Web Programming

YJ – Oct 2015

MySQL and AJAX

- Database Concepts
- SQL
- ER Diagram
- Case Study
- Ajax

SQL

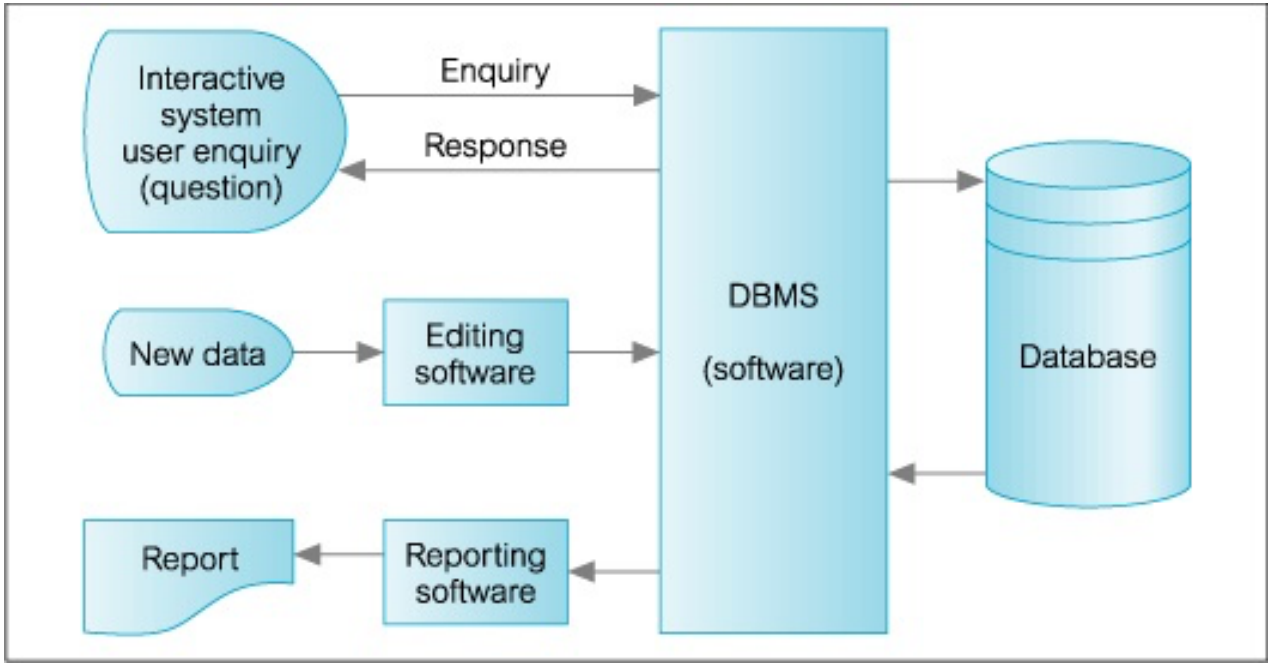
SQL is a database computer language designed for the retrieval and management of data in relational database. SQL stands for Structured Query Language.

SQL is the standard language for Relation Database System. All relational database management systems like MySQL, MS Access, Oracle, Sybase, Informix, postgres and SQL Server use SQL as standard database language.

- Allows users to access data in relational database management systems.
- Allows users to describe the data.
- Allows users to define the data in database and manipulate that data.
- Allows to embed within other languages using SQL modules, libraries & pre-compilers.
- Allows users to create and drop databases and tables.
- Allows users to create view, stored procedure, functions in a database.
- Allows users to set permissions on tables, procedures, and views

RDBMS

- RDBMS stands for **R**elational **D**atabase **M**anagement **S**ystem. RDBMS is the basis for SQL, and for all modern database systems like MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.



Popular RDBMS

- MySQL

  MySQL is an open source SQL database, which is developed by Swedish company MySQL AB. MySQL comes with a very fast, multi-threaded, multi-user, and robust SQL database server.

- MS SQL Server

  MS SQL Server is a Relational Database Management System developed by Microsoft Inc.

- ORACLE

  It is a very large and multi-user database management system. Oracle is a relational database management system developed by 'Oracle Corporation'.

  Oracle works to efficiently manage its resource, a database of information, among the multiple clients requesting and sending data in the network.

  It is an excellent database server choice for client/server computing. Oracle supports all major operating systems for both clients and servers, including MSDOS, NetWare, UnixWare, OS/2 and most UNIX flavors.

- MS ACCESS

  Microsoft Access is an entry-level database management software. MS Access database is not only an inexpensive but also powerful database for small-scale projects.

SQL Syntax

```
SELECT SUM(column_name)
FROM   table_name
WHERE  CONDITION
GROUP BY column_name
HAVING (ARITHMETIC FUNCTION CONDITION)
ORDER BY COLUMN1, COLUMN2

UNION

SELECT SUM(column_name)
FROM   table_name
WHERE  CONDITION
GROUP BY column_name
HAVING (arithmetic function condition)
ORDER BY COLUMN1, COLUMN2
;
```

Like

Statement	Description
WHERE SALARY LIKE '200%'	Finds any values that start with 200
WHERE SALARY LIKE '%200%'	Finds any values that have 200 in any position
WHERE SALARY LIKE '_00%'	Finds any values that have 00 in the second and third positions
WHERE SALARY LIKE '2_%_%'	Finds any values that start with 2 and are at least 3 characters in length
WHERE SALARY LIKE '%2'	Finds any values that end with 2
WHERE SALARY LIKE '_2%3'	Finds any values that have a 2 in the second position and end with a 3
WHERE SALARY LIKE '2___3'	Finds any values in a five-digit number that start with 2 and end with 3

SELECT * **FROM** CITY **WHERE NAME like 'TIANJI_'**;

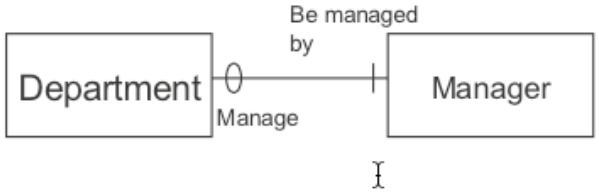
Limit

The LIMIT clause is used to specify the number of records to return.
The LIMIT clause can be very useful on large tables with thousands of records.
Returning a large number of records can impact on performance.

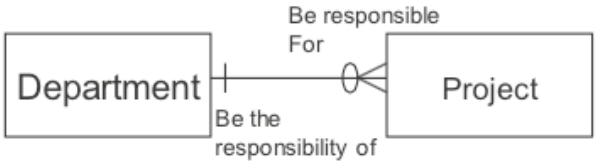
```
SELECT column_name FROM table_name
WHERE [condition]
LIMIT 2
ORDER BY column_name DESC;

SELECT * FROM CITY LIMIT 10 OFFSET 15;
```

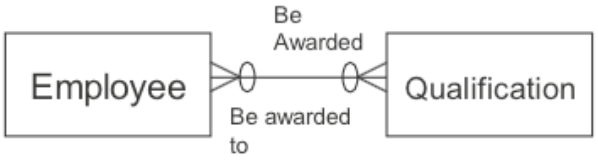
Entity Relationship



One-To-One

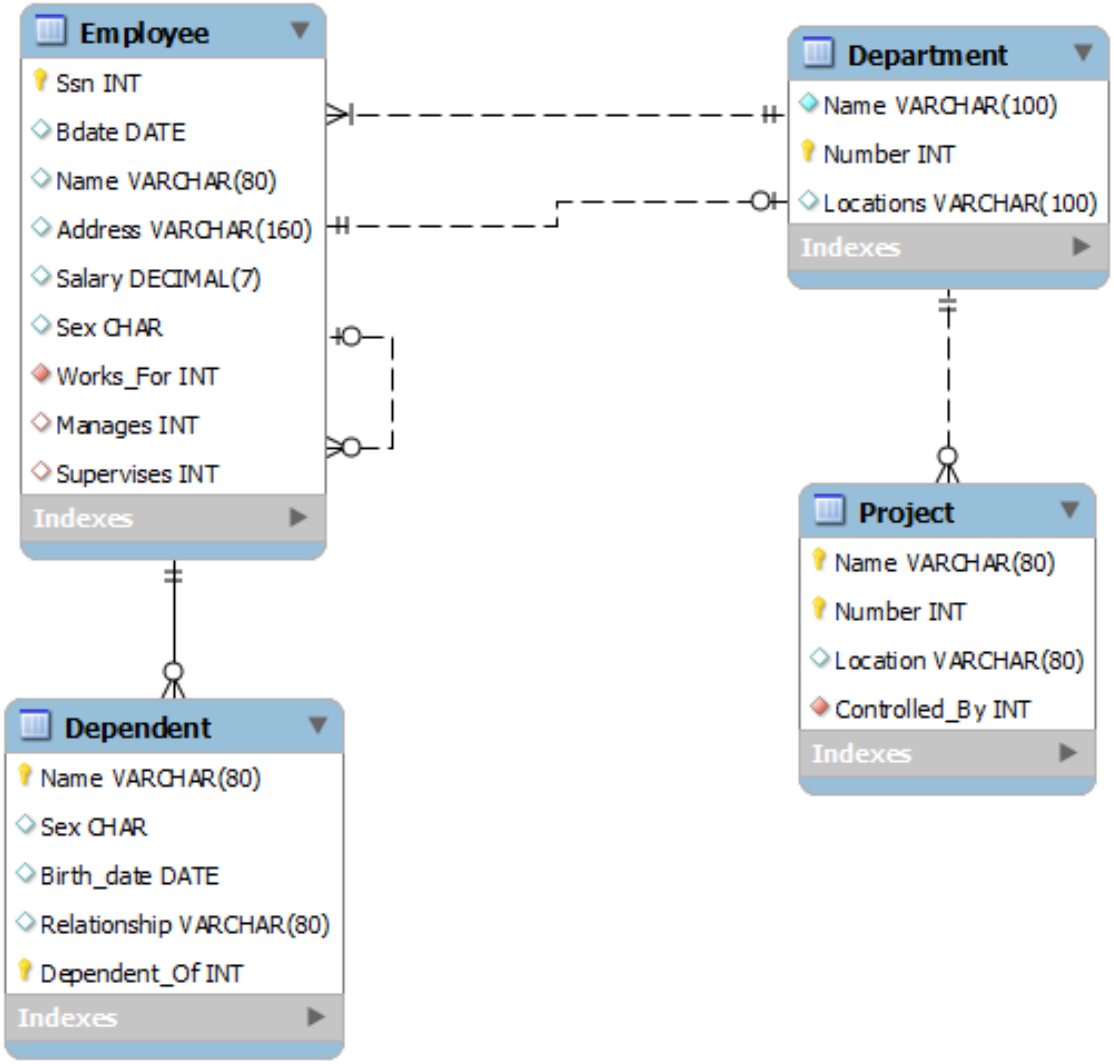


One-To-Many



Many-To-Many

Entity Relationship



Functional Dependency

An attribute B is FUNCTIONALLY DEPENDENT on another attribute A, if a value of A determines a single value of B at any one time.

ORDER-NUMBER➔ORDER-DATE

ORDER-NUMBER, PART-NUMBER ➔ QTY-ORDERED, PART-DESCRIPTION

- here although qty-ordered is **fully dependent** on order-number and part-number, only part-number is required to determine part-description
- part-description is said to be **partially dependent** on order-number and part- number

INVOICE-NUMB ➔ CUSTOMER-NUMB ➔ CUSTOMER-NAME

- **transitive dependency** occurs when Y depends on X, and Z depends on Y - thus Z also depends on X ie. X➔Y➔Z

Unormalised Form (UNF)

PROJ_NUM	PROJ_NAME	EMP_NUM	EMP_NAME	JOB_CLASS	CHG_HOUR	HOURS
15	Evergreen	103	June E. Arbough	Elect. Engineer	84.50	23.8
		101	John G. News	Database Designer	105.00	19.4
		105	Alice K. Johnson *	Database Designer	105.00	35.7
		106	William Smithfield	Programmer	35.75	12.6
		102	David H. Senior	Systems Analyst	96.75	23.8
18	Amber Wave	114	Annelise Jones	Applications Designer	48.10	24.6
		118	James J. Frommer	General Support	18.36	45.3
		104	Anne K. Ramoras *	Systems Analyst	96.75	32.4
		112	Darlene M. Smithson	DSS Analyst	45.95	44.0
22	Rolling Tide	105	Alice K. Johnson	Database Designer	105.00	64.7
		104	Anne K. Ramoras	Systems Analyst	96.75	48.4
		113	Delbert K. Joenbrood *	Applications Designer	48.10	23.6
		111	Geoff B. Wabash	Clerical Support	26.87	22.0
		106	William Smithfield	Programmer	35.75	12.8
25	Starflight	107	Maria D. Alonzo	Programmer	35.75	24.6
		115	Travis B. Bawangi	Systems Analyst	96.75	45.8
		101	John G. News *	Database Designer	105.00	56.3
		114	Annelise Jones	Applications Designer	48.10	33.1
		108	Ralph B. Washington	Systems Analyst	96.75	23.6
		118	James J. Frommer	General Support	18.36	30.5
		112	Darlene M. Smithson	DSS Analyst	45.95	41.4

First Normal Form (1NF)

A RELATION IS IN FIRST NORMAL FORM (1NF) IF

- a unique key has been identified for each tuple/row.
- it is a valid relation
  - Entity integrity (no part of PK is null)
  - Single value for each cell.
  - No repeating group.
- all attributes are functionally dependent on all or part of the primary key

2NF & 3NF

A RELATION IS IN 2NF IF -

- all non key attributes are functionally dependent on the entire key
- ie. no partial dependencies exist

A RELATION IS IN 3NF IF –

- all transitive dependencies have been removed - check for non key attribute dependent on another non key attribute
- Move from 2NF to 3NF by removing transitive dependencies

Entire Process UNF to 3NF

- UNF
  PROJECT (proj_num, proj_name {emp_num, emp_name, job_class, chg_hour, assign_hours})

- 1NF – remove repeating group
  PROJECT (proj_num, proj_name)
  ASSIGN (proj_num, emp_num, emp_name, job_class, chg_hour, assign_hours)

- 2NF – remove partial dependencies
  PROJECT (proj_num, proj_name)
  EMPLOYEE (emp_num, emp_name, job_class, chg_hour)
  ASSIGN (proj_num, emp_num, assign_hours)

- 3NF
  PROJECT (proj_num, proj_name)
  EMPLOYEE (emp_num, emp_name, job_class)
  ASSIGN (proj_num, emp_num, assign_hours)
  JOB (job_class, chg_hour)

Case Study

Pizza shop

Types of pizza

Orders

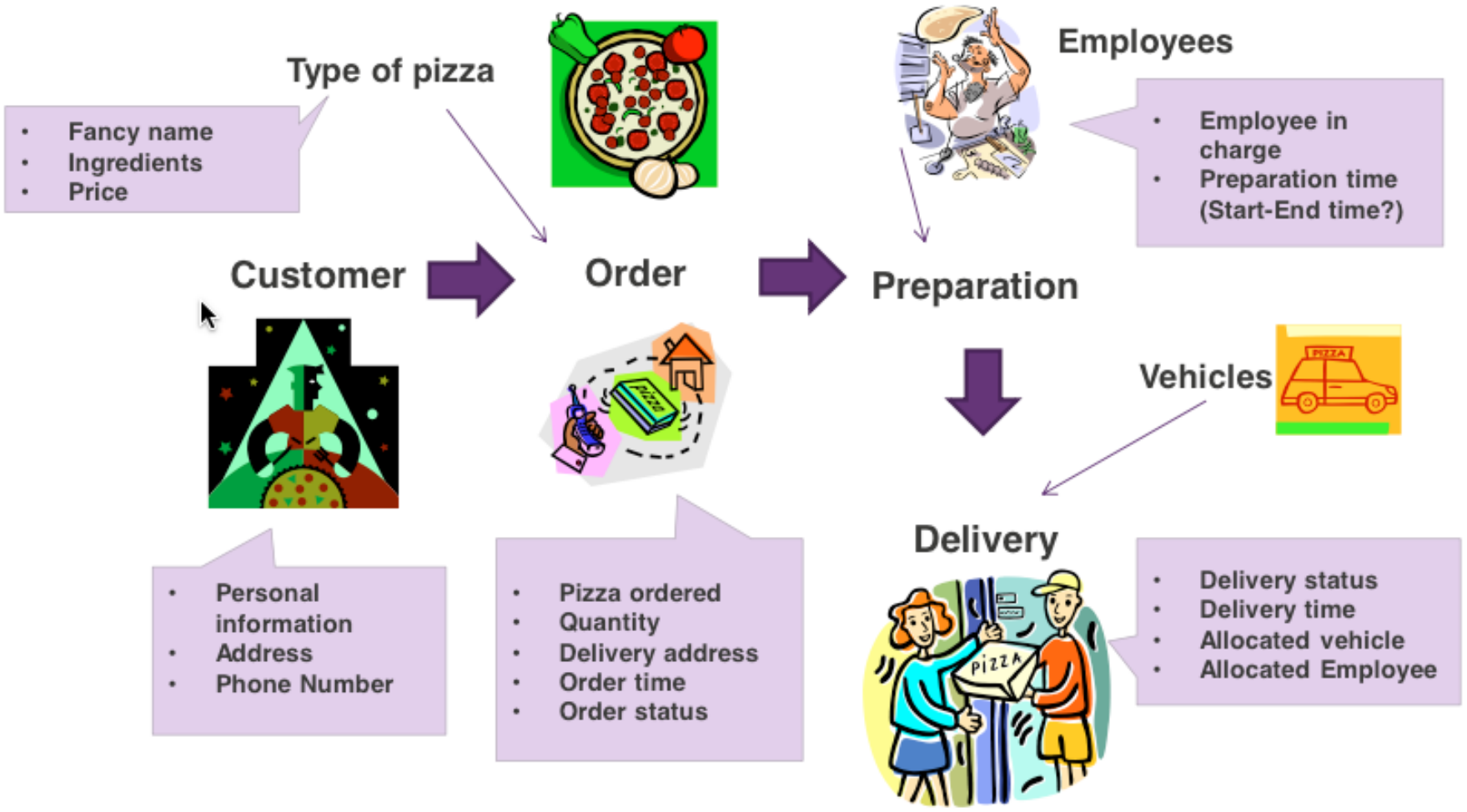
Delivery

Employees

Vehicles

Customers

Case Study


Type of pizza
Fancy name
Ingredients
Price
Employees
Employee in charge
Preparation time (Start-End time?)
Customer
Order
Preparation
Vehicles
Personal information
Address
Phone Number
Pizza ordered
Quantity
Delivery address
Order time
Order status
Delivery
Delivery status
Delivery time
Allocated vehicle
Allocated Employee
PIZZA

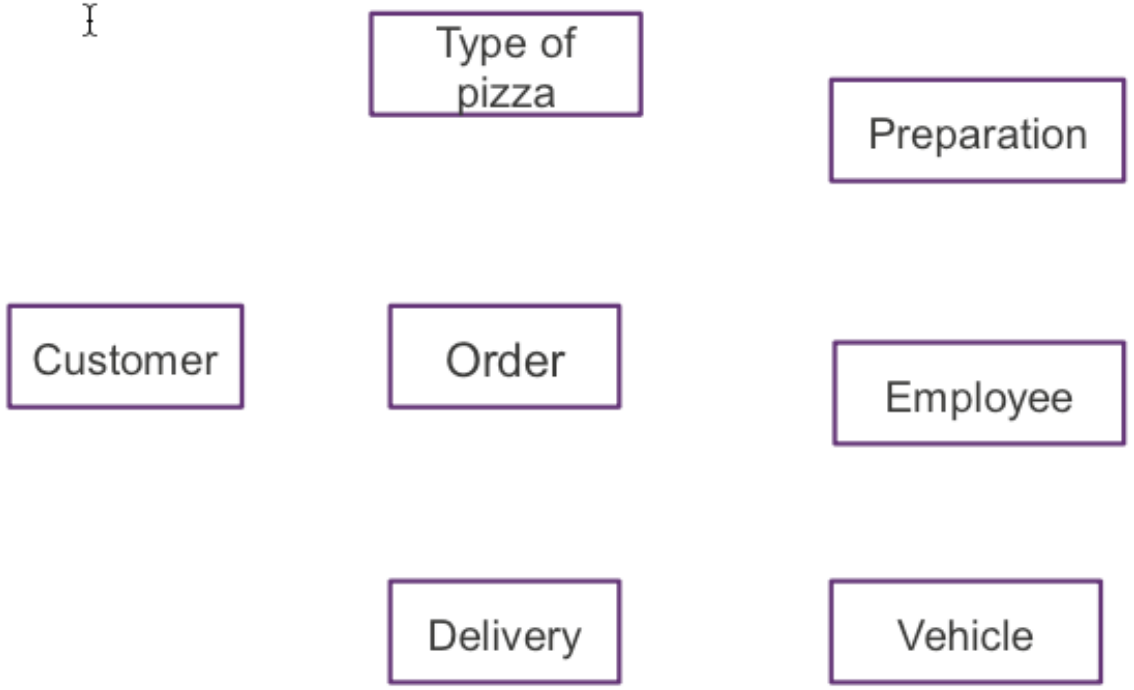
Case Study

Understand the business

- One order can contain many pizzas and at least one pizza
- One or more employees can be involved in the preparation of an order.
- Customers can have their information recorded without actually registering an order.
- The delivery of an order can be allocated to one employee only.
- One order can be allocated to a delivery. In case there's an error with the order, a new order is generated.

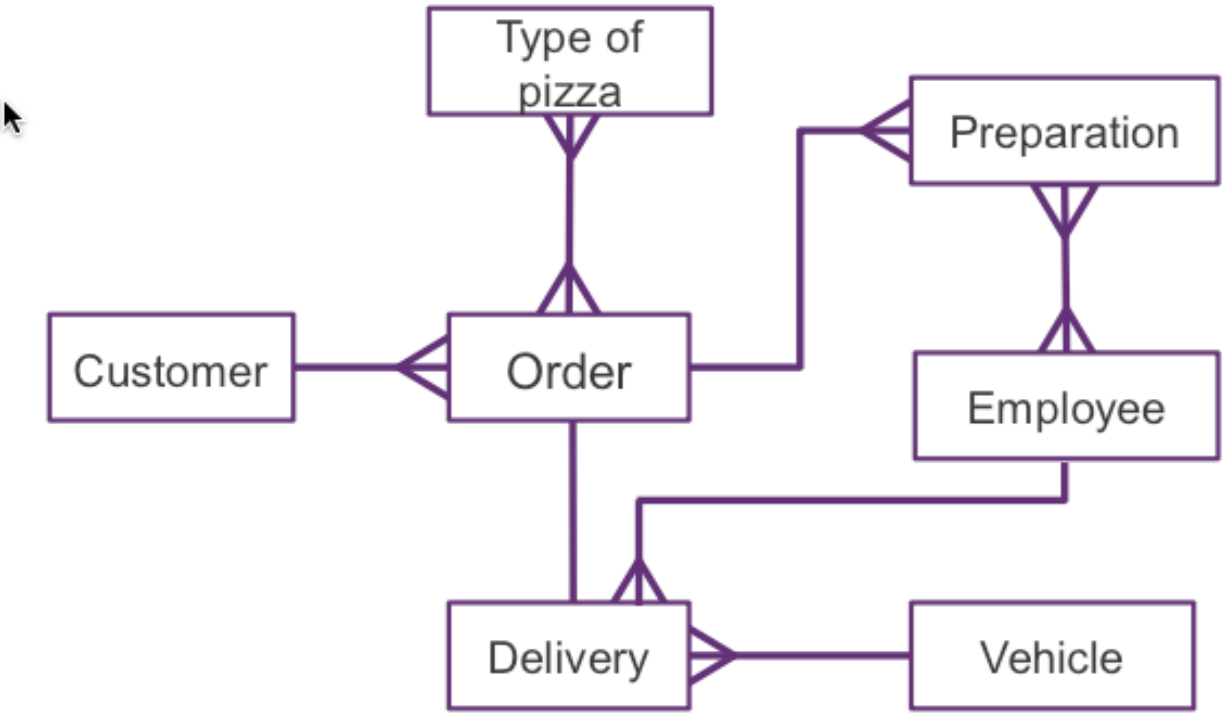
Case Study

Identify entities and put them on paper



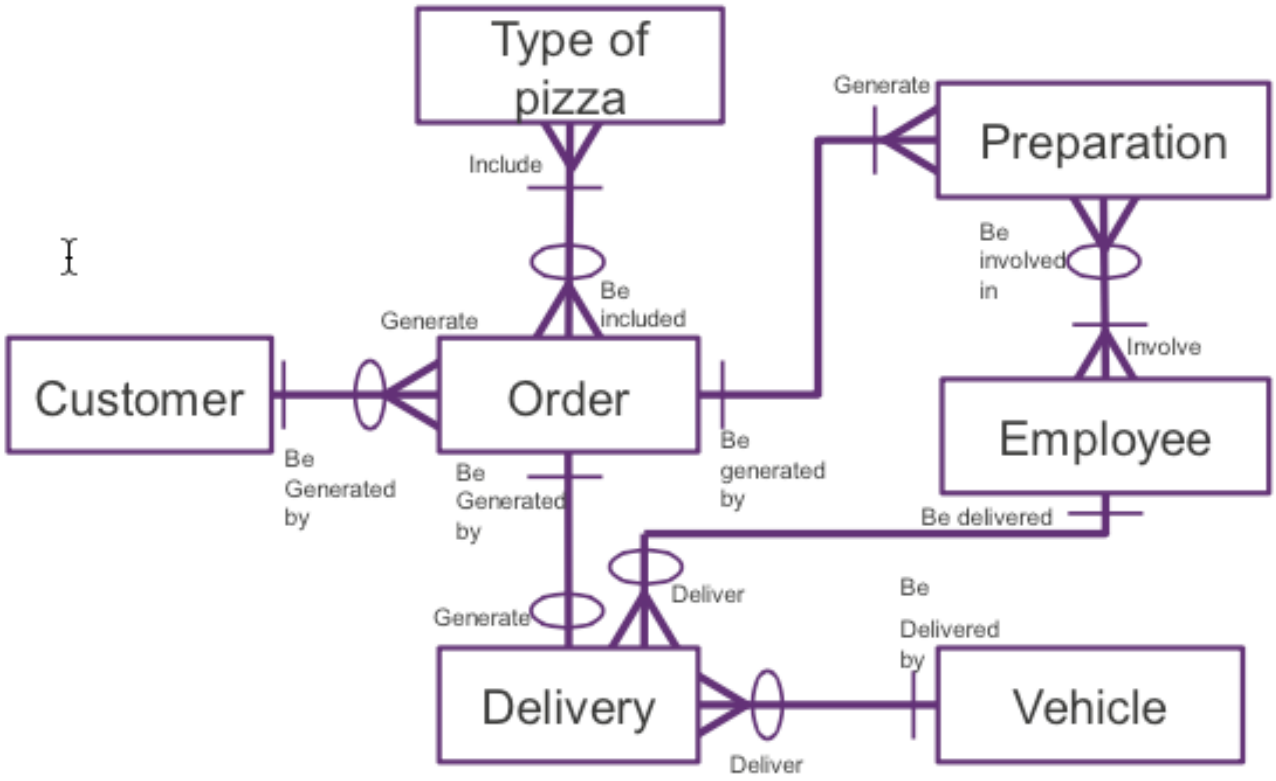
Case Study

Identify relationships



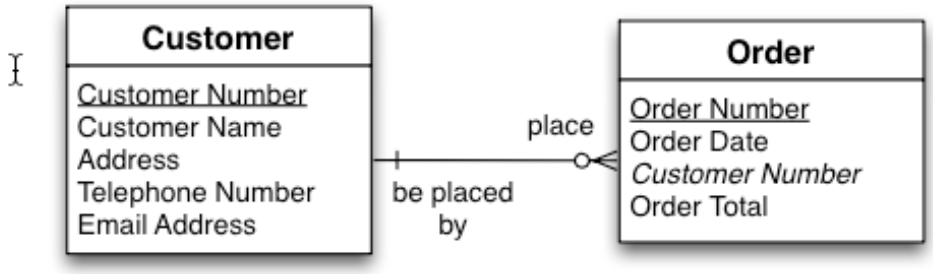
Case Study

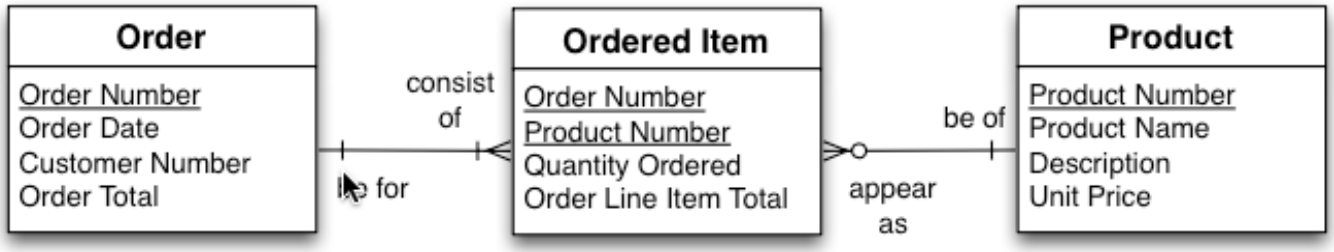
Identify Optionality



Case Study

Attributes and keys





Case Study

Physical implementation

Customer Table

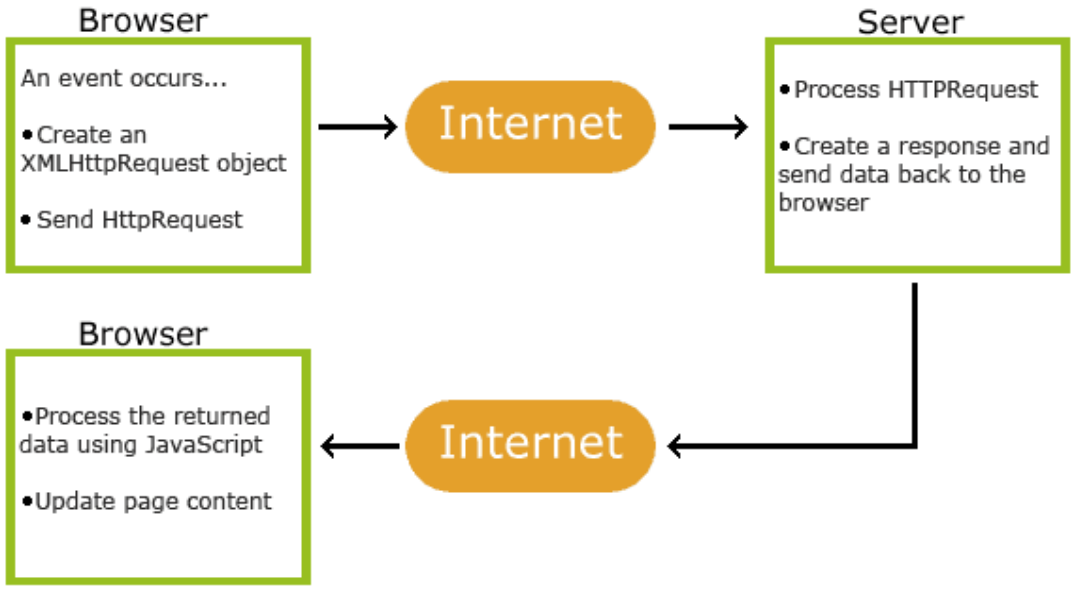
Customer Number	Name	Postal Code	Age
24734	S Hayes	3000	34
33347	H Walsh	3065	43
37942	J O'Dea	3145	55
46745	B Rich	3184	39
78648	A De Silva	3507	27

Insurance Policy Table

Policy Number	Date Issued	Customer Number	Policy Type
1347	2/12/2003	46745	Car02
1487	14/5/2001	33347	Car02
9521	28/6/2004	46745	House01
3458	20/7/2003	78648	Car01
4876	19/4/2005	37942	Boat03

AJAX

- AJAX is about updating parts of a web page, without reloading the whole page.
- AJAX = Asynchronous JavaScript and XML.
- AJAX is a technique for creating fast and dynamic web pages.
- AJAX allows web pages to be updated asynchronously by exchanging small amounts of data with the server behind the scenes. This means that it is possible to update parts of a web page, without reloading the whole page.
- Classic web pages, (which do not use AJAX) must reload the entire page if the content should change.



XMLHttpRequest

- XMLHttpRequest is a JavaScript object that provides an easy way to retrieve data from a URL without having to do a full page refresh.
- A Web page can update just a part of the page without disrupting what the user is doing. XMLHttpRequest is used heavily in AJAX programming.
- Despite its name, XMLHttpRequest can be used to retrieve any type of data, not just XML, and it supports protocols other than HTTP (including file and ftp).

```
var myRequest = new XMLHttpRequest();
```

Methods

- **open()**

Initializes a request. This method is to be used from JavaScript code.

```
void open(DOMString method, DOMString url, optional boolean async, optional DOMString? user,
optional DOMString? password);

xmlhttp.open("GET", "nameHint.php?q=" + str, true);
```

- **send()**

Sends the request. If the request is asynchronous (which is the default), this method returns as soon as the request is sent. If the request is synchronous, this method doesn't return until the response has arrived.

```
void send();
void send(ArrayBufferView data);
void send(Blob data);
void send(Document data);
void send(DOMString? data);
void send(FormData data);
```

Note: *Any event listeners you wish to set must be set before calling* send().

Properties

- XMLHttpRequest.onreadystatechange

  Returns a EventHandler that is called whenever the readyState attribute changes. The callback is called from the user interface thread.

- XMLHttpRequest.readyState

Value	State	Description
0	UNSENT	open() has not been called yet.
1	OPENED	send() has been called.
2	HEADERS_RECEIVED	send() has been called, and headers and status are available.
3	LOADING	Downloading; responseText holds partial data.
4	DONE	The operation is complete.

Properties

- XMLHttpRequest.status

  Returns an unsigned short with the status of the response of the request. This is the HTTP result code (for example, status is 200 for a successful request).

- XMLHttpRequest.statusText

  Returns a DOMString containing the response string returned by the HTTP server. Unlike XMLHTTPRequest.status, this includes the entire text of the response message ("200 OK", for example).

Properties

- XMLHttpRequest.response

  Returns an ArrayBuffer, Blob, Document, JavaScript object, or a DOMString, depending of the value of XMLHttpRequest.responseType. that contains the response entity body. This is null if the request is not complete or was not successful.

- XMLHttpRequest.responseText

  Returns a DOMString that contains the response to the request as text, or null if the request was unsuccessful or has not yet been sent.

- XMLHttpRequest.responseType

  Is an enumerated value that defines the response type. It can have the following values:””(DOMString (this is the default value)), "arraybuffer”, "document”, "json”, "text"

Browser compatibility

Feature	Chrome	Firefox (Gecko)	Internet Explorer	Opera	Safari (WebKit)
Basic support (XHR1)	1	1.0 (1.7 or earlier)[1]	5[2] 7	(Yes)	1.2
`send(ArrayBuffer)`	9	9.0 (9.0)	10	11.60	?
`send(ArrayBufferView)`	22	20.0 (20.0)	?	?	?
`send(Blob)`	7	3.6 (1.9.2)	10	12	?
`send(FormData)`	6	4.0 (2.0)	10	12	?
`sendAsBinary(DOMString)` ⚠👎	Not supported[3]	2.0 (1.8.1)	Not supported	Not supported	Not supported
`response`	10	6.0 (6.0)	10	11.60	(Yes)
`responseType = 'arraybuffer'`	10	6.0 (6.0)	10	11.60	(Yes)
`responseType = 'blob'`	19	6.0 (6.0)	10	12	(Yes)
`responseType = 'document'`	18	11.0 (11.0)	10	Not supported	6.1
`responseType = 'json'`	31	10.0 (10.0)	Not supported	12[4] Not supported 16 17	(Yes)
Progress Events	7	3.5 (1.9.1)	10	12	(Yes)
`withCredentials`	3	3.5 (1.9.1)	10	12	4
`timeout`	29.0[5]	12.0 (12.0)	8	12[6] 16	(Yes)
`responseType = 'moz-blob'`	Not supported	12.0 (12.0)	Not supported	Not supported	Not supported