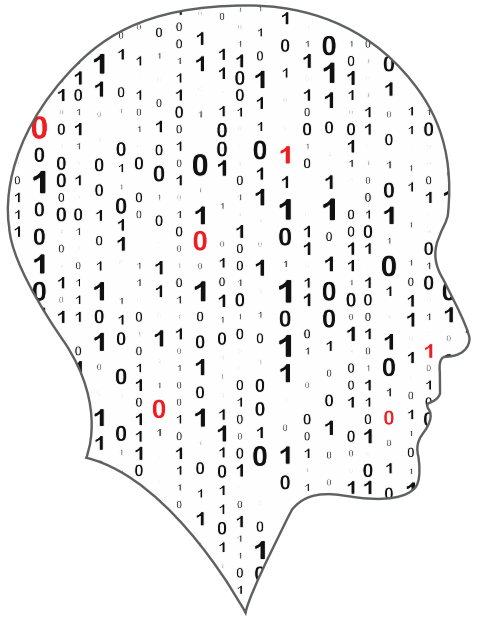
PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

An Roinn Oideachais agus Scileanna
Department of Education and Skills

National Workshop 5



LEAVING CERTIFICATE
COMPUTER SCIENCE

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Day 2 Session 3

ALT1 – Interactive Information Systems

By the end of this session participants will have …

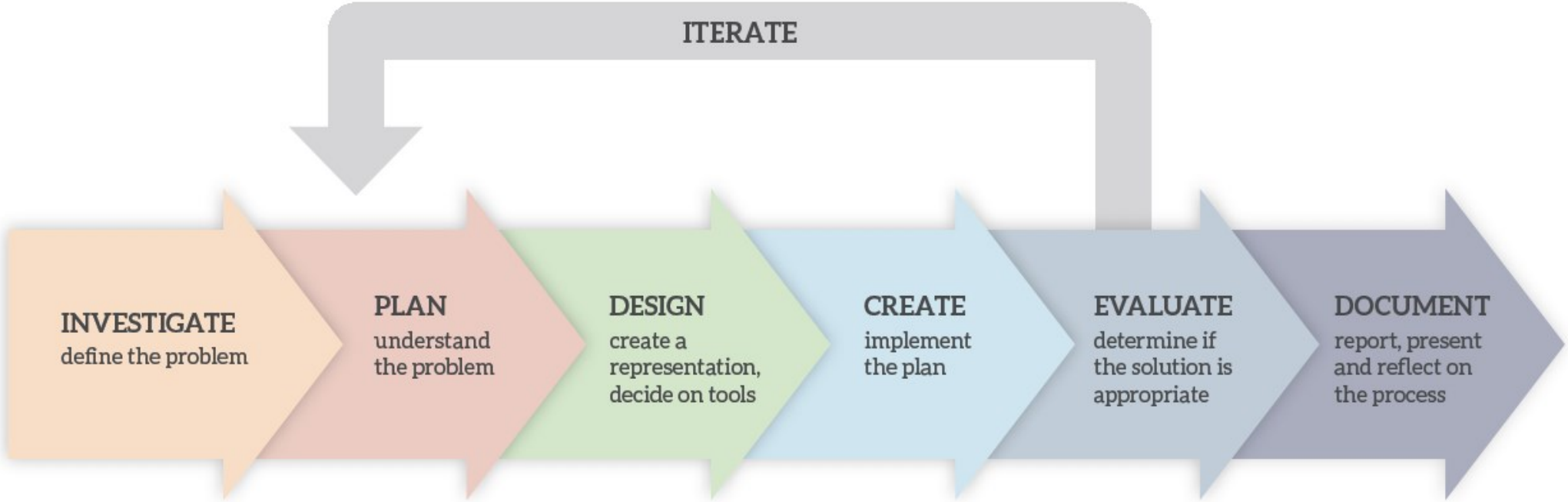
used a web application to populate a Firebase database

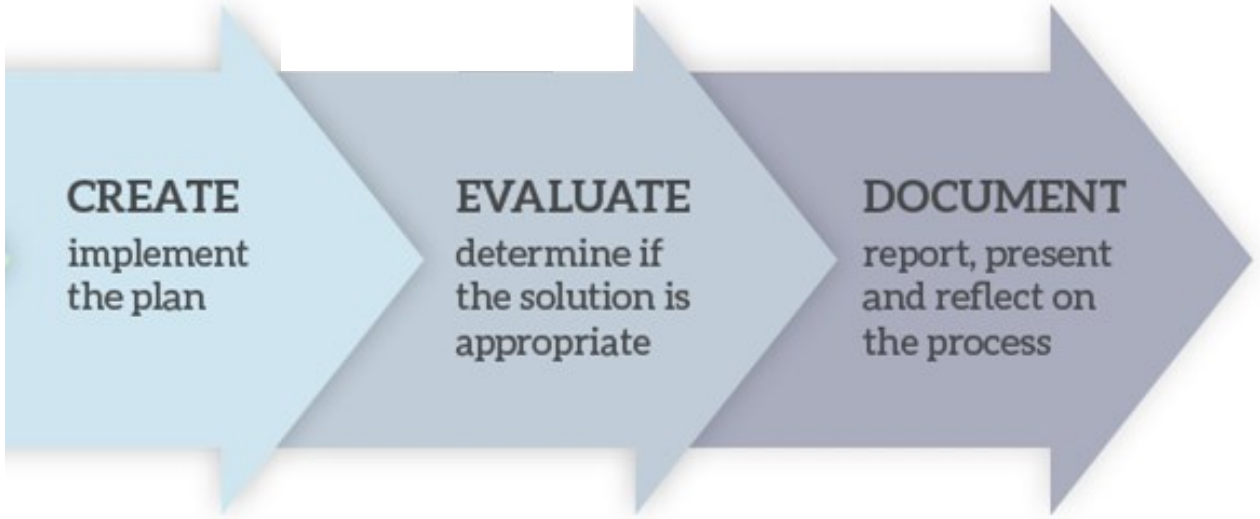
created their own instance of NoSQL/Cloud realtime database

participated in a code-along activity to develop a web application and insert/retrieve data from a NoSQL/Cloud database

enhanced their web development skills in the areas of HTML/CSS, JavaScript and database technologies

acquired additional skills, knowledge and ideas on how they will facilitate ALT1 in their own classrooms


ITERATE
INVESTIGATE
define the problem
PLAN
understand the problem
DESIGN
create a representation, decide on tools
CREATE
implement the plan
EVALUATE
determine if the solution is appropriate
DOCUMENT
report, present and reflect on the process


CREATE
implement the plan
EVALUATE
determine if the solution is appropriate
DOCUMENT
report, present and reflect on the process

Terminology / Concepts

What is a database?

Database vs. Database Management System

DBMS

Relational Databases

primary key

foreign key

field

record

non relational

System Architecture

SQL vs. NoSQL

Cloud Databases

Client-server model

sqlite

MySQL

Firebase

MS SQL Server

Front end system

Back end system

MS Access

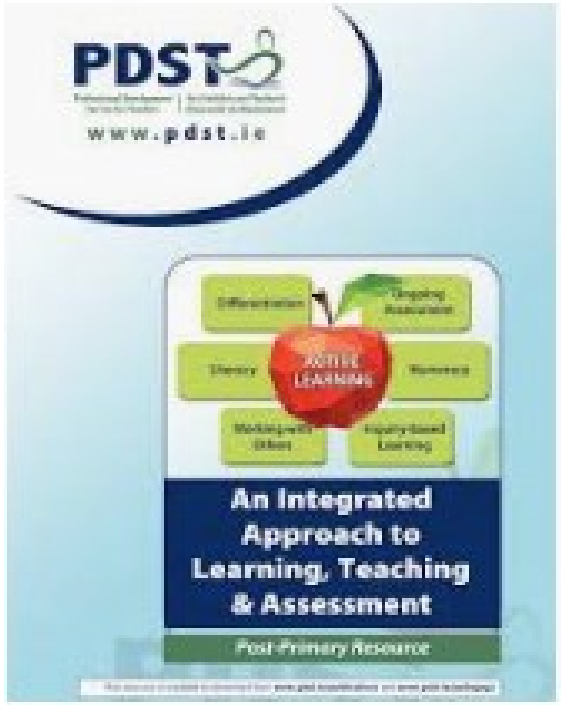
MongoDB

Base

HTML/CSS

JavaScript

An Integrated Approach to Learning, Teaching and Assessment



Know?	Want to know?	How will I find out more?	What have I learned?

KWHL Activity (Page 27)

PDST

Keywords to know

Tick the column that best describes your knowledge in relation to each term/topic

Term/Topic	Completely unfamiliar	Somewhat familiar	Very familiar	Completely familiar
Data (**raw data**)				
Database				
Relational Databases				
SQL				
NoSQL				
client server model				
Front end vs. backend systems				
HTML				
CSS				
JavaScript				
...				

Adapted from An Integrated Approach to Learning, Teaching & Assessment (Page 28)

Mentimeter

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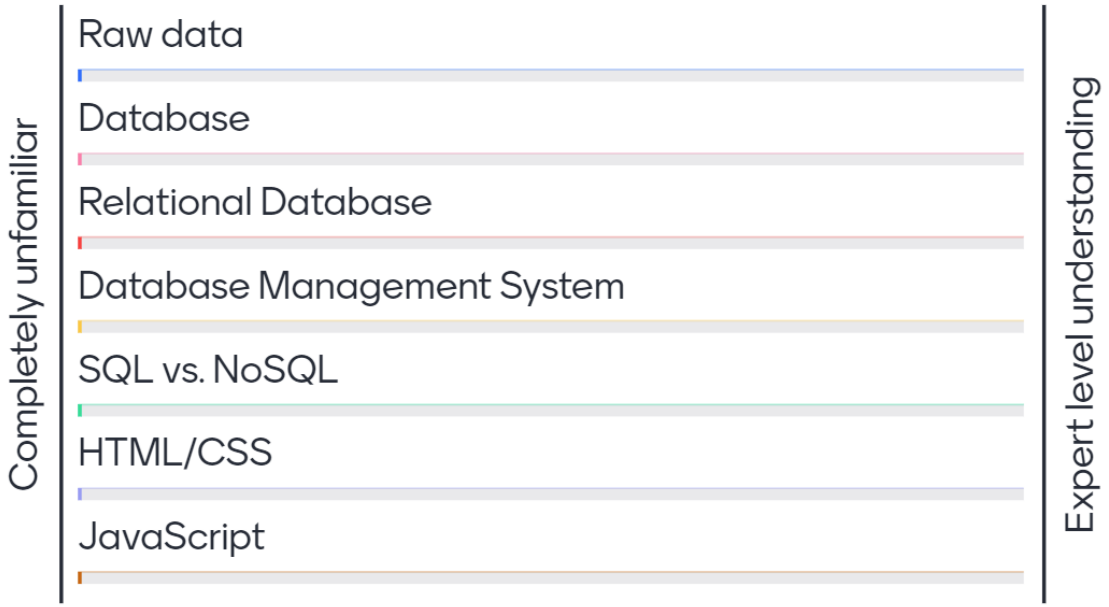
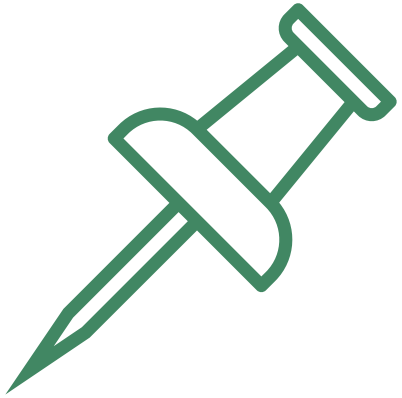
Go to **www.menti.com** and use the code **4092 6210**

Mentimeter

Please rate your own knowledge/understanding with respect to the following terms/topics





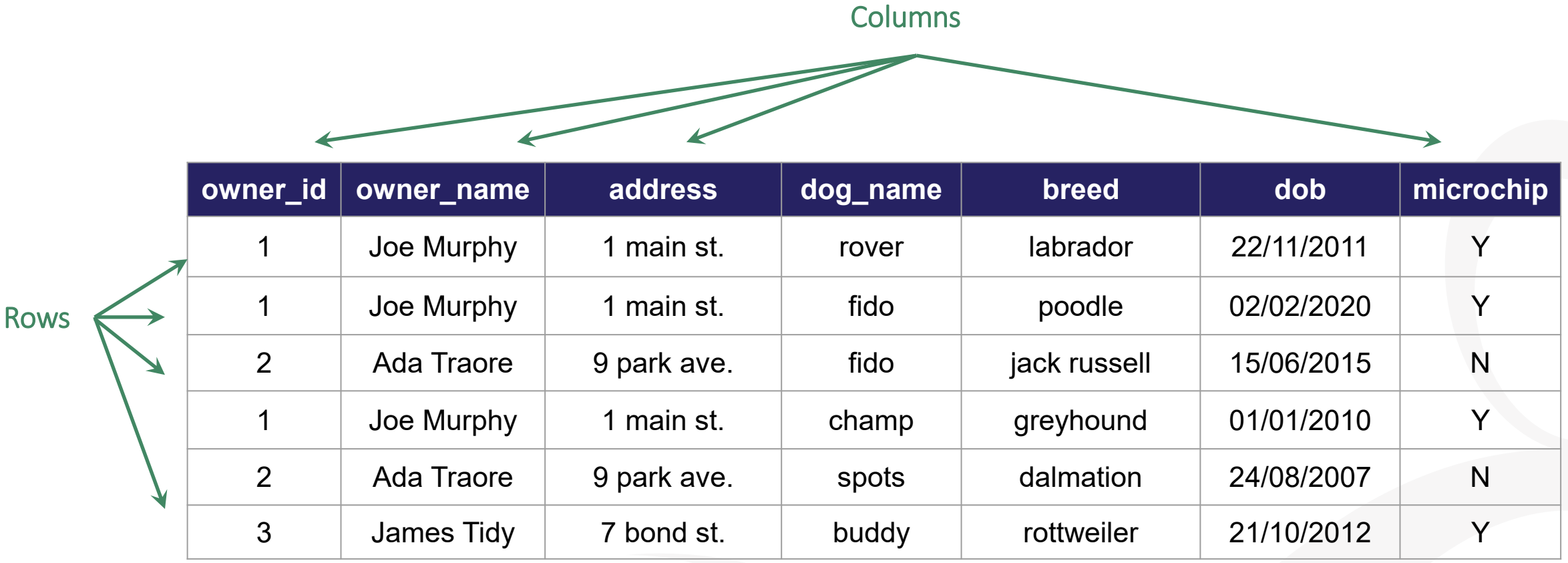
Key Message to remember:

Explore and teach the LOs through the lens of ALTs.

There are numerous ways to achieve this.

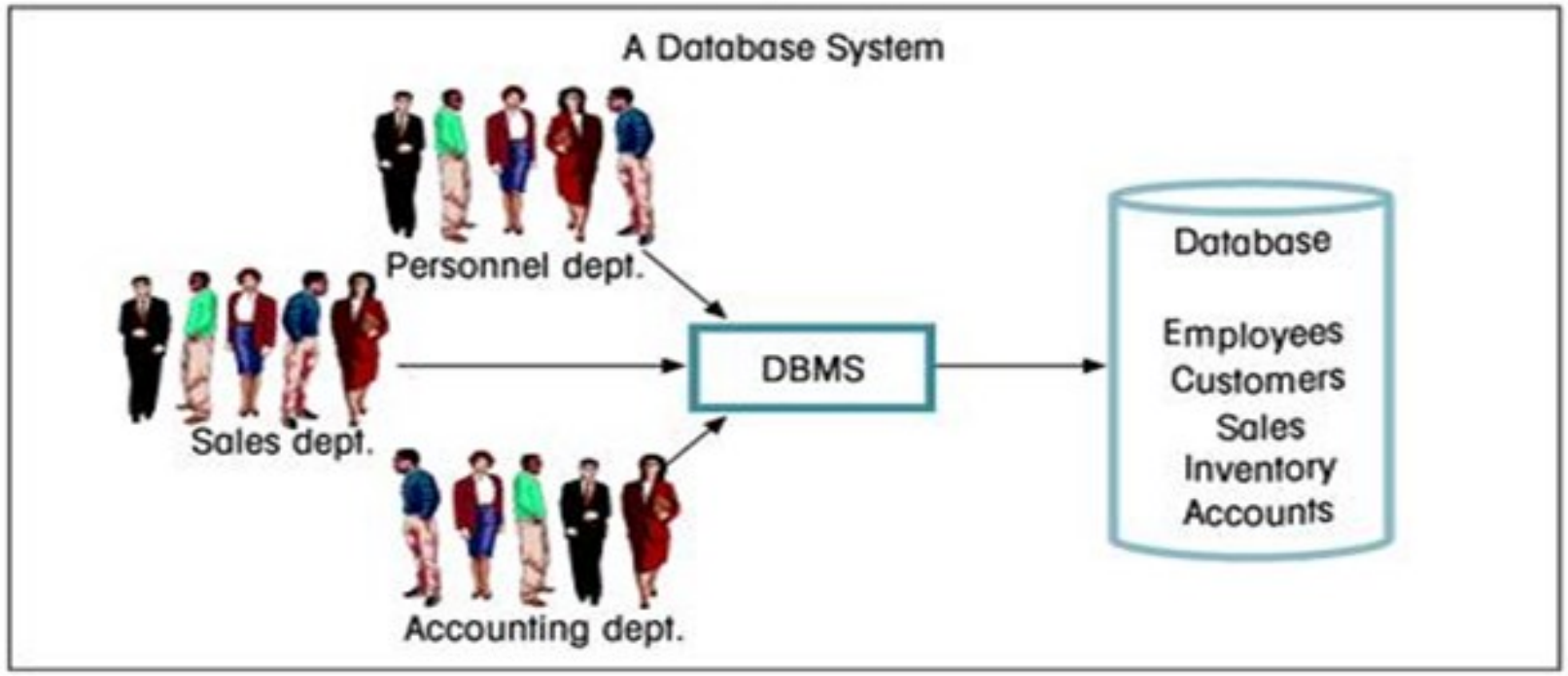
Database Concepts

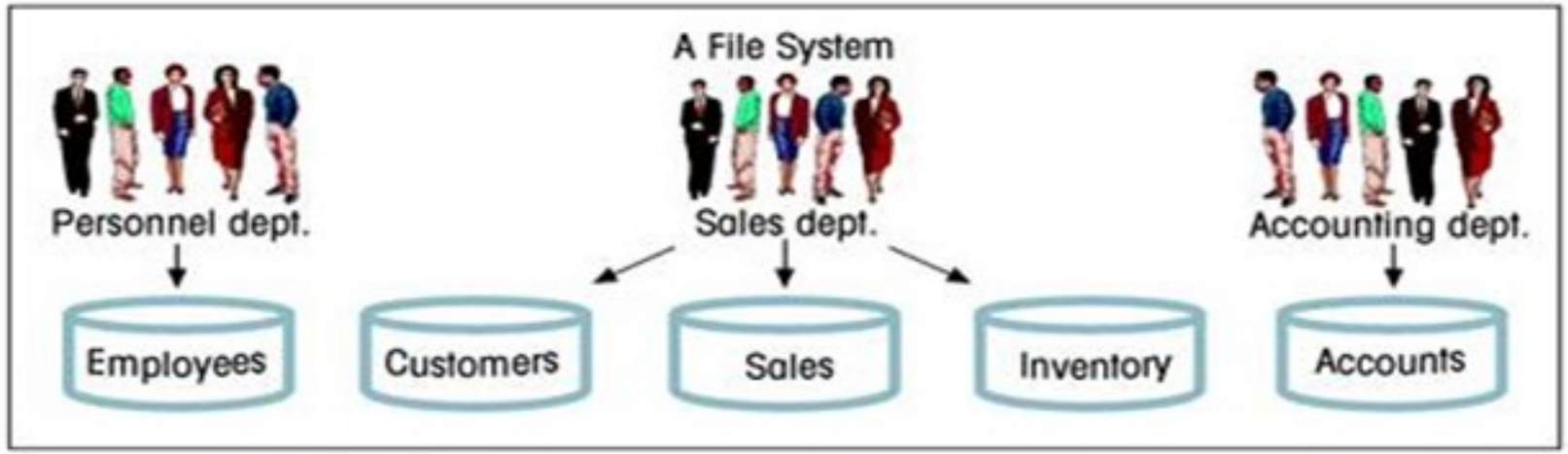
- **Database:** A structured collection of related data



owner_id	owner_name	address	dog_name	breed	dob	microchip
1	Joe Murphy	1 main st.	rover	labrador	22/11/2011	Y
1	Joe Murphy	1 main st.	fido	poodle	02/02/2020	Y
2	Ada Traore	9 park ave.	fido	jack russell	15/06/2015	N
1	Joe Murphy	1 main st.	champ	greyhound	01/01/2010	Y
2	Ada Traore	9 park ave.	spots	dalmation	24/08/2007	N
3	James Tidy	7 bond st.	buddy	rottweiler	21/10/2012	Y

- Data is stored in **tables** - organised by rows (tuples) and columns (attributes)
- Each row is called a **record**
- Each attribute value is called a **field**


A Database System
Personnel dept.
Sales dept.
Accounting dept.
DBMS
Database
Employees
Customers
Sales
Inventory
Accounts


A File System
Personnel dept.
Sales dept.
Accounting dept.
Employees
Customers
Sales
Inventory
Accounts

Database Concepts

- **Table:** A set of data elements (values) organised by rows (records) and columns (values)
- **Attribute:** A characteristic of the data in the table, describing a field or cell in a table.
- **Primary Key:** A unique identifier for a row in a table

Would `dog_name` be a good PK?

What about `breed`?

dog_id	dog_name	breed	dob	microchip
1	rover	labrador	22/11/2011	Y
2	fido	poodle	02/02/2020	Y
3	fido	jack russell	15/06/2015	N
4	champ	greyhound	01/01/2010	Y
5	spots	dalmation	24/08/2007	N
6	buddy	rottweiler	21/10/2012	Y

Database Concepts

owner_id	owner_name	address	dog_name	breed	dob	microchip
1	Joe Murphy	1 Main st.	rover	labrador	22/11/2011	Y
1	Joe Murphy	1 Main St.	fido	poodle	02/02/2020	Y
2	Ada Traore	9 Park Ave.	fido	jack russell	15/06/2015	N
1	Joe Murphy	1 Main St.	champ	greyhound	01/01/2010	Y
2	Ada Traore	9 Park Ave.	spots	dalmation	24/08/2007	N
3	James Tidy	7 Bond St.	buddy	rottweiler	21/10/2012	Y

- How do add a new customer (unless they order dog)?
- How do we update a record that occurs multiple times?
- How do we ensure we don't delete too much information?

Primary Key

ID	fname	sname	address	...	email	...
1	Joe	Murphy	1 Main St.	...	jmurphy@outlook.ie	...
2	Ada	Traore	9 Park Ave.	...	at@gmail.com	...
3	James	Tidy	7 Bond St.	...	tidy@outlook.ie	...
4	Joe	Murphy	1 Park Ave.	...	murphyj@yahoo.com	...

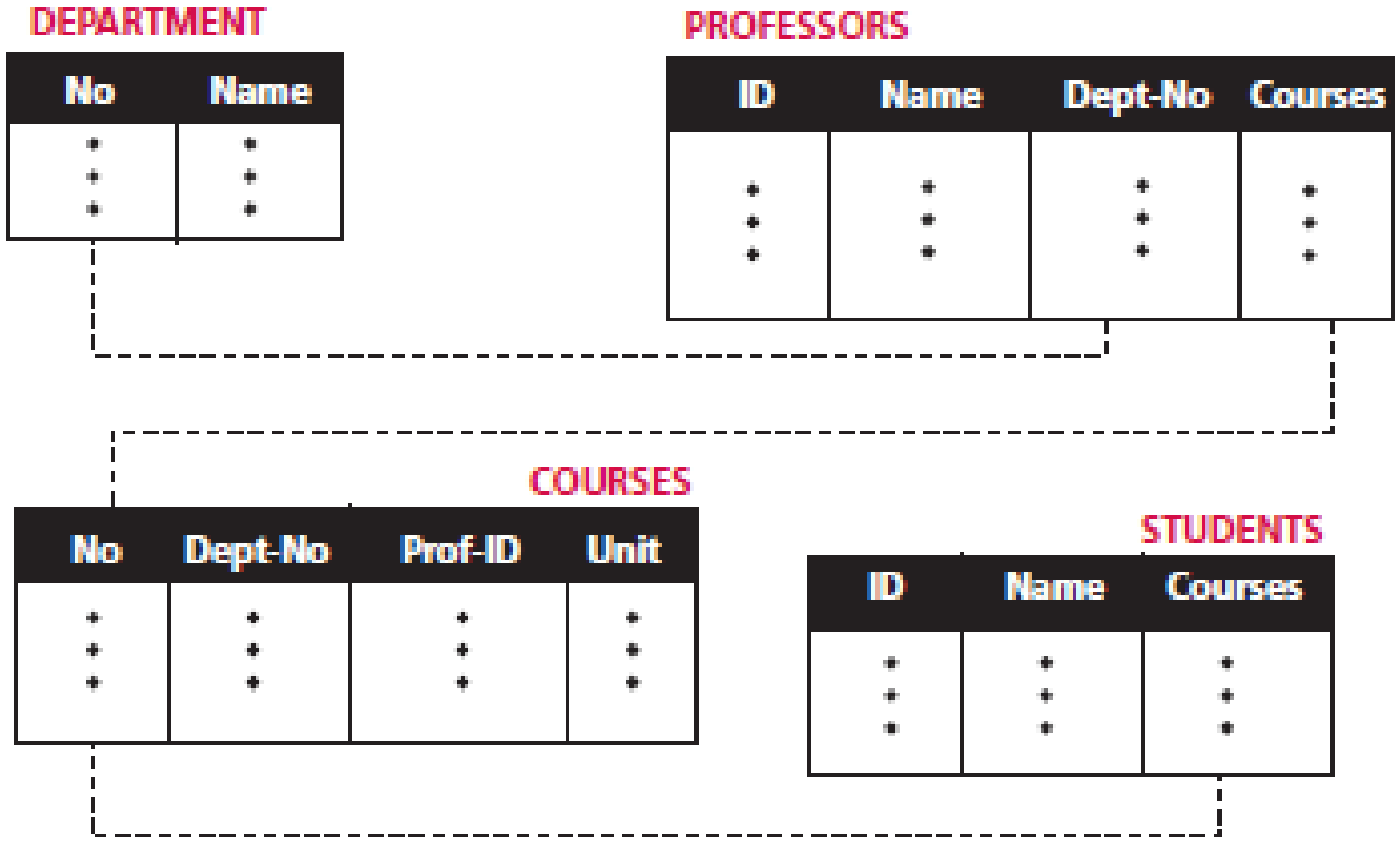
Foreign Key

Foreign Key (FK): An attribute in a table that is used as a primary key in another table.

A FK provides the relationship by linking one table to another

dog_id	name	breed	dob	microchip	owner_id
1	rover	labrador	22/11/2011	Y	1
2	fido	poodle	02/02/2020	Y	1
3	fido	jack russell	15/06/2015	N	2
4	champ	greyhound	01/01/2010	Y	1
5	spots	dalmation	24/08/2007	N	2
6	buddy	rottweiler	21/10/2012	Y	3

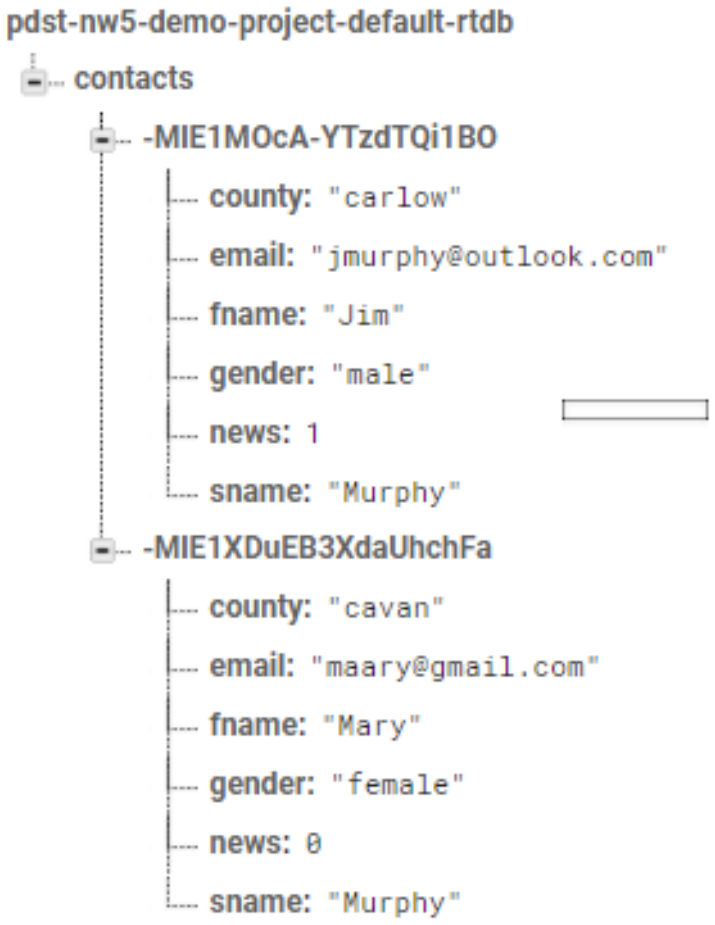
Relational Model



Structured Query Language (SQL) vs. NoSQL

fname	sname	county	gender	email	news
Joe	Murphy	carlow	male	jmurphy@outlook.ie	Yes
Mary	Murphy	cavan	female	maary@gmail.com	No

Relational Model (SQL Based)



Cloud Model (NoSQL)

Structured Query Language (SQL)

INSERT

DELETE

Structured Query Language (SQL)

UPDATE

COURSES

No	Course-Name	Unit
CIS15	Intro to C	5
CIS17	Intro to Java	5
CIS19	UNIX	4
CIS51	Networking	5
CIS52	TCP/IP	6

Command

```
update COURSES
set Unit = 6
where No = "CIS51"
```

COURSES

No	Course-Name	Unit
CIS15	Intro to C	5
CIS17	Intro to Java	5
CIS19	UNIX	4
CIS51	Networking	6
CIS52	TCP/IP	6

SELECT

COURSES

No	Course-Name	Unit
CIS15	Intro to C	5
CIS17	Intro to Java	5
CIS19	UNIX	4
CIS51	Networking	5
CIS52	TCP/IP	6

Command

```
select *
from COURSES
where Unit =5
```

No	Course-Name	Unit
CIS15	Intro to C	5
CIS17	Intro to Java	5
CIS51	Networking	5

COURSES

No	Course-Name	Unit
CIS15	Intro to C	5
CIS17	Intro to Java	5
CIS19	UNIX	4
CIS51	Networking	5
CIS52	TCP/IP	6

Command

```
select No, Unit
from COURSES
```

No	Unit
CIS15	5
CIS17	5
CIS19	4
CIS51	5
CIS52	6

Stretch break

Code along Demo/Tutorial

https://drive.google.com/file/d/1ILz-fNf7daGu533FNaoK6Y7m8J5-H98v/view

- **Task 1.** Getting Started. Setting up the Home page

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- **Task 2.** Create a Contact Us page

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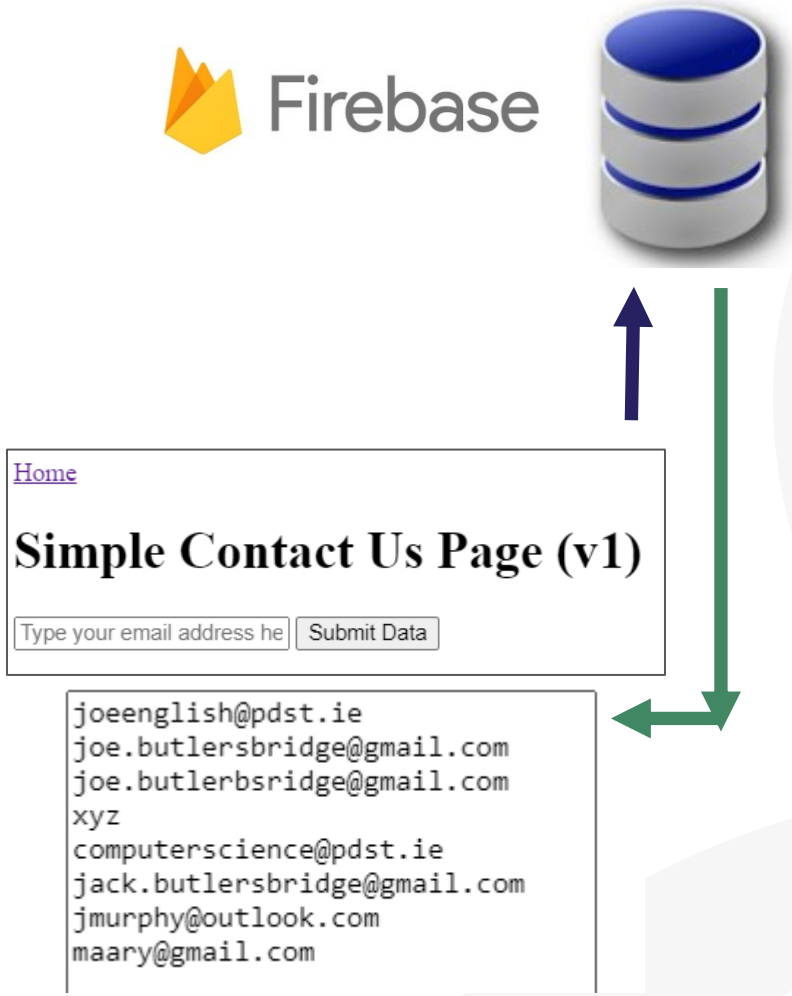
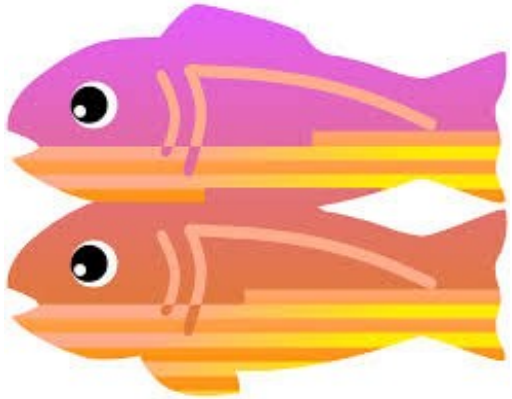
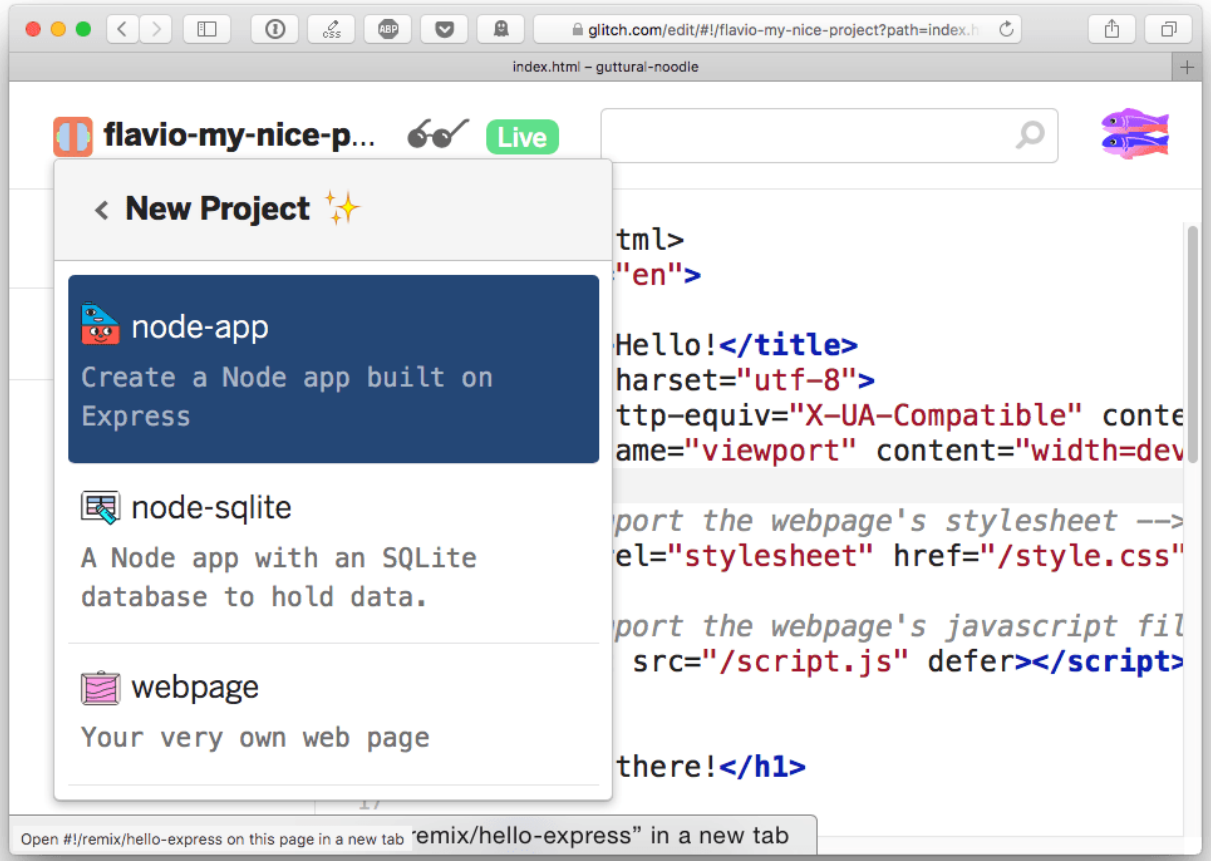
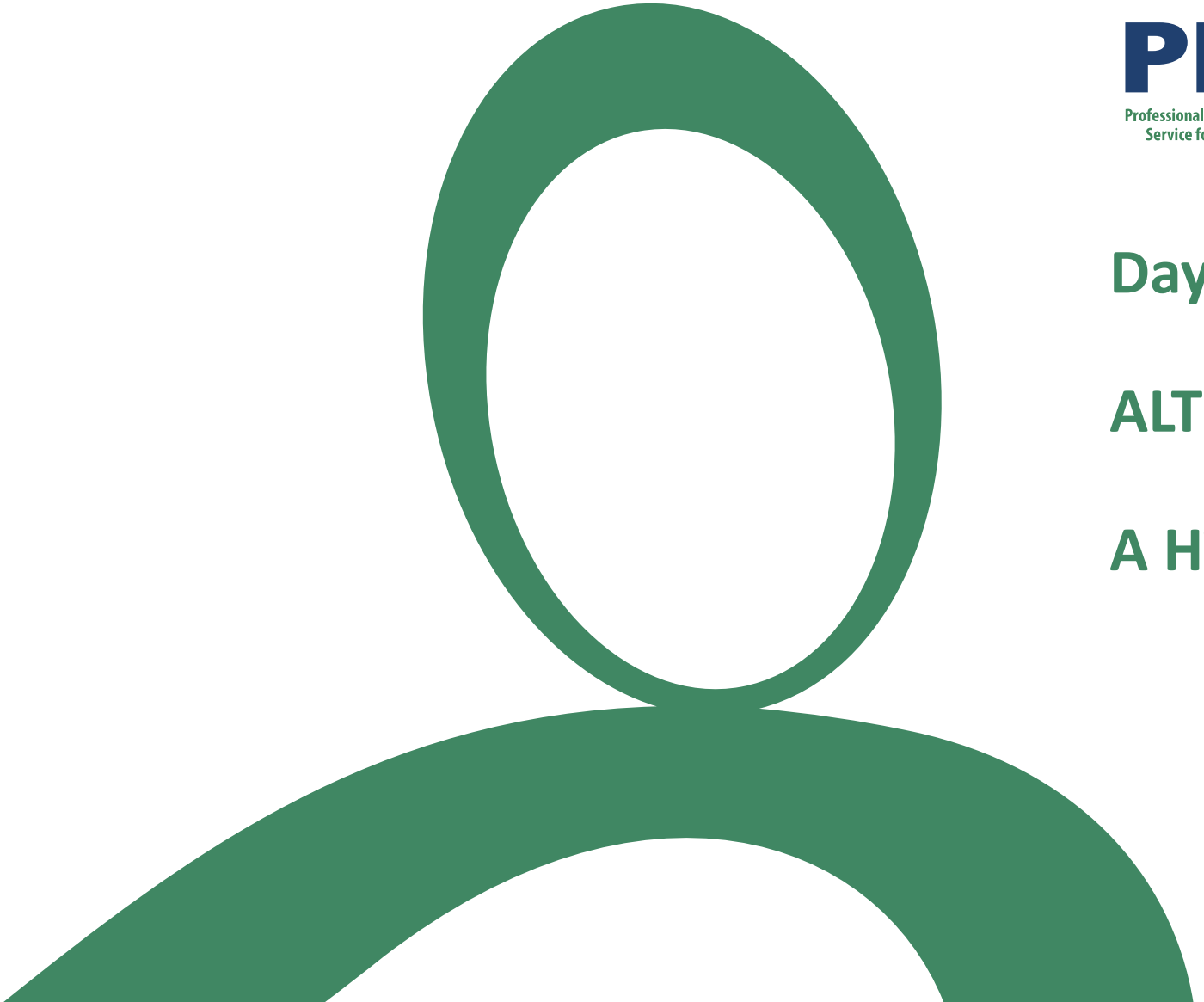
- **Task 3.** Setup Firebase
- **Task 4.** Save contact data to Firebase

- **Task 1.** Getting Started. Setting up the Home page
- **Task 2.** Create a Contact Us page
- **Task 3.** Setup Firebase
- **Task 4.** Save contact data to Firebase
- **Task 5.** Read (and display) data from Firebase






glitch.com/edit/#!/flavio-my-nice-project?path=index.h
index.html – guttural-noodle
flavio-my-nice-p...
Live
New Project
node-app
Create a Node app built on Express
node-sqlite
A Node app with an SQLite database to hold data.
webpage
Your very own web page
tml>
"en">
Hello!</title>
harset="utf-8">
ttp-equiv="X-UA-Compatible" conte
ame="viewport" content="width=dev
port the webpage's stylesheet -->
el="stylesheet" href="/style.css"
port the webpage's javascript fil
src="/script.js" defer></script>
there!</h1>
Open #!/remix/hello-express on this page in a new tab
emix/hello-express" in a new tab



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Day 2 Session 3

ALT1 – Interactive Information Systems

A HTML – Open Office Base solution

Fwd: Computer Science PDST - t | sqlite v1 | index.html

File | C:/Users/tonym/OneDrive/Documents/pdst/Database/site/index.html

Welcome to the Book Club website

Read the latest book reviews:

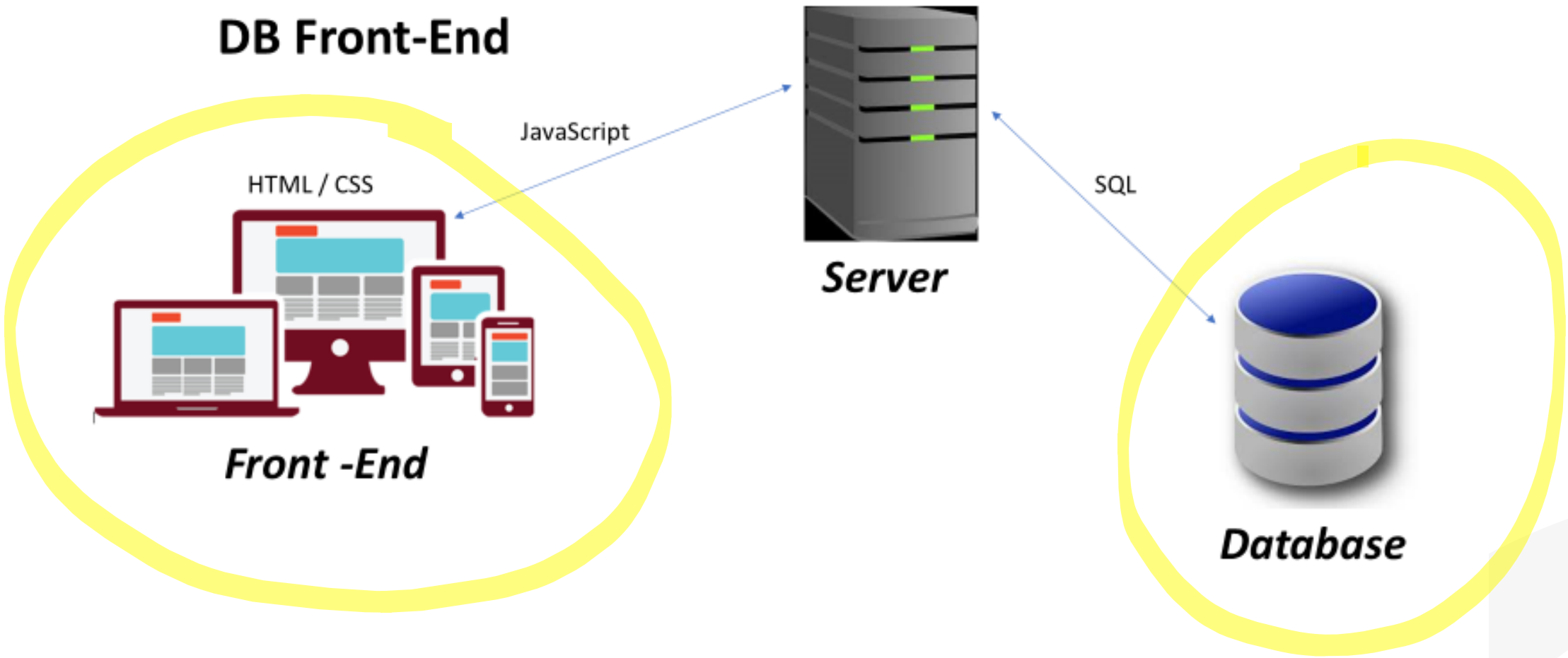
I found Text and Tests a super read.
T n T 2 was particularly brilliant.

Book_club.odb
Size: 4.06KB

See link to the latest book suggestions.Feel free to make your own: Book Suggestions

https://luxuriant-boom-cannon.glitch.me

Client-Server Model
DB Front-End



Ireland Women's Hockey Team

Base

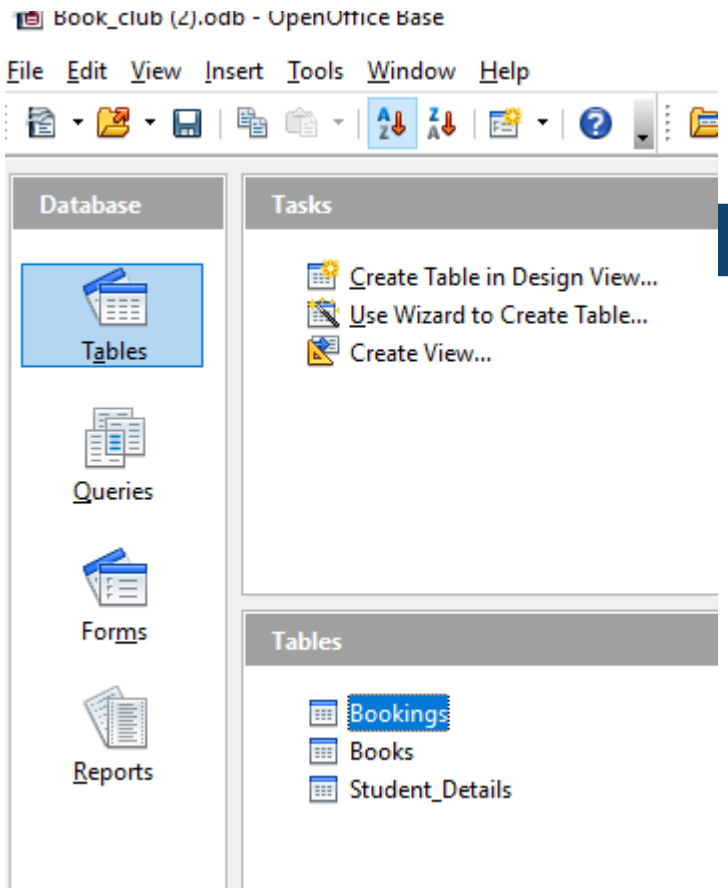
- Book Club
  - 1-table
  - > 1 table

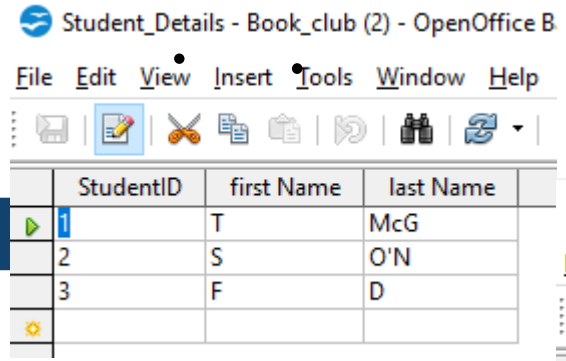
Book Club – Database design

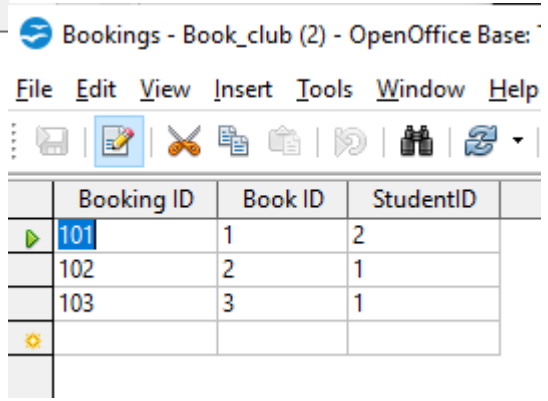
- Fields

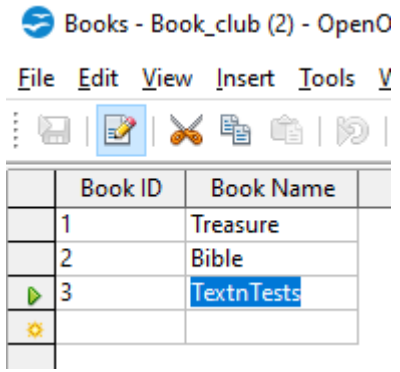
ID	FName	LName	Email	Age	Phone	Booking_ID	Date due	Book_Name	Book_ID	Fee_paid	O/D

Book Club - Tables



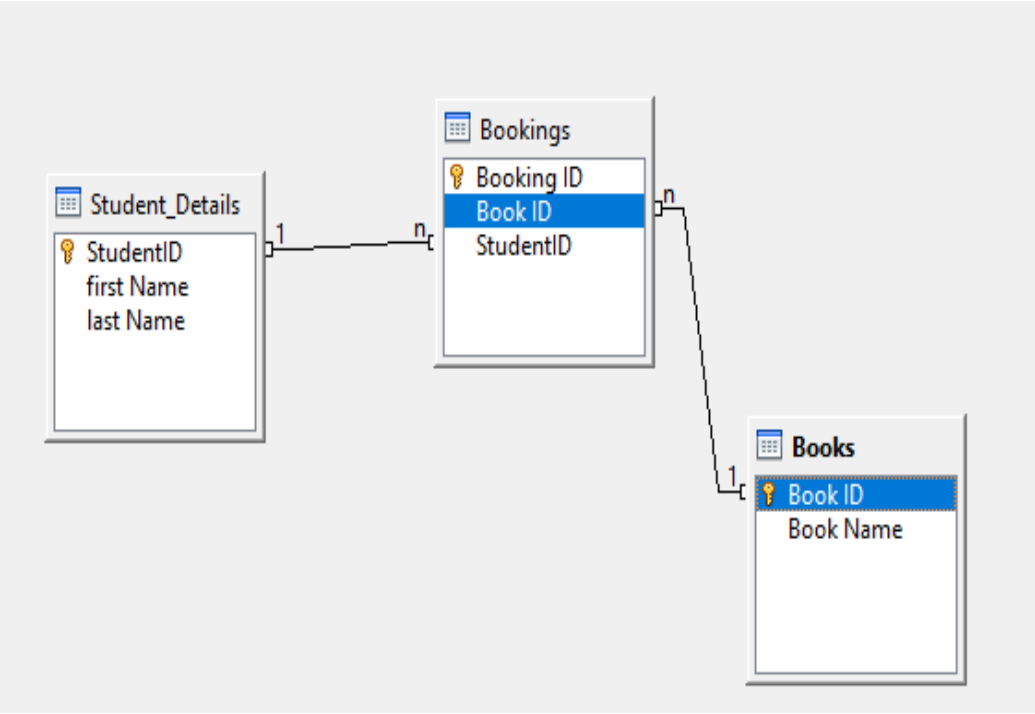






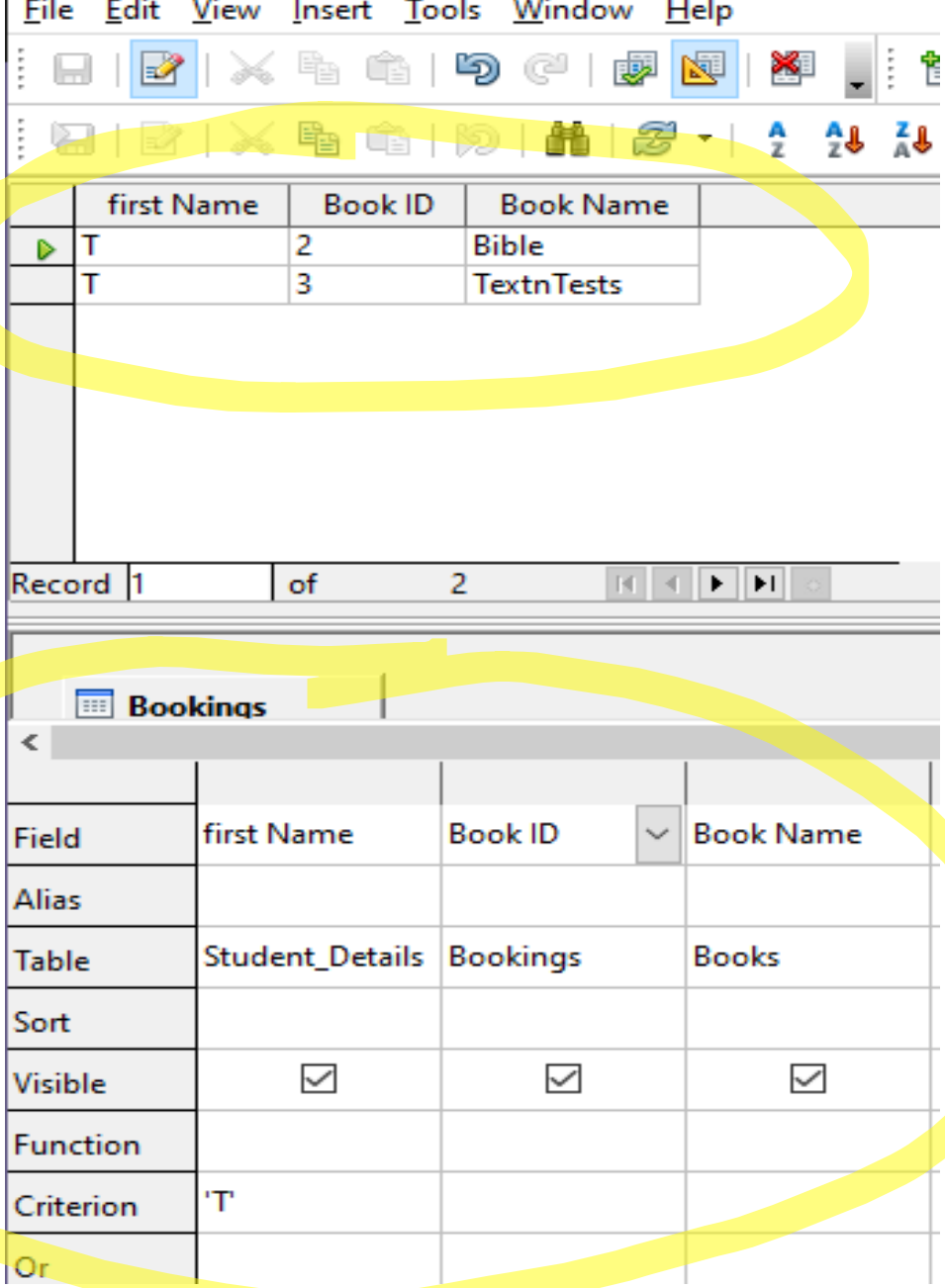
Relationships / Queries

- Relationships



Queries

You want to get the first name and the Book IDs and Book Names for books borrowed by the Student with StudentID 1.


File Edit View Insert Tools Window Help
first Name
Book ID
Book Name
T
2
Bible
T
3
TextnTests
Record 1 of 2
Bookings
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Book ID
Book Name
Alias
Table
Student_Details
Bookings
Books
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'T'
Or

Fwd: Computer Science PDST - t | sqlite v1 | index.html

File | C:/Users/tonym/OneDrive/Documents/pdst/Database/site/index.html

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Link to Suggestions

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