Full Stack Web Development

Origin of Internet

- The **Advanced Research Projects Agency Network** (**ARPANET**) was the first wide-area packet-switched network with distributed control and one of the first networks to implement the TCP/IP protocol suite. Both technologies became the technical foundation of the Internet. The ARPANET was established by the Advanced Research Projects Agency (ARPA) of the United States Department of Defense.
- January 1, **1983 is considered the official birthday of the Internet**. Prior to this, the various computer networks did not have a standard way to communicate with each other. A new communications protocol was established called Transfer Control Protocol/Internetwork Protocol (TCP/IP).
- The The World Wide Web was invented by British scientist Tim Berners-Lee in 1989 while working at CERNWorld Wide Web was invented by British scientist Tim Berners-Lee in 1989 while working at CERN.
-

Origin of WWW

- Only a few users had access to a NeXT computer platform on which the first browser ran, but development soon started on a simpler, ‘line-mode’ browser, which could run on any system. It was written by Nicola Pellow during her student work placement at CERN.
- In 1991, Berners-Lee released his WWW software. It included the ‘line-mode’ browser, Web server software and a library for developers. In March 1991, the software became available to colleagues using CERN computers. A few months later, in August 1991, he announced the WWW software on Internet newsgroups and interest in the project spread around the world.
- The first version of HTML1.0 was written by Tim Berners-Lee in 1993. Since then, there have been many different versions of HTML. The most widely used version throughout the 2000's was **HTML 4.01**, which became an official standard in December 1999.
- This first version consisted of 18 HTML tags. Now, there are currently about 140 HTML tags

What is World Wide Web?

- It is a collection of websites or web pages stored in web servers and connected to local computers through the internet.
- These websites contain text pages, digital images, audios, videos, etc.
- The WWW, along with internet, enables the retrieval and display of text and media to your device.

How the Invention Started

- In March 1989, Tim Berners-Lee took the initiative towards the invention of WWW and wrote the first proposal for the World Wide Web.
- Later, he wrote another proposal in May 1990. After a few months, in November 1990, along with Robert Cailliau, it was formalized as a management proposal.
- This proposal had outlined the key concepts and defined terminology related to the Web. In this document, there was a description of "hypertext project" called World Wide Web in which a web of hypertext documents could be viewed by browsers.
- His proposal included the three main technologies (HTML, URL, and HTTP).
- In 1990, Tim Berners-Lee was able to run the first Web server and browser at CERN to demonstrate his ideas. He used a NeXT computer to develop the code for his Web server and put a note on the computer "*The machine is a server. Do Not Power It DOWN!!*" So that it was not switched off accidentally by someone.
- In 1991, Tim created the world's first website and Web Server. Its address was info.cern.ch, and it was running at CERN on the NeXT computer.
- the first web page address was http://info.cern.ch/hypertext/WWW/TheProject.html. [This page had links to the information related to the WWW project, and also about the Web servers, hypertext description, and information for creating a Web server.]

WORLD WIDE WEB

The WorldWideWeb (W3) is a wide-area hypermedia[1] information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary[2] of the project, Mailing lists[3] , Policy[4] , November's W3 news[5] , Frequently Asked Questions[6] .

What's out there?[7]	Pointers to the world's online information, subjects[8] , W3 servers[9], etc.
Help[10]	on the browser you are using
Software Products[11]	A list of W3 project components and their current state. (e.g. Line Mode[12] ,X11 Viola[13] , NeXTStep[14] , Servers[15] , Tools[16] , Mail robot[17] , Library[18])
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Pointers to the world's online information, subjects , W3 servers, etc.

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on the browser you are using

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A list of W3 project components and their current state. (e.g. Line Mode ,X11 Viola , NeXTStep , Servers , Tools , Mail robot , Library)

Technical
Details of protocols, formats, program internals etc

Bibliography
Paper documentation on W3 and references.

People
A list of some people involved in the project.

History
A summary of the history of the project.

How can I help ?
If you would like to support the web..

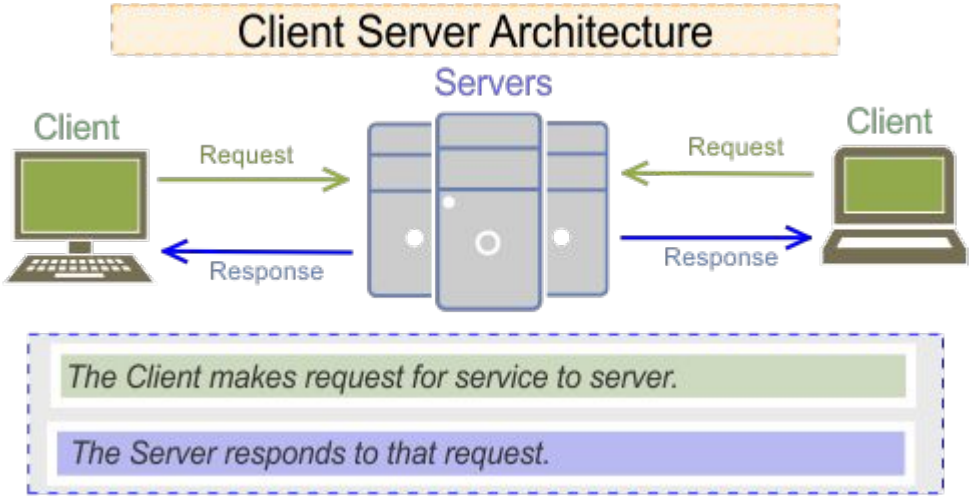
Getting code
Getting the code by anonymous FTP , etc.

Evolution of HTML

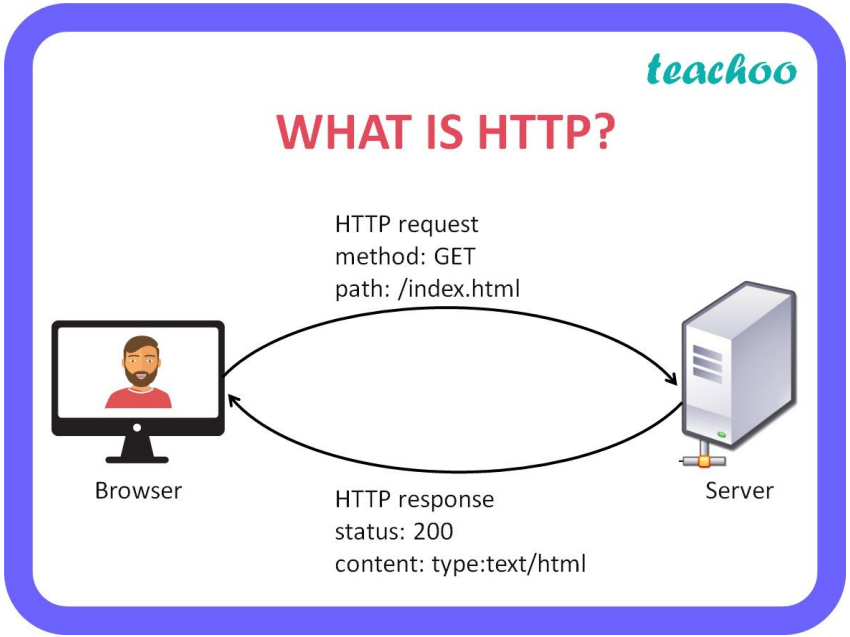
The Timline of HTML

- **1991-** Tim Berners-Lee invents HTML 1.0
- **1993-** HTML 1.0 is released. Not many developers are creating websites at this time.
- **1995-** HTML 2.0 is published. This contains the features of HTML 1.0 plus new features. This remained the standard markup language for designing and creating websites until 1997.
- **1997-** HTML 3.0 was invented. Here, Dave Raggett introduced a fresh draft on HTML, which improved new features of HTML and gave more powerful characteristics for webmasters in designing websites. Unfortunately, the powerful features slowed down the browser in applying further improvements.
- **1999-** The widely-used HTML 4.0 comes out. It is very successful.
- **2014-** HTML 5.0 is released and used worldwide. It is said to be the extended version of HTML 4.01 which was published in 2012.

Web Applications involves Client Server Architecture



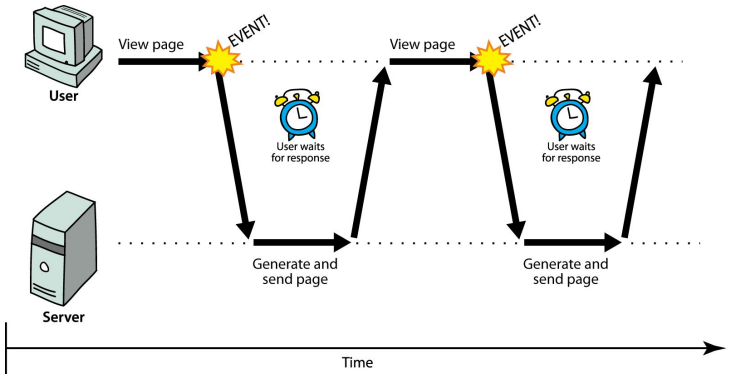
HTTP and HTTPS

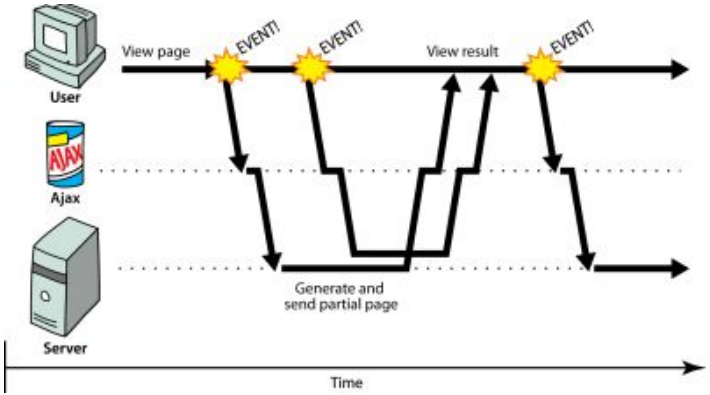


- Hypertext Transfer Protocol (HTTP) is **an application-layer protocol for transmitting hypermedia documents, such as HTML.**
- **It is a stateless protocol.**
- **It works on client/server architecture**

Type of I/O

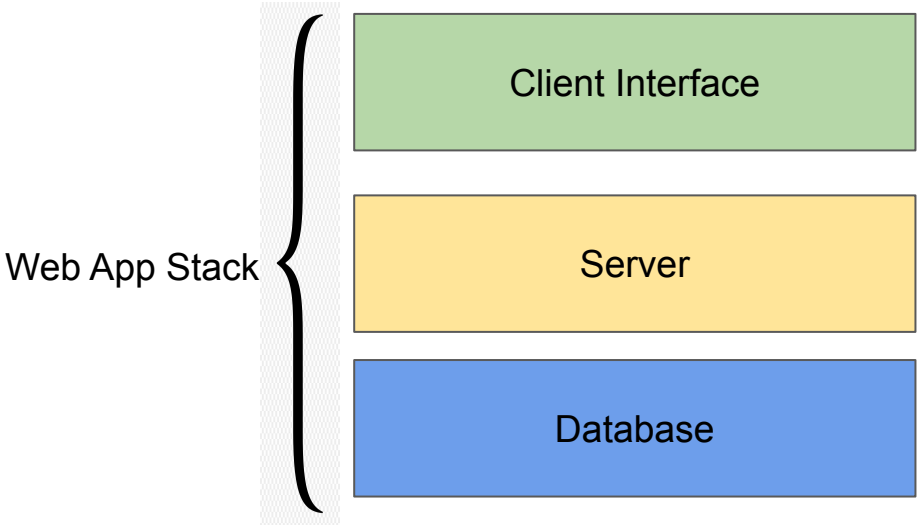
- Synchronous: **Synchronous** means that you call a web service (or function or whatever) and wait until it returns - all other code execution and user interaction is stopped until the call returns.
- Asynchronous: **Asynchronous** means that you do not halt all other operations while waiting for the web service call to return. Other code executes and/or the user can continue to interact with the page (or program UI).





Basic Building Blocks of Web Application

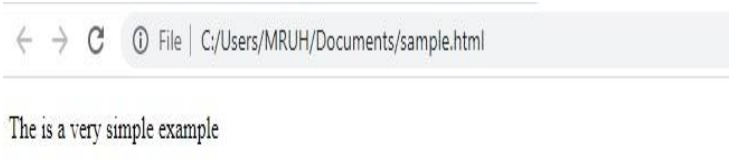
- Client Interface
- Server[which acts as middleware]
- A database server



HTML DOCUMENT(Client Interface)

- An **HTML document** is a file containing hypertext markup language.
- It consists of TAGS: **hidden keywords**, which provide instructions for formatting the document.
-

```
<!DOCTYPE html>
<head>
<title>This is a First Page</title>
</head>
<body>
<p> The is a very simple example</p>
</body>

</html>
```



List of TAGS

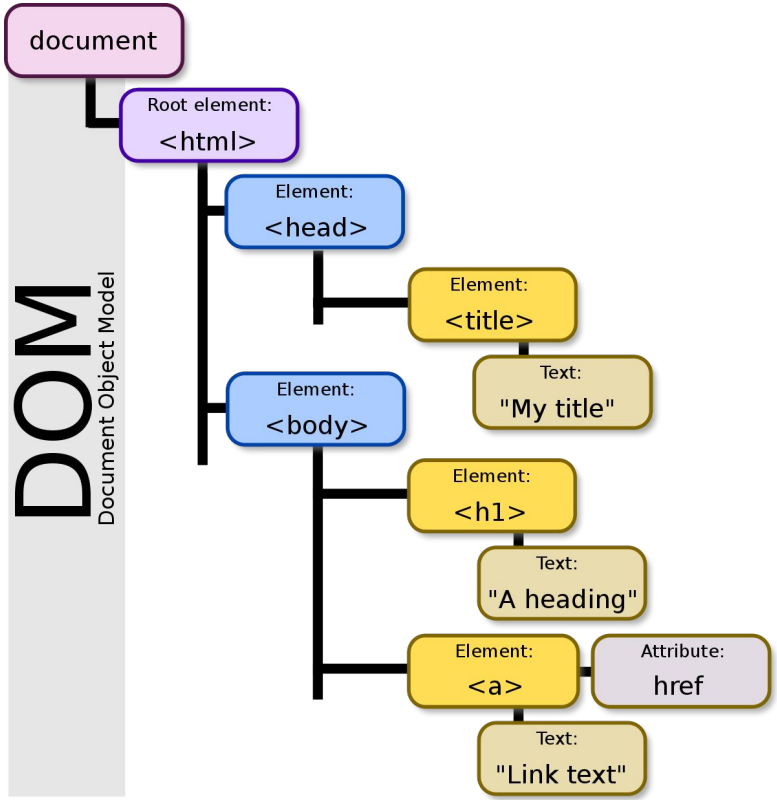
Categories	TAGS
HTML Meta Tags	DOCTYPE, title, link, meta and style
HTML Text Tags	<p>, <h1>, <h2>, <h3>, <h4>, <h5>, <h6>, , , <abbr>, <acronym>, <address>, <bdo>, <blockquote>, <cite>, <q>, <code>, <ins>, <del>, <dfn>, <kbd>, <pre>, <samp>, <var> and
HTML Link Tags	<a> and <base>
HTML Image and Object Tags	<img>, <area>, <map>, <param> and <object>
HTML List Tags	, , , <dl>, <dt> and <dd>
HTML Table Tags	table, tr, td, th, tbody, thead, tfoot, col, colgroup and caption
HTML Form Tags	form, input, textarea, select, option, optgroup, button, label, fieldset and legend
HTML Scripting Tags	script and noscript

Is HTML is enough

Java Script

- HTML can create document without life.
- “Life” refers to ability to interact with user
- How can JavaScript introduce interactive feature into your document?
- Object Modeling requires to access each tag element to dynamically modified

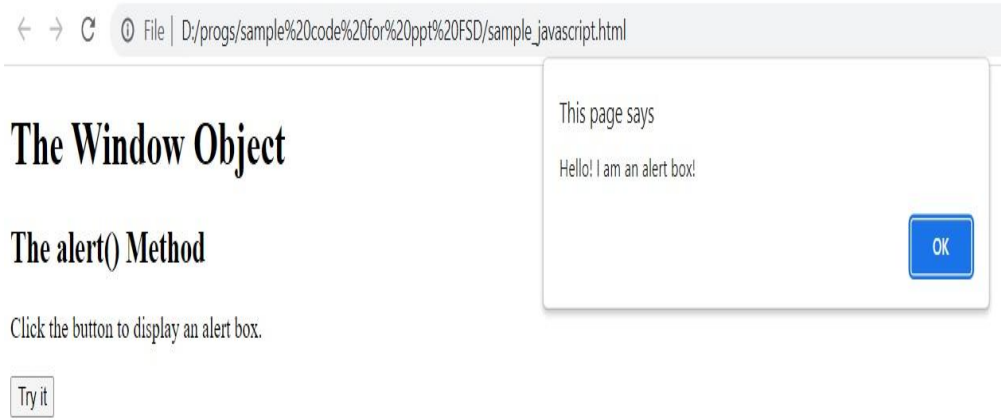
DOM: Document Object Modeling



- Each TAG is considered as an object.
- Each TAG has different properties
- “Property” changes the way an tag element behaves.

A sample Web Page With JavaScript

```
<!DOCTYPE html>
<html>
<script type="text/javascript">
function myFunction() {
  alert("Hello! I am an alert box!");
}
</script>
<body>

<h1>The Window Object</h1>
<h2>The alert() Method</h2>

<p>Click the button to display an alert box.</p>

<button onclick="myFunction()">Try it</button>



</body>
</html>
```



Is JavaScript+HTML is enough

Cascading Style Sheet(CSS)?

- CSS describes how HTML elements are to be displayed on screen, paper, or in other media
- It can control the layout of multiple web pages all at once.
- CSS can inline, Internal or Embedded CSS

  And External stylesheets are stored in CSS files.

Inline CSS

```
<!DOCTYPE html>
<html>
    <head>
        <title>Inline CSS</title>
    </head>

    <body>
        <p style = "color:#009900; font-size:50px;
                font-style:italic; text-align:center;">
            GeeksForGeeks
        </p>

    </body>
</html>
```

Internal or Embedded CSS

```
<!DOCTYPE html>
<html>
    <head>
        <title>Internal CSS</title>
        <style>
            .main {
                text-align:center;
            }
            .GFG {
                color:#009900;
                font-size:50px;
                font-weight:bold;
            }
            .geeks {
                font-style:bold;
                font-size:20px;
            }
        </style>
    </head>
    <body>
        <div class = "main">
            <div class ="GFG">GeeksForGeeks</div>

            <div class ="geeks">
                A computer science portal for geeks
            </div>
        </div>
    </body>
</html>
```

External CSS

geeks.css

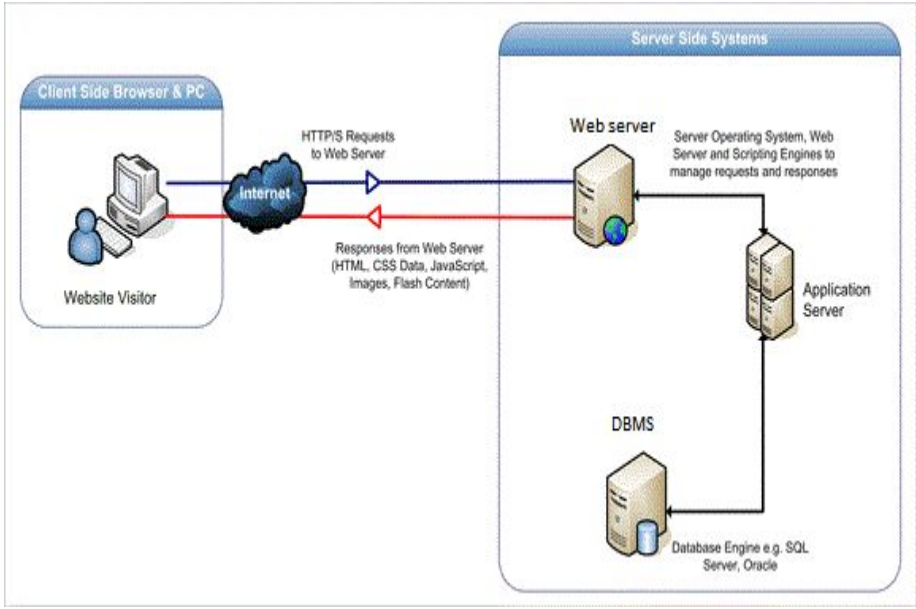
```
body {

background-color:powderblue;
}
.main {
    text-align:center;
}
```

```
.GFG {
    color:#009900;
    font-size:50px;
    font-weight:bold;
}
#geeks {
    font-style:bold;
    font-size:20px;
}
```

External CSS

```
<!DOCTYPE html>
<html>
    <head>
        <link rel="stylesheet" href="geeks.css"/>
    </head>

    <body>
        <div class = "main">
            <div class ="GFG">GeeksForGeeks</div>
            <div id ="geeks">
                A computer science portal for geeks
            </div>
        </div>
    </body>
</html>
```

Server



- It is of two types: Web Server and Application server
- Web server deals only HTTP requests and responses
- Application server deals with logics and interaction between web server and user.
- Example: Apache, Apache Tomact

Is Web and Application server always distinct entity?

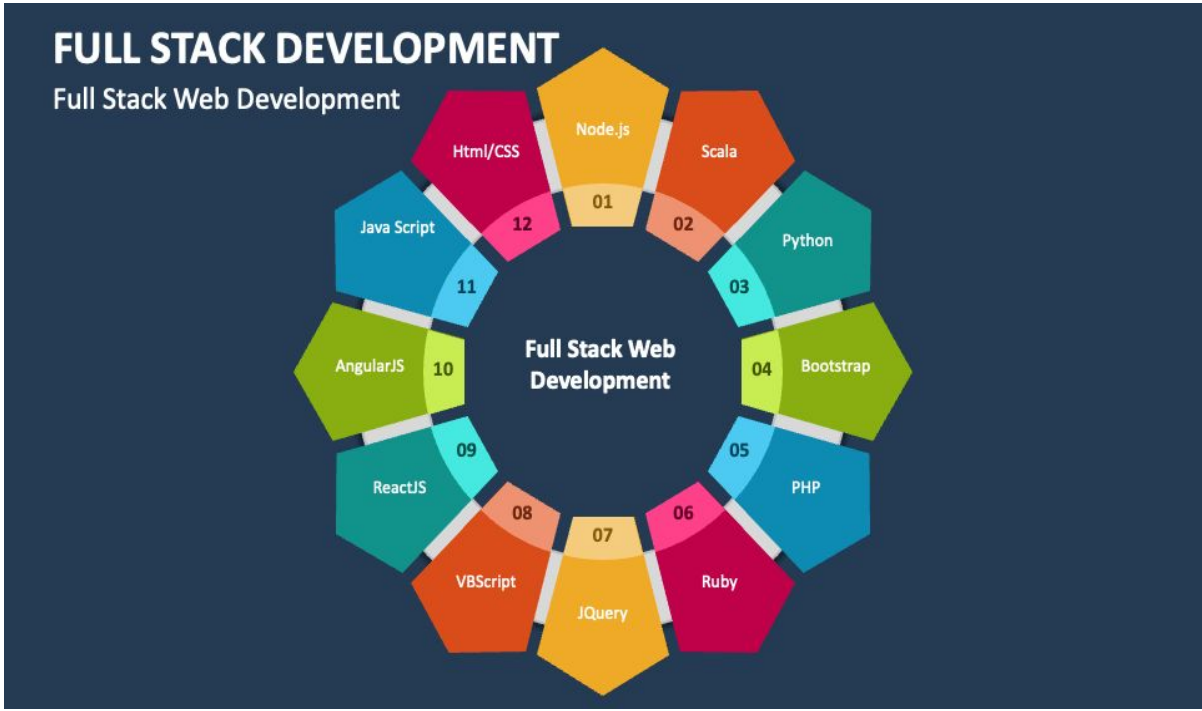
- In some cases web and application are merged into a single server
- Node JS is such an application.
- In Node JS, we create HTTP server and manage logical aspects user interaction with the server as well.

Data Storage

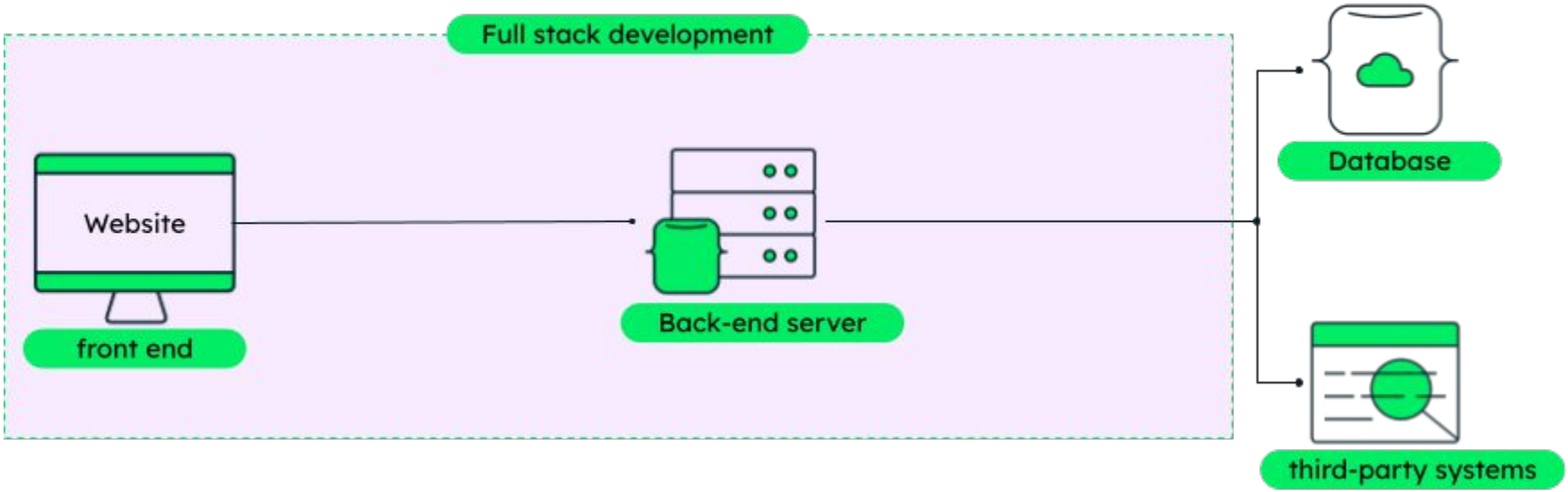
- Data dependent applications needs access to some storage
- Usually such storages are called DBMS
- DBMS(s) are also server(data server)
- Popular DBMS are of RDBMS.
- But, non RDBMS systems like MongoDB(noSQL) are also popular data servers.

What is Full Stack

- It refers to the development of both **front end**(client side) and **back end**(server side) portions of web application.
- It contains all type languages like java, python, rails, ruby, cgi
- The front end may be designed with- simple javascript and HTML or state of the art frameworks like- Angular JS, React JS. jQuery etc.
- The database connectivity

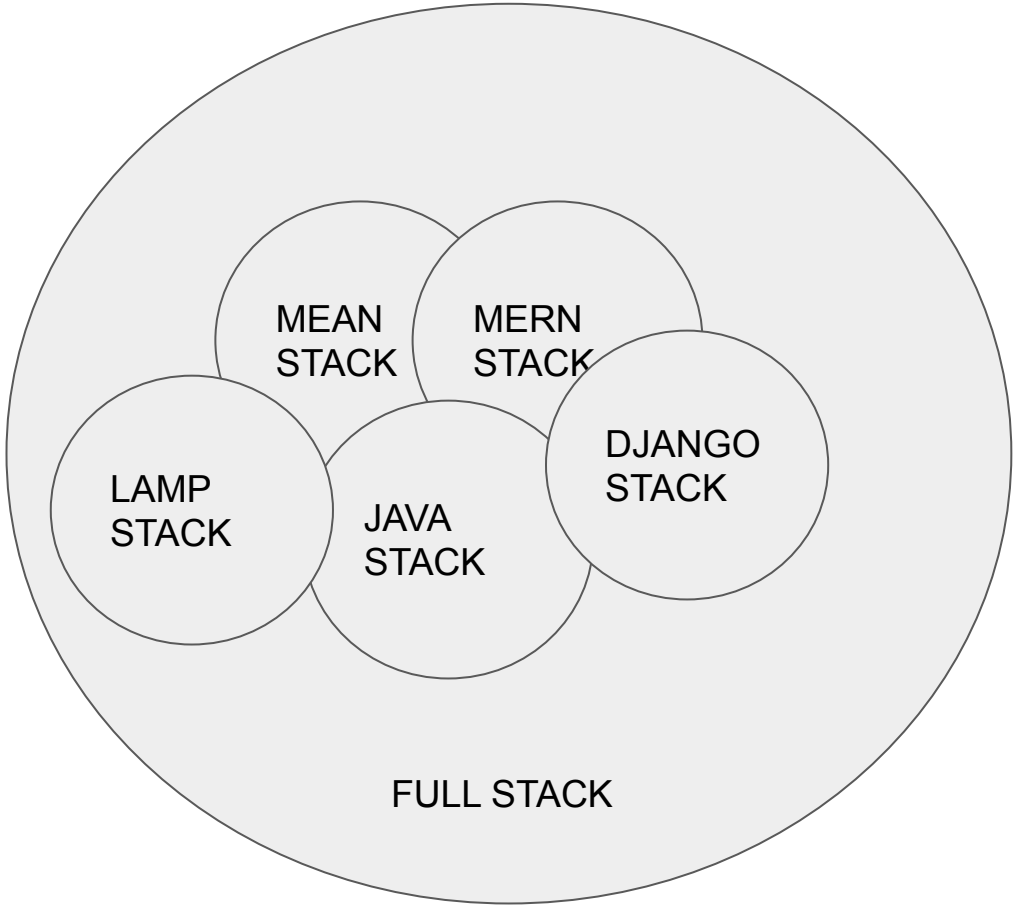


Anatomy of Full Stack Operation



Full Stack

- **MEAN Stack:** MongoDB, Express, AngularJS and Node.js.
- **MERN Stack:** MongoDB, Express, ReactJS and Node.js
- **Django Stack:** Django, python and MySQL as Database.
- **Rails or Ruby on Rails:** Uses Ruby, PHP and MySQL.
- **LAMP Stack:** Linux, Apache, MySQL and PHP.


MEAN
STACK
MERN
STACK
LAMP
STACK
JAVA
STACK
DJANGO
STACK
FULL STACK

What’s In our Syllabus?

Front End:

- Angular JS, React JS

Back End:

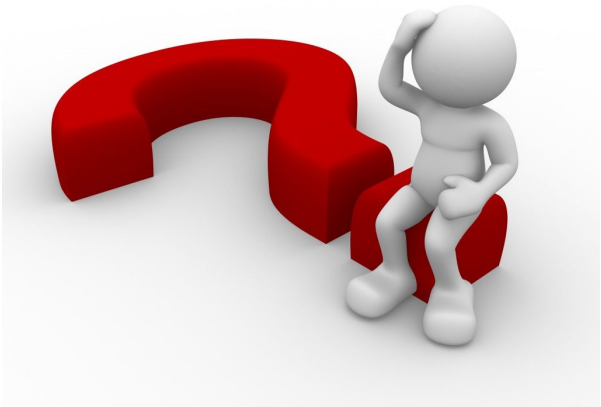
- Node JS

Data Base:

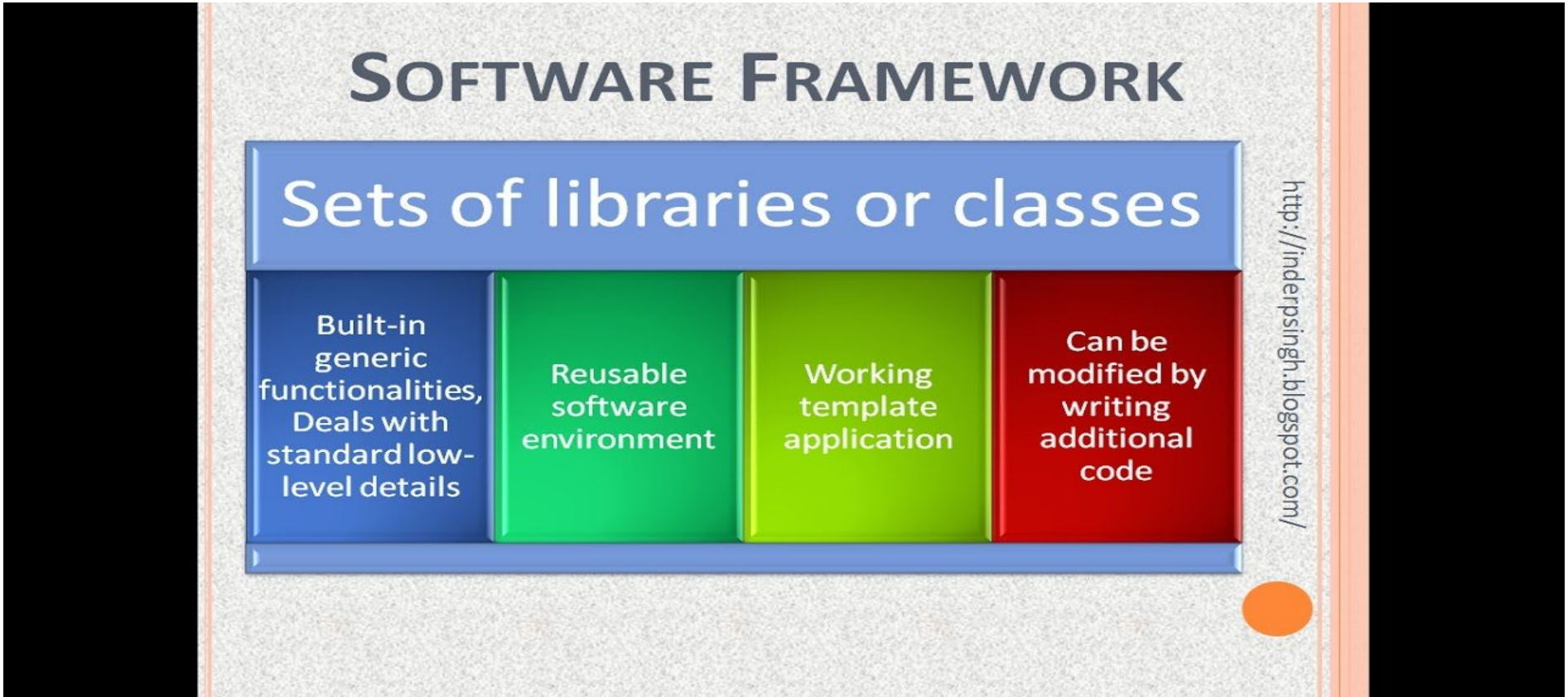
- Mongo DB

Problem with Classical Web App Design

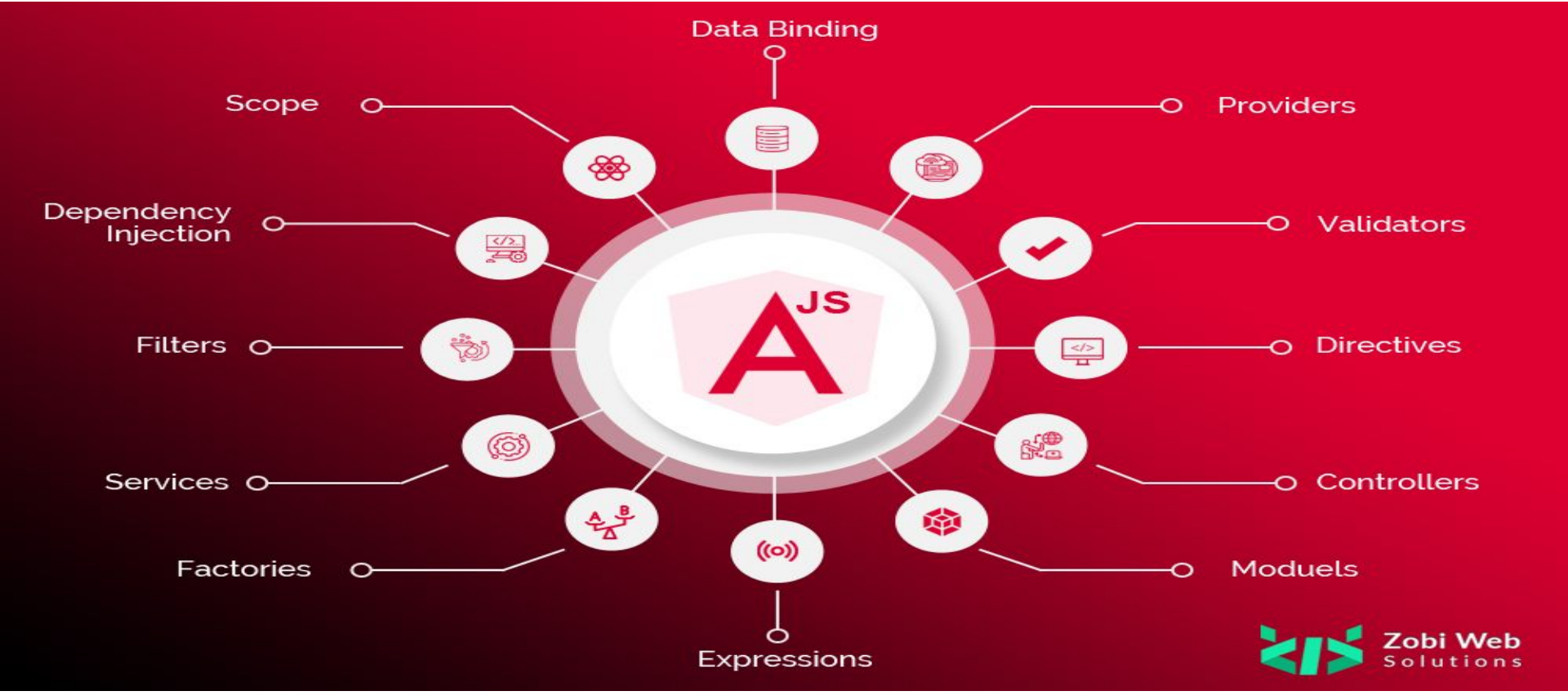
- The major problem with classical approaches is cost of development.
- More people will require if development time has to be reduced
- Efficient technical people is not available all the time and it will increase the development time.
- Also, design may not be robust.



Solution - Framework



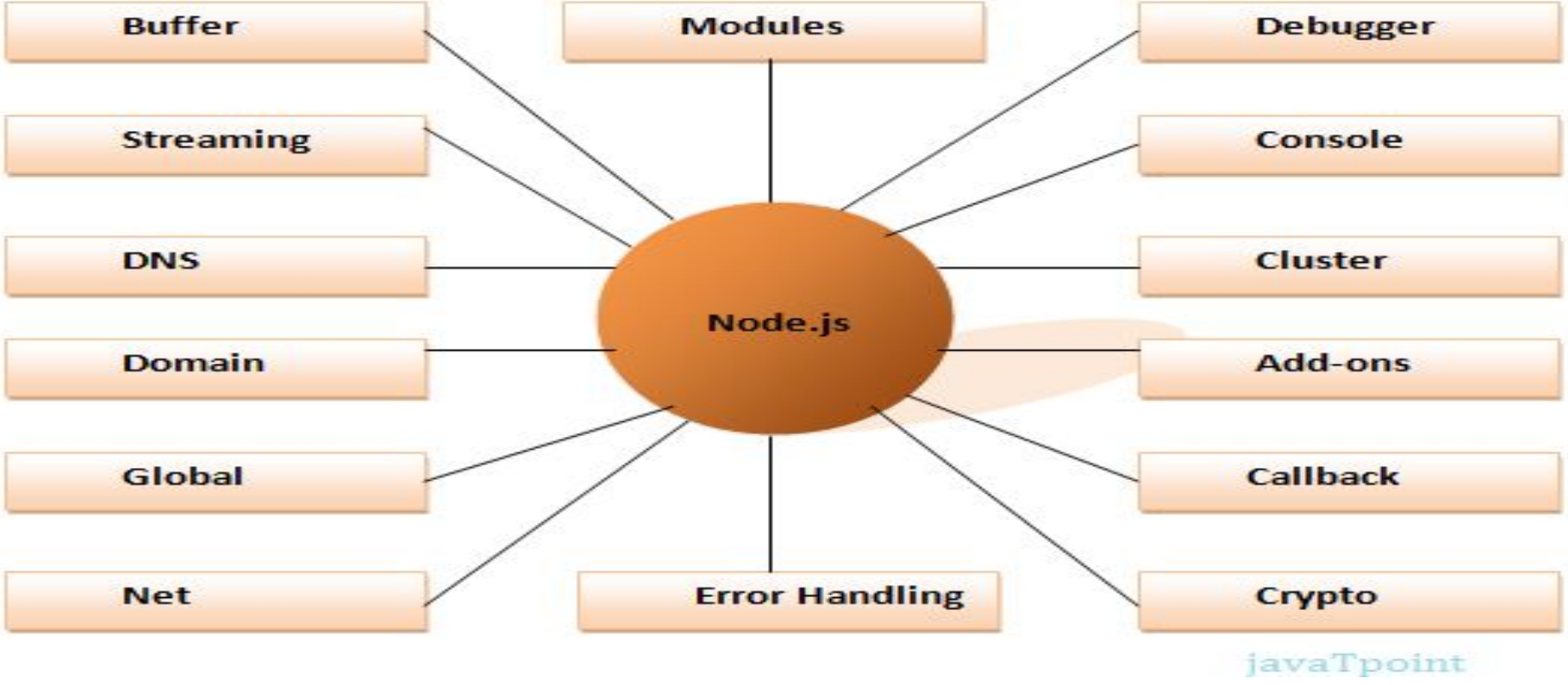
Angular JS


Data Binding
Scope
Providers
Dependency Injection
Validators
Filters
Directives
Services
Controllers
Factories
Moduels
Expressions
JS
Zobi Web Solutions

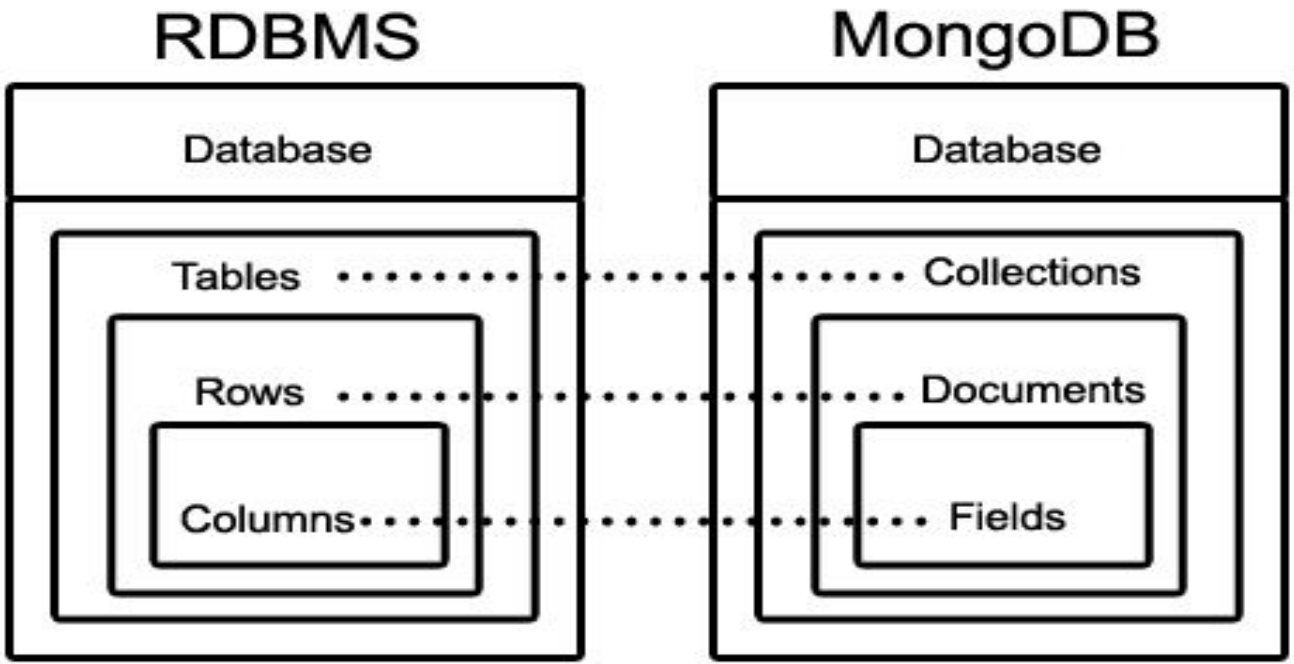
React JS


Top Features of React
• Virtual DOM
• JSX
• One-way data binding
• React native
• Declarative UI
• Component-based architecture
• Speed and efficiency
• Flexibility
Angular Minds

Node JS


Buffer
Modules
Debugger
Streaming
Console
DNS
Node.js
Cluster
Domain
Add-ons
Global
Callback
Net
Error Handling
Crypto
javaTpoint

Mongo DB


RDBMS
MongoDB
Database
Database
Tables
Collections
Rows
Documents
Columns
Fields

MVC(Model View Controller)