everywhere. *Head First SQL* is at the top of my stack. Heck, even the PDF I have for review is tattered and torn.”

— **Bill Sawyer, ATG Curriculum Manager, Oracle**

“This is not SQL made easy; this is SQL made challenging, SQL made interesting, SQL made fun. It even answers that age-old question ‘How to teach non-correlated subqueries without losing the will to live?’ This is the right way to learn – it’s fast, it’s flippant, and it looks fabulous.”

— **Andrew Cumming, Author of *SQL Hacks*, Zoo Keeper at [sqlzoo.net](http://sqlzoo.net)**

“Outrageous! I mean, SQL is a *computer* language, right? So books about SQL should be written for *computers*, shouldn’t they? *Head First SQL* is *obviously* written for *human beings*! What’s up with *that*!?”

— **Dan Tow, Author of *SQL Tuning***

## **Praise for other *Head First* books**

“This book’s admirable clarity, humor and substantial doses of clever make it the sort of book that helps even non-programmers think well about problem-solving.”

— **Cory Doctorow, co-editor of *Boing Boing***  
Author, *Down and Out in the Magic Kingdom*  
and *Someone Comes to Town, Someone Leaves Town*

“If you thought Ajax was rocket science, this book is for you. Head Rush Ajax puts dynamic, compelling experiences within reach for every web developer.”

— **Jesse James Garrett, *Adaptive Path***

“I received the book yesterday and started to read it...and I couldn’t stop. This is definitely très ‘cool.’ It is fun, but they cover a lot of ground and they are right to the point. I’m really impressed.”

— **Erich Gamma, IBM Distinguished Engineer, and co-author of *Design Patterns***

“*Head First Design Patterns* managed to mix fun, belly-laughs, insight, technical depth and great practical advice in one entertaining and thought provoking read. Whether you are new to design patterns, or have been using them for years, you are sure to get something from visiting Objectville.”

— **Richard Helm, co-author of *Design Patterns***

“One of the funniest and smartest books on software design I’ve ever read.”

— **Aaron LaBerge, VP Technology, ESPN.com**

“I just finished reading HF OOA&D and I loved it! The thing I liked most about this book was its focus on why we do OOA&D – to write great software!”

— **Kyle Brown, Distinguished Engineer, IBM**

I *\*heart\** *Head First HTML with CSS & XHTML* – it teaches you everything you need to learn in a ‘fun coated’ format!”

— **Sally Applin, UI Designer and Fine Artist, <http://sally.com>**

## Praise for the *Head First* Approach

“It’s fast, irreverent, fun, and engaging. Be careful— you might actually learn something!”

— **Ken Arnold, former Senior Engineer at Sun Microsystems**  
**Co-author (with James Gosling of Java),**  
***The Java Programming Language***

“I feel like a thousand pounds of books have just been lifted off of my head.”

— **Ward Cunningham, inventor of the Wiki**  
**and founder of the Hillside Group**

“This book is close to perfect, because of the way it combines expertise and readability. It speaks with authority and it reads beautifully.”

— **David Gelernter, Professor of Computer Science, Yale University**

“Just the right tone for the geeked-out, casual-cool guru coder in all of us. The right reference for practical development strategies—gets my brain going without having to slog through a bunch of tired, stale professor-speak.”

— **Travis Kalanick, Founder of Scour and Red Swoosh Member of the MIT TR100**

“The combination of humour, pictures, asides, sidebars, and redundancy with a logical approach to introducing the basic tags and substantial examples of how to use them will hopefully have the readers hooked in such a way that they don’t even realize they are learning because they are having so much fun.”

— **Stephen Chapman, Fellgall.com**