

Tomcat Installation:

Linux:

```
$ sudo apt-get install tomcat7
```

(Install the required version of tomcat)

Windows:

Download the latest version of Tomcat from <https://tomcat.apache.org/>.

Once you downloaded the installation, unpack the binary distribution into a convenient location. For example, in C:\apache-tomcat-5.5.29 on windows, or /usr/local/apache-tomcat-5.5.29 on Linux/Unix and create CATALINA_HOME environment variable pointing to these locations.

Starting Tomcat

Tomcat can be started by executing the following commands on the Windows machine –

```
%CATALINA_HOME%\bin\startup.bat  
or  
C:\apache-tomcat-5.5.29\bin\startup.bat
```

Tomcat can be started by executing the following commands on the Unix (Solaris, Linux, etc.) machine –

```
$ cd CATALINA_HOME/bin/  
$ ./startup.sh
```

or

```
$ cd /usr/local/apache-tomcat-5.5.29/bin/  
$ ./startup.sh
```

After a successful startup, the default web-applications included with Tomcat will be available by visiting <http://localhost:8080/>.

11. Database(MySQL)

A database is a separate application that stores a collection of data. Each database has one or more distinct APIs for creating, accessing, managing, searching and replicating the data it holds. Other kinds of data stores can also be used, such as files on the file system or large hash tables in memory but data fetching and writing would not be so fast and easy with those type of systems.

Well, there's tons of types of databases nowadays. Many companies develop their own databases to adapt them to their needs.

First of all, there's the relational databases, that's where the industry started, they use table-like schemes and store the data in disk. This kind of databases are pretty good to store business data. For example MySQL, Postgres, SQL Server etc.

Then there's the NoSQL databases. This kind of databases cover a wide amount of technologies where you can find **key-value databases**. Here you would find databases like MongoDB, Cassandra, Neo4j etc.

Note: Here we used Mysql Relational Database

We use relational database management systems (RDBMS) to store and manage huge volume of data. This is called relational database because all the data is stored into different tables and relations are established using primary keys or other keys known as Foreign Keys.

A Relational DataBase Management System (RDBMS) is a software that –

Enables you to implement a database with tables, columns and indexes.

Guarantees the Referential Integrity between rows of various tables.

Updates the indexes automatically.

Interprets an SQL query and combines information from various tables.

MySQL

MySQL is the most popular Open Source Relational SQL Database Management System. MySQL is one of the best RDBMS being used for developing various web-based software applications.

Windows:

The default installation on any version of Windows is now much easier than it used to be, as MySQL now comes neatly packaged with an installer. Simply download the installer package, unzip it anywhere and run the setup.exe file. (<https://dev.mysql.com/downloads/installer/>)

The default installer setup.exe will walk you through the trivial process and by default will install everything under C:\mysql.

Linux:

To install it, simply update the package index on your server and install the default package with apt-get.

- sudo apt-get update
- sudo apt-get install mysql-server

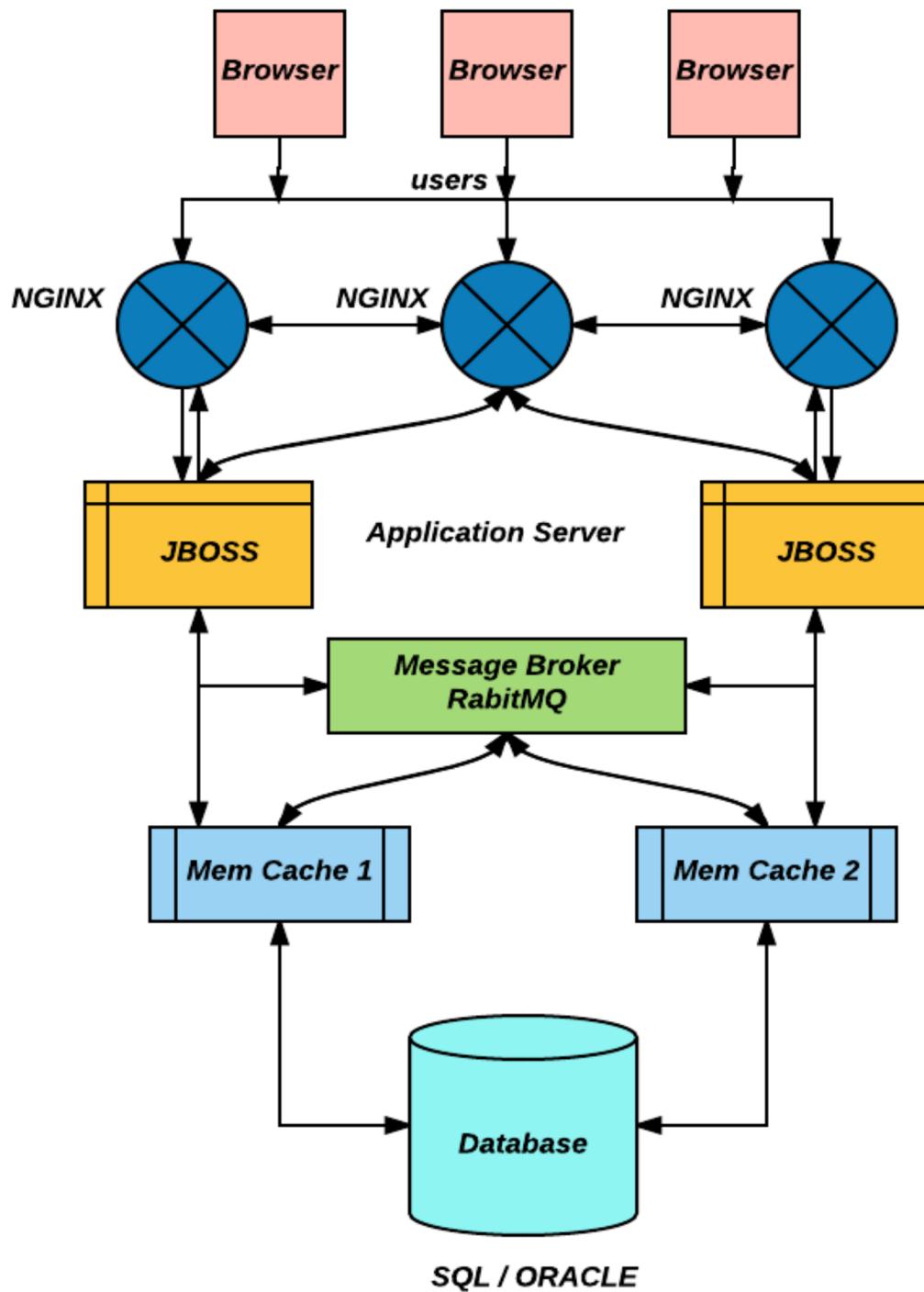
Note : Here we use linux as an OS

List of HandFul MYSQL commands:

\$ sudo apt-get install mysql-server;	Mysql-server installation
\$ mysql -u root -p;	For login
\$ SHOW DATABASES;	Show list of databases
\$ CREATE DATABASE database name;	Create a database
\$ DROP DATABASE database name;	Delete a database
\$ USE database name;	for selecting the database
\$ SHOW tables;	for showing table in database

\$ CREATE TABLE potluck (id INT NOT NULL PRIMARY KEY AUTO_INCREMENT, name VARCHAR(20), food VARCHAR(30), confirmed CHAR(1), signup_date DATE);	Create a table
\$ DESCRIBE potluck;	We can remind ourselves about the table's organization with this command
\$ INSERT INTO `potluck` ('id', `name`, `food`, `confirmed`, `signup_date`) VALUES (NULL, "John", "Casserole", "Y", '2012-04-11');	Insert values into table
\$ SELECT * FROM potluck;	Viewing the content of table
\$ UPDATE `potluck` SET `confirmed` = 'Y' WHERE `potluck`.`name` ='Sandy';	Updating the Existing table
\$ ALTER TABLE potluck ADD email VARCHAR(40);	Adding a column to table
\$ ALTER TABLE potluck ADD email VARCHAR(40) AFTER name;	Adding a column after a specific column
\$ ALTER TABLE potluck DROP email;	Dropping a column
\$ DELETE from [table_name] where [column name]=[field text];	For deleting a row

12. WEB APPLICATION ARCHITECTURE 2



13. Web Browser

The most popular web browsers that are used today are Mozilla Firefox, Google Chrome, Microsoft Internet Explorer, Apple Safari and the Opera browser. These browsers are free and available for download and use. Web browsers allow users to view resources that are stored on a server. For

example, if you were to visit www.google.com, you are actually viewing a file that is displayed using the web browser. This file is drafted using the hypertext markup language, or HTML for short. These files, or web pages as they're commonly known, are pulled from the web server and then translated by the web browser for the user to view. If you don't have a web browser and attempt to view the HTML file, you will see numerous amounts of code lines that may not make sense to the average user. The browser will translate those code lines that makes it easily readable for the user.

14. Setup for Nginx as Load Balancer

Note : Web Application Architecture 1 give an clear idea for installing and configuring Nginx as Load Balancer. Refer Web Application Architecture 1.

15. JBOSS

JBoss is a application server, is the most widely used Open Source application server on the market. The highly flexible and easy-to-use server architecture has made JBoss the ideal choice for users just starting out with J2EE, as well as senior architects looking for a customizable middleware platform. The server binary and source code distributions are available from the SourceForge repository. (<http://sourceforge.net/projects/jboss>). The ready availability of the source code allows you to debug the server, learn its inner workings and create customized versions for your personal or business use.

This chapter is a step-by-step tutorial that will show you how to install and configure JBoss 4.0. Specifically, you will learn how to:

- Obtain updated binaries from the JBoss SourceForge project site
- Install the binary
- Test the installation

You will also learn about:

- The installation directory structure
- Key configuration files an administrator may want to use to customize the JBoss installation
- Obtaining the source code for the 4.0 release from the SourceForge CVS repository
- Building the server distribution.

Getting the Binary Files

The most recent release of JBoss is available from the SourceForge JBoss project files page, <http://sourceforge.net/projects/jboss>. You will also find previous releases as well as beta and release candidate versions of upcoming releases.

Prerequisites

Before installing and running the server, check your system to make sure you have a working JDK 1.4+ installation. The simplest way to do this is to execute the java -version command to ensure that the java executable is in your path, and that you are using Version 1.4 or higher. For example, running this command with a 1.4.1 JDK would produce version number like the following.

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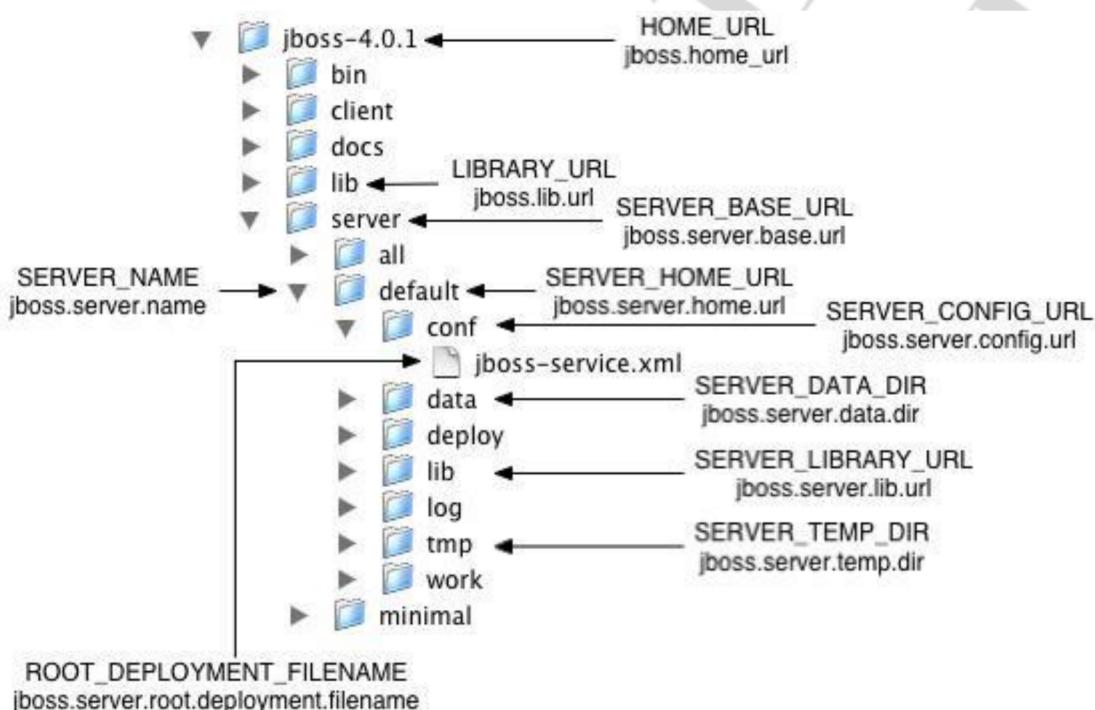
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```
[tmp]$ java -version
java version "1.4.2_05"
Java(TM) 2 Runtime Environment, Standard Edition (build 1.4.2_05-b04)
Java HotSpot(TM) Client VM (build 1.4.2_05-b04, mixed mode)
```

Installing the Binary Package

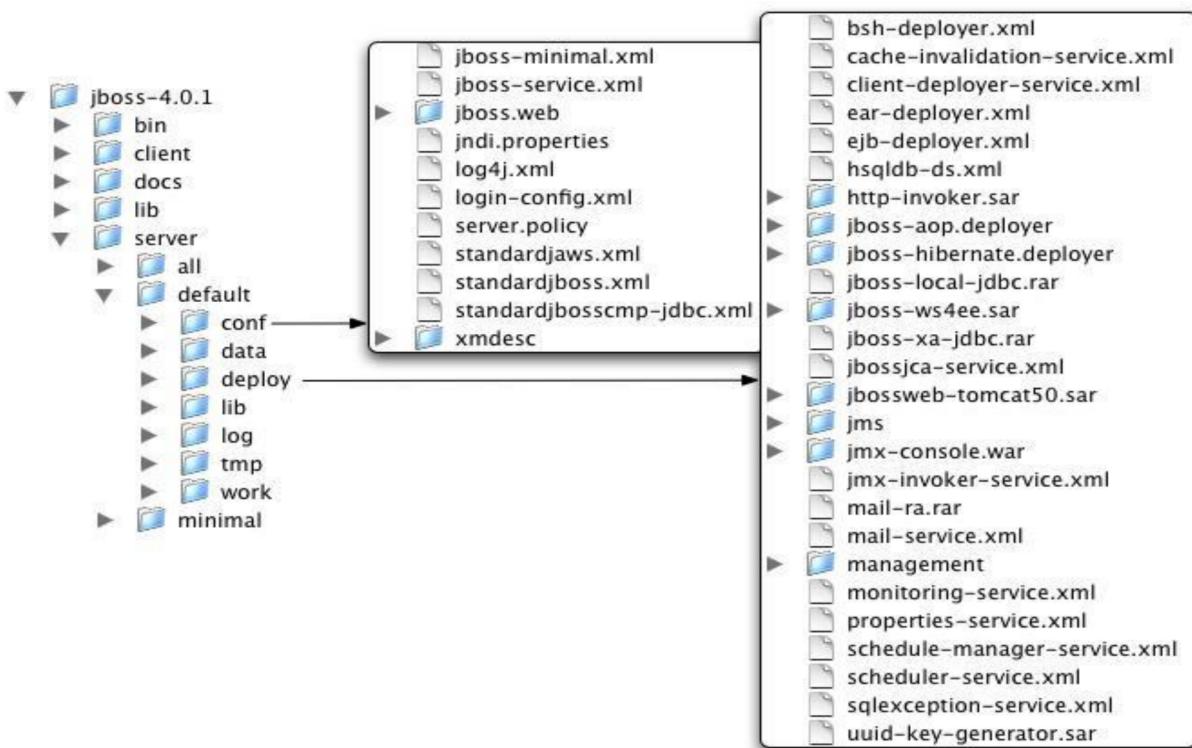
After you have the binary archive you want to install, use the `JDK jar` tool (or any other ZIP extraction tool) to extract the `jboss-4.0.1.zip` archive contents into a location of your choice. The `jboss-4.0.1.tgz` archive is a gzipped tar file that requires a gnutar compatible tar which can handle the long path names in the archive. The default tar binaries on Solaris and OS X do not currently support the long path names. The extraction process will create a `jboss-4.0.1` directory. The following section explores the contents of this directory.

Directory Structure



The Default Server Configuration File Set

The `JBOSS_DIST/server` directory contains one or more configuration file sets. The default JBoss configuration file set is located in the `JBOSS_DIST/server/default` directory. JBoss allows you to add more than one configuration set so a server can easily be run using alternate configurations. Creating a new configuration file set typically starts with copying the default file set into a new directory name and then modifying the configuration files as desired.



Basic Installation Testing

Once you have installed the JBoss distribution, it is wise to perform a simple startup test to validate that there are no major problems with your Java VM/operating system combination. To test your installation, move to the JBOSS_DIST/bin directory and execute the run.bat or run.sh script as appropriate for your operating system.

```
JBoss Bootstrap Environment :
JBOSS_HOME: /tmp/jboss-4.0.1
JAVA: /System/Library/Frameworks/JavaVM.framework/Home//bin/java
JAVA_OPTS: -server -Xms128m -Xmx128m -Dprogram.name=run.sh
CLASSPATH: tmp/jboss-
4.0.1/bin/run.jar:/System/Library/Frameworks/JavaVM.framework/Home//lib/tools.ja
r
[bin]$ sh run.sh
```

16. RabbitMQ

RabbitMQ is open source **message broker** software (sometimes called message-oriented middleware) that implements the Advanced Message Queuing Protocol (AMQP). The RabbitMQ server is written in the Erlang programming language and is built on the Open Telecom Platform framework for clustering and failover.

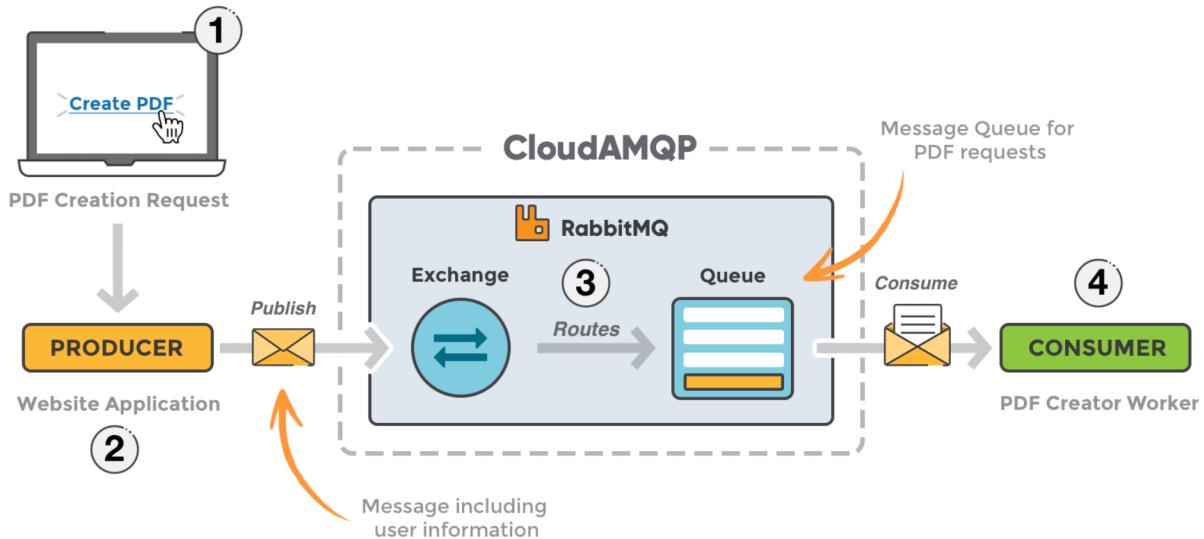
Note :For RabbitMQ installation guide follow the given link :

<https://www.rabbitmq.com/configure.html>

Note : For RabbitMQ code examples follow the given link:

<https://www.rabbitmq.com/getstarted.html>

Below example gives an idea about RabbitMQ as a middleware



17. Memcached

Memcached is Free & open source, high-performance, distributed memory object caching system, generic in nature, but intended for use in speeding up dynamic web applications by alleviating database load.

Memcached is an in-memory **key-value store** for small chunks of arbitrary data (strings, objects) from results of database calls, API calls, or page rendering.

Memcached is simple yet powerful. Its simple design promotes quick deployment, ease of development, and solves many problems facing large data caches. Its API is available for most popular languages.

Installing Memcached on Ubuntu

To install Memcached on Ubuntu, go to terminal and type the following commands

```
$ sudo apt-get update
$ sudo apt-get install memcached
```

Confirming Memcached Installation

To check if Memcached is presently running or not, run the command given below –

```
$ ps aux | grep memcached
```

This command should show that Memcached is running on the default port 11211.

To run Memcached server on a different port, run the command given below

```
$ memcached -p 11111 -U 11111 -u user -d
```

It should start the server and listen on TCP port 11111 and UDP port 11111 as a daemon process.

This command is explained below –

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- -p is for TCP port number
- -U is for UDP port number
- -u is for user name
- -d runs memcached as daemon process

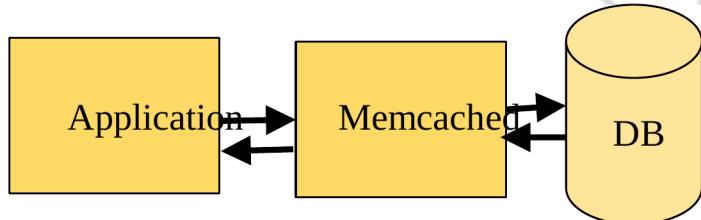
You can run multiple instances of Memcached server through a single installation.

What do we use Memcached for?

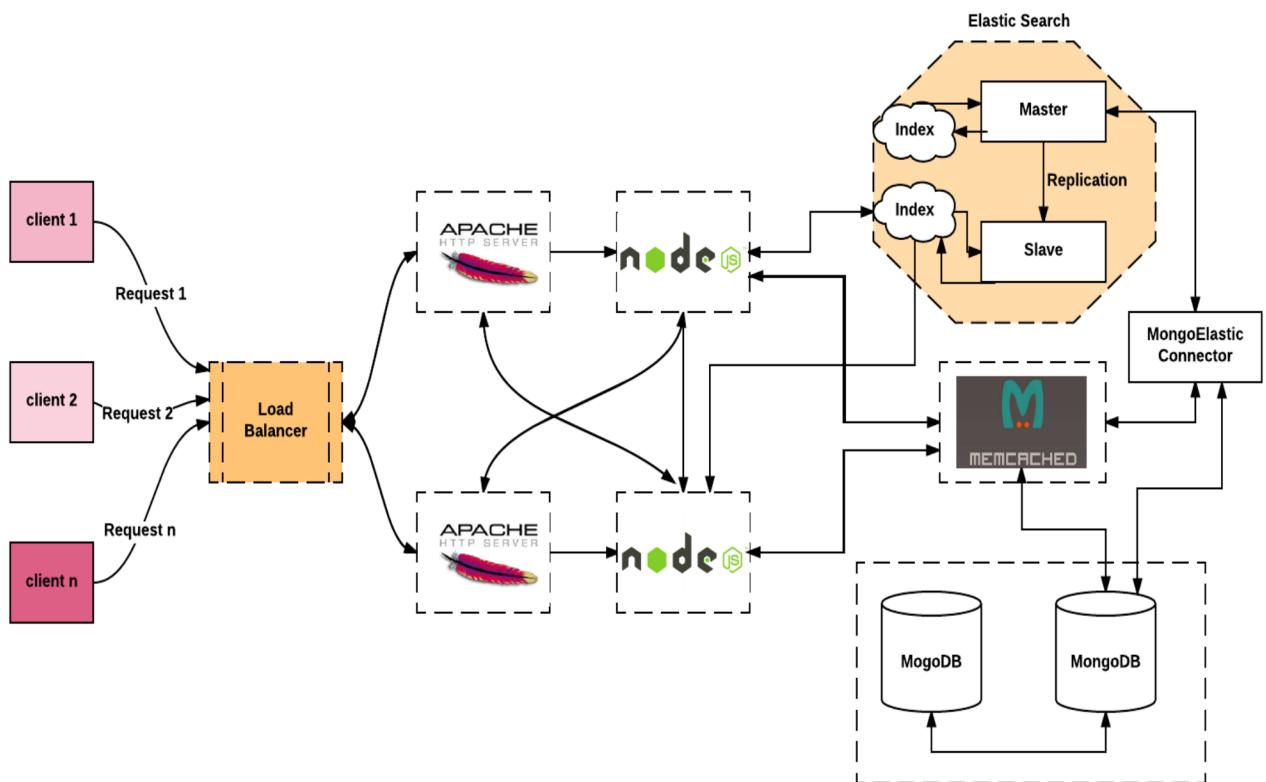
- Caching
 - Datastore query result
 - Use Authentication token and session data
 - API calls or other computational data
- Sharing data cross App Instances

Why do we need Memcached?

- ✓ Improve application performance
- ✓ Reduce application cost



18. WEB APPLICATION ARCHITECTURE 3



This architecture describes an approach to designing heavyweight web application for robust, concurrent with fault-tolerance and distributed software structure. An app is robust when it can work consistently with inconsistent data. For example: a maps application is robust when it can parse addresses in various formats with various misspellings and return a useful location.

This web application architecture contains load balancing, static content handler, dynamic content handler(NodeJS), Elastic search (For Indexing), Memcached, NoSQL Database (MongoDB).

Load Balancer:

Note: Web Application Architecture 1 give a clear idea for installing and configuring Nginx as Load Balancer. Refer Web Application Architecture 1.

Apache HTTP Server:

Note: Web Application Architecture 1 give an idea for installing and configuring Apache HTTP server for handling static content of the application. Refer Web Application Architecture 1 for more details on Apache HTTP server.

19. NodeJS Server:

Node.js is a JavaScript runtime built on Chrome's V8 JavaScript engine. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient.

- Node.js is nothing but javascript running on server.
- Use to build powerful, fast & scalable application.
- Node.js uses an event-driven, non-blocking I/O model.

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- Node.js uses a single threaded model with event looping.
- Node.js applications never buffer any data. These applications simply output the data in chunks.

Node.js Runtime

The source code written in source file will be normal javascript code only. The Node.js interpreter will be used to interpret and execute your javascript code.

Node.js distribution comes as a binary installable for SunOS , Linux, Mac OS X, and Windows operating systems with the 32-bit (386) and 64-bit (amd64) x86 processor architectures.

Following section guides you on how to install Node.js binary distribution on various OS.

Download Node.js archive

Download latest version of Node.js installable archive file from(<https://nodejs.org/en/>) At the time of writing this tutorial, following are the versions available on different OS.

OS	Archive name
Windows	node-v6.11.0-x64.msi
Linux	node-v6.11.0-linux-x86.tar.gz
Mac	node-v6.11.0-darwin-x86.tar.gz
SunOS	node-v6.11.0-sunos-x86.tar.gz

Add /usr/local/nodejs/bin to the PATH environment variable.

OS	Output
Linux	export PATH=\$PATH:/usr/local/nodejs/bin
Mac	export PATH=\$PATH:/usr/local/nodejs/bin
FreeBSD	export PATH=\$PATH:/usr/local/nodejs/bin

Note: In Linux, we can have installation directly from linux shell by using apt package manager. following commands

```
sudo apt-get update
sudo apt-get install nodejs
```

If the package in the repositories suits your needs, this is all that you need to do to get set up with Node.js. In most cases, you'll also want to also install npm, which is the Node.js package manager. You can do this by typing:

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```
sudo apt-get install npm
```

Verify installation: Executing a File

Open terminal in linux and command prompt in Windows and Use following command

```
$ node
> console.log('Hello World!');
Hello World!
```

- Create a js file named app.js on your machine (Windows or Linux) having the following code.

```
/* Hello, World! program in node.js */
console.log("Hello, World!")
```

Now execute app.js file using Node.js interpreter to see the result:

```
$ node app.js
```

If everything is fine with your installation, this should produce the following result:

```
Hello, World!
```

Creating Node.js Application

In above example we have created a sample application to run “Hello World !” In terminal ,Now printing hello world to a terminal isn't all that exciting. Let's take the next step and write a program that responds to hello world via http. We'll call the file 'hello_http.js' and put the following code into it:

```
var http = require('http');

var server = http.createServer(function(req, res) {
  res.writeHead(200);
  // Send the response body as "Hello World"
  res.end('Hello World');
});
server.listen(8081);
// Console will print the message
console.log('Server running at http://127.0.0.1:8081/');
```

Now let's run this program from the terminal by typing:

```
$ node hello_http.js
```

We can hit the browser with <http://127.0.0.1:8081/>



20. Elasticsearch

Elasticsearch is a real-time distributed and open source full-text search and analytics engine. Elasticsearch is able to achieve fast search responses because, instead of searching the text directly, it searches an index instead. Elasticsearch is developed in java.

Elasticsearch uses JSON objects as responses, which makes it possible to invoke the Elasticsearch server with a large number of different programming languages.

Elasticsearch Installation

The steps for installation of Elasticsearch are as follows:

Step 1 – Check and Verify the minimum version of your java is installed your computer, it should be java 7 or more updated version. You can check by doing the following:

Note –Please make sure, JAVA_HOME set, please set it in environment variables to “C:\Program Files\Java\jre1.8.0_31” or the location where you installed java.

In Windows Operating System (OS) (using command prompt):

```
$ java -version  
In UNIX OS (Using Terminal)  
$ echo $JAVA_HOME
```

Step 2 – Download latest version of Elasticsearch from

<https://www.elastic.co/downloads/elasticsearch>

For windows OS download ZIP file.

For UNIX OS download TAR file.

For Debian OS download DEB file.

For Red Hat and other Linux distributions download RPM file.

APT and Yum utilities can also be used to install Elasticsearch in many Linux distributions.

Step 3 – Installation process for Elasticsearch is very easy and described below for different OS –

- Windows OS – Unzip the zip package and the Elasticsearch is installed.
- UNIX OS – Extract tar file in any location and the Elasticsearch is installed.

```
$ tar -xvf elasticsearch-5.4.1.tar.gz
```

Using APT utility for Linux OS –

Download and install the Public Signing Key –

```
$ wget -qO - https://packages.elastic.co/GPG-KEY-elasticsearch | sudo apt-key add -
```

Save the repository definition:

```
$ echo "deb http://packages.elastic.co/elasticsearch/2.x/debian stable main" | sudo tee -a /etc/apt/sources.list.d/elasticsearch-2.x.list
```

Run update:

```
$ sudo apt-get update
```

Now you can install by using the following command

```
$ sudo apt-get install elasticsearch
```

Step 4 – Go to the Elasticsearch home directory and inside the bin folder. Run the elasticsearch.bat file in case of windows or you can do the same using command prompt and through terminal in case of UNIX run Elasticsearch file.

In Windows –

```
> cd elasticsearch-2.1.0/bin  
> elasticsearch
```

In Linux –

```
$ cd elasticsearch-2.1.0/bin  
$ ./elasticsearch
```

Step 5 – Default port for Elasticsearch web interface is 9200 or you can change it by changing http.port inside elasticsearch.yml file present in bin directory. You can check if the server is up and running by browsing <http://localhost:9200>. It will return a JSON object, which contains the information about the installed Elasticsearch in the following way :

```
{  
  "name" : "Brain-Child",  
  "cluster_name" : "elasticsearch", "version" : {  
    "number" : "2.1.0",  
    "build_hash" : "72cd1f1a3eee09505e036106146dc1949dc5dc87",  
    "build_timestamp" : "2015-11-18T22:40:03Z",  
    "build_snapshot" : false,  
    "lucene_version" : "5.3.1"  
  },  
  "tagline" : "You Know, for Search"
```

```
}
```

Note: Memcached description and installation are given in web application architecture-2 .please refer web application architecture-2 for more details.

21.MongoDB

MongoDB is an open-source document-oriented database. MongoDB is one of highly used NoSQL database. MongoDB is written in C++.

All the modern applications require big data, fast features development, flexible deployment and the older database systems not enough competent, so the MongoDB is designed to fulfil the requirement.

MongoDB Supported Feature:

- Support ad hoc queries --In MongoDB, you can search by field, range query and it also supports regular expression searches.
- Indexing -- You can index any field in a document.
- Replication -- MongoDB supports Master Slave replication.
- Duplication of data --MongoDB can run over multiple servers. The data is duplicated to keep the system up and also keep its running condition in case of hardware failure.
- Schema less
- Scalability
- Performance
- High Availability
- Scaling from single server deployments to large, complex multi-site architectures.

Install MongoDB On Windows

To install MongoDB on Windows, first download the latest release of MongoDB from <https://www.mongodb.org/downloads>. Make sure you get correct version of MongoDB depending upon your Windows version.

32-bit versions of MongoDB only support databases smaller than 2GB and suitable only for testing and evaluation purposes.

Now extract your downloaded file to c:\ drive or any other location.

Make sure the name of the extracted folder is mongodb-win32-i386-[version] or mongodb-win32-x86_64-[version]. Here [version] is the version of MongoDB download.

Next, open the command prompt and run the following command.

```
C:\> move mongodb-win64-* mongodb
      1 dir(s) moved.
C:\>
```

In case you have extracted the MongoDB at different location, then go to that path by using command cd FOLDER/DIR and now run the above given process.

MongoDB requires a data folder to store its files. The default location for the MongoDB data directory is c:\data\db. So, you need to create this folder using the Command Prompt.

Execute the following command sequence.

```
C: \>md data  
C: \md data\db
```

If you have to install the MongoDB at a different location, then you need to specify an alternate path for \data\db by setting the path dbpath in mongod.exe. For the same, issue the following commands.

In the command prompt, navigate to the bin directory present in the MongoDB installation folder.

Suppose my installation folder is D:\Software\mongodb

```
C: \Users \XYZ \ABC>d:  
D: \>cd Software  
D: \Software>cd mongodb  
D: \Software\mongodb>cd bin  
D: \Software\mongodb\bin>mongod.exe --dbpath "d: \Software\mongodb\data"
```

The result will show waiting for connections message on the console output, which indicates that the mongod.exe process is running successfully.

Run MongoDB:

Now to run the MongoDB, you need to open another command prompt and execute the following command.

```
D: \Software\mongodb\bin>mongo.exe  
MongoDB shell version: 2.4.6  
connecting to: test  
>db.test.save( { a: 1 } )  
>db.test.find()  
{ "_id" : ObjectId("5879b0f65a56a454"), "a" : 1 }  
>
```

This will show that MongoDB is installed and run successfully. Next time when you run MongoDB, you need to issue only commands.

```
D: \Software\mongodb\bin>mongod.exe --dbpath "d: \Software\mongodb\data"  
D: \Software\mongodb\bin>mongo.exe
```

Install MongoDB on Ubuntu

Import the public key used by the package management system. Run the following command to import the MongoDB public GPG key.

```
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv 7F0CEB10
```

Create a list file for MongoDB ,create a /etc/apt/sources.list.d/mongodb.list file using the following command.

```
echo 'deb http://downloads-distro.mongodb.org/repo/ubuntu-upstart dist 10gen'  
| sudo tee /etc/apt/sources.list.d/mongodb.list
```

Now issue the following command to update the repository –

```
sudo apt-get update
```

Install Mongodb packages.

You can install either the latest stable version of MongoDB or a specific version of MongoDB. Install the latest stable version of MongoDB.

Issue the following command:

```
sudo apt-get install -y mongodb-org
```

Next install the MongoDB by using the following command

To install a specific release, you must specify each component package individually along with the version number, as in the following example:

```
apt-get install mongodb-10gen =3.4.5
```

In the above installation, 3.4.5 is currently released MongoDB version. Make sure to install the latest version always. Now MongoDB is installed successfully.

Start MongoDB

```
sudo service mongodb start
```

Stop MongoDB

```
sudo service mongodb stop
```

Restart MongoDB

```
sudo service mongodb restart
```

To use MongoDB run the following command.

Mongo This will connect you to running MongoDB instance.

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Remove Packages

Remove any MongoDB packages that you had previously installed.

```
sudo apt-get purge mongodb-org*
```

Remove Data Directories

Remove MongoDB databases and log files.

```
sudo rm -r /var/log/mongodb  
sudo rm -r /var/lib/mongodb
```

Technologies Use for an Web Application

Front End (in the browser of the user):

- 1) HTML for the structure of a single web page
- 2) CSS for the design of elements of the single web page, often as a repository for many web pages to keep consistency
- 3) Native Javascript or libraries like jQuery. AJAX that allow interaction with the user and the backend system while staying on the same page.
- 4) Other special technologies e.g. Flash Movie Addins or such, most often replaced by HTML 5.

Backend (on the server of the host of the web page):

- 1) Operating system (e.g. Linux)
- 2) Web application Server (e.g. Apache)
- 3) Database, e.g. MySQL ,MongoDB or other
- 4) PHP,Java,python and nodeJs and other languages to run queries on the database etc.

Summary:

- Any Architectural design include Many point such as what (conceptual) parts does our app consist of? How do the different parts communicate with each other? How do they depend on each other?
- A well-defined Architecture consist of Many components which communicate hand to hand with each other with higher accuracy and less fault tolerance.
- A web application architecture consist of many services such as load balancer, Message broker(ActiveMQ/rabbitMQ), Elasticsearch, web server(Tomcat),Application server(JBOSS),Node JS and different high level programming language such as Java, PHP, python and Javascript etc.
- Above three different web application architectural design are given to understood the real time web application design.

Conclusion:

The goal of Chapter was to provide a understanding of architectural design with necessary background information for Web-based applications. Every architectural design will be different based on the requirement and facilities(Technologies) used. Nowadays growing web-based applications thus requires both scalable architectures and appropriate concepts for concurrent programming.

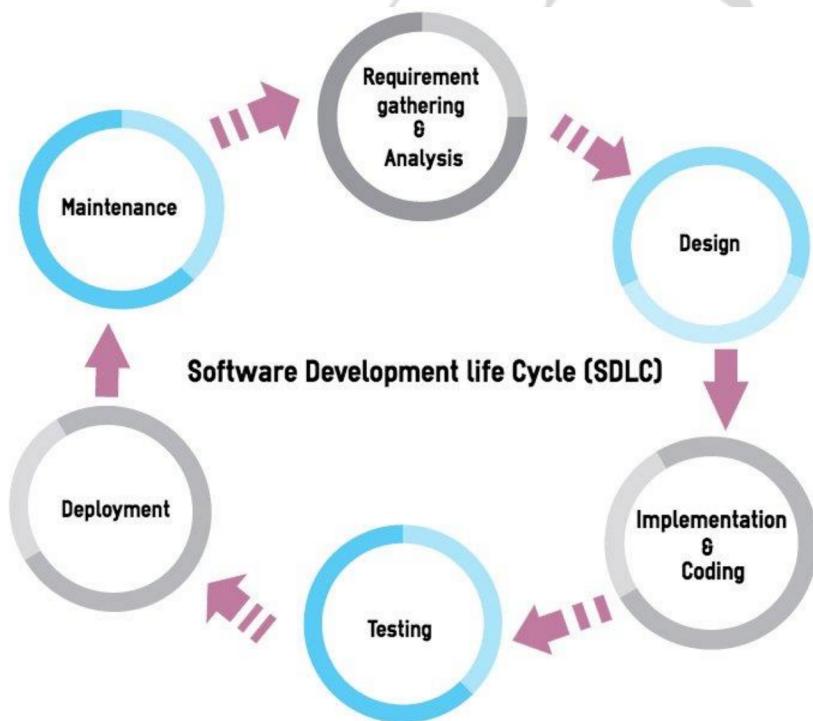
VIII. Software Development

Before we go in understand Continuous Integration and the tools required to do Continuous Integration, lets understand how the Software Development happens. Software development is a structured and well-defined process, which everyone in the development team follows. It has several phases like Requirement Analysis. Architecture, Implementation, testing etc.

1. Software Development Process

A software development process or life cycle is a structured way of developing a software. Software Development Life Cycle (SDLC) include well organized steps to deliver a high quality, well tested product with a dedicated time period.

Nowadays, nearly all organizations are following SDLC for detail planning, maintenance, testing and delivery of product.



We have numerous types of SDLC models like Waterfall, Agile, Spiral etc.
All these SDLC must follow below mentioned steps to develop software.

- Requirement Gathering & Analysis.
- Designing, software, system & its components.
- Implementation/Development/coding
- Testing
- Deployment
- Maintenance

Requirement Gathering & Analysis

Software Development Life Cycle begins with Requirement Gathering Analysis phase, where the senior level management (Architect, Developer, DevOps) discuss What are the requirements for the software product? and How to should be the work flow? that to be adapted to achieve a goal.

The software requirements are description of features and functionalities of the target system. Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from client's point of view.

The process to gather the software requirements from client, analyse and document them is known as requirement engineering. The goal of requirement engineering is to develop and maintain a descriptive 'System Requirements Specification' document.

Designing

In the design phase, the developers and technical architects start the high-level design of the software and system to be able to deliver each requirement. Software architects will use all the information gathered in Requirement phase. They identify what you need in the software/system? how you will use it? who will use it? etc.

The technical details of the design are discussed with the stakeholders and various parameters such as risks, technologies to be used, capability of the team, project constraints, time and budget are reviewed and then the best design approach is selected for the product. Software design is a process to transform user requirements into some suitable form, which helps the programmer in software coding and implementation.

For assessing user requirements, an SRS (Software Requirement Specification) document is created whereas for coding and implementation, there is a need of more specific and detailed requirements in software terms. The output of this process can directly be used into implementation in programming languages.

This phase yields three results.

- Architectural Design -- A diagrammatic structure
- High-level Design -- A diagrammatic structure with technologies specification for developers
- Detailed Design -- A detailed doc with a each and Every single feature

Implementation/Development & Coding

In this process, a team of developers are assigned by the organization to work on software development. This is the phase where actual development starts. The work is divided among the developers called as Task Allocation.

DB admins create the necessary data in the database, Schemas, and Tables etc. front-end developers create the necessary interfaces and GUI to interact with the back-end services. Backend developer the code Backend services and building API to integrate with other party vendors .For developing

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