# (ELECTIVE) CS 304: Project

- ➢ The Project can be platform, Language and technology independent.
- ➢ Project will be evaluated by project guide.
- ➢ Assessment will be done weekly in the respective batch.
- ➢ Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation and demonstration.
- ➢ You should fill your status of the project work on the progress report and get the Signature of project guide regularly. Progress report should sharply focus how much time you have spent on specific task. (The format of progress report is given as follow.)
- ➢ You should keep all signed progress report.
- ➢ Project will not be accepted if progress report is not submitted and all responsibility remains with student.
- ➢ Students should prepare design document using SE/UML techniques depends on your project.

**About project Report: -**
- ➢ The report should be typed on A4 size, executive bond paper for the final submission. The report should be in the good quality Rexene bound. We suggest, using one-and-half spaced printing, Times New Roman 12 font sizes for the normal text, 14-16 font sizes for headings & page titles.
- ➢ Number of copies:
  For one project you should prepare 2 copies of the project report. One for yourself, one for college (**College copy can be in CD**).

**Evaluation for internal 50 Marks**

| Description | Marks |
|---|---|
| UML Diagrams | 10 M |
| Technology And Design Based First Demo | 15 M |
| Project Technology Based 2 assignments | 10 M |
| Second Demo | 15M |

**Evaluation for external 50 Marks**

| Description | Marks |
|---|---|
| Demo | 15 M |
| Report | 15 M |
| Presentation | 15 M |
| Viva | 05M |

# (ELECTIVE) CS 305: Web Services

**No of lectures: 48**

**Pre-requisites**

- Strong knowledge about Java programming.
- Good Understanding of Object Oriented Programming concepts.
- Must be familiar with XML.

**Objectives**

- To Understand Web Services and implementation model for SOA
- To Understand the SOA, its Principles and Benefits
- Understanding cloud computing as a web service
- Discuss the concept of virtualization and data in cloud.

**Chapter 1 : Web Service and SOA fundamentals** [ 8 ]

Introduction, Concept of Software as a Service(SaaS), Web services versus Web based applications, Characteristics of Web services, Service interface and implementation, The Service Oriented Architecture(SOA), Quality of service (QoS), Web service interoperability, Web services versus components, RESTful services , Impact and shortcomings of Web services.

**Chapter 2 : Web Services Architecture.** [ 8 ]

Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

**Chapter 3 : SOAP: Simple Object Access Protocol** [ 10 ]

Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP communication model, Building SOAP Web Services, developing SOAP Web Services using Java, Error handling in SOAP, Advantages and disadvantages of SOAP.

**Chapter 4 : Describing and Discovering Web Services**           **[12]**

WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL, Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDI Registry, searching information in a UDDI Registry, deleting information in a UDDI Registry, limitations of UDDI.

**Chapter 5 : Emerging trends: Cloud Computing**           **[10]**

What is Cloud Computing?, SOA meets the Cloud, Cloud Service Models, SaaS-Salesforce.com, PaaS-Google App Engine, IaaS-Amazon EC2, Cloud Deployment Models – Public, Community, Private, Hybrid. Virtualization , Virtual Machine(VM) Technology, Virtual Machine Monitor or Hypervisor - KVM, Xen, VMware hypervisors and their features, Multi-tenancy, Architecture model for Cloud Computing .

Case Study: Use Cloud Services – Amazon EC2, Google App Engine, Salesforce.com

**Text books:**

1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.
4. Gautam Shroff, "Enterprise Cloud Computing" ,Cambridge.

**Reference Books:**

1. Building Web Services with Java, 2$^{nd}$ Edition, S. Graham and others, Pearson Edn., 2008.
2. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
3. J2EE Web Services, Richard Monson-Haefel, Pearson Education.
4. Java Web Services Programming,R.Mogha,V.V.Preetham,Wiley India Pvt.Ltd.
5. 5.Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India
6. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
7. Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication
8. Borko Furht, "Handbook of Cloud Computing", Springer

# (ELECTIVE) CS 306: Database and System Administrator

**No of lectures: 48**

**Pre-requisites**

- Concepts of Databases
- Basic knowledge of any operating system and programming language.

**Objectives**

- This curriculum offers you the opportunity to acquire a combination of both Operating Systems & Database Administration skills.
- SDBA program gives you ideal opportunity to practice what you have learned through real life case studies.

## DBMS Administration

### Chapter 1 : Client/Server Concepts                                    [1]

- Client server Architecture
- Invoking Client Programs

### Chapter 2 : MySQL Client Program                                      [4]

- Using MySQL interactively
- Statement Terminators
- Using Script Files with MySQL
- MySQL Output Formats
- Client Commands and SQL Statements
- Using Server-Side Help
- Using the – safeupdates Option

### Chapter 3 : MySQL Architecture                                        [3]

- Client/Server Overview
- Communication Protocols
- The SQL Parser and Storage Engine
- Tiers
- How MySQL Uses Disk Space
- How MySQL Uses Memory

### Chapter 4 : Starting, Stopping, and Configuring MySQL                 [3]

- Types of MySQL Distributions
- Starting and Stopping MySQL Server on Windows
- Starting and Stopping MySQL Server on Unix
- Runtime MySQL Configuration
- Log and Status Files

- Loading Time Zone Tables
- Security-Related Configuration
- Setting the Default SQL mode
- Upgrading MySQL

**Chapter 5 : Locking** [2]

- Locking Concepts
- Explicit Table Locking
- Advisory Locking

**Chapter 6 : Storage Engines** [5]

- MySQL Storage Engines
- The MyISAM Engine
- The MERGE Engine
- The InnoDB Engine
- The MEMORY Engine
- The FEDERATED Engine
- The Cluster Storage Engine
- Other Storage engines

**Chapter 7 : Data (Table) Maintenance** [3]

- Types of Table Maintenance Operations
- SQL Statements for Table Maintenance
- Client and Utility Programs for Table Maintenance
- Repairing InnoDB Tables
- Enabling MyISAM Auto-Repair

**Chapter 8 : Data Backup and Recovery Methods** [3]

- Introduction
- Binary Versus Textual Backups
- Making Binary Backups
- Making Text Backups
- Backing Up Log and Status Files
- Replication as an Aid to Backup
- MySQL Cluster as Disaster Prevention
- Data Recovery

**System Administration**

**Chapter 9 : Introduction** [1]

- Know Your PC
- Different Linux Distribution

- Daily tasks of system Administrator
- Responsibilities of System Administrator

**Chapter 10 : Linux Installation** [2]

- Text VS Graphics
- Partitioning & Disk management
- GUI Configuration

**Chapter 11 : File manipulations Under Linux** [4]

- Copy rename, delete & move
- File & directory listing
- File handling & I/O redirection
- File systems and their types
- Names & contents of important Unix/Linux file directories
- Compatibility of file Systems
- fsck & Disk check Commands, Log files

**Chapter 12 : Command Line Interface** [3]

- Text Manipulation Commands e.g. cut, grep, egrep, split, paste
- Vi editor
- su, ps, find, make, df/du
- Introduction to Regular expression
- awk, sed, passwd, wc, Antivirs, utilities, tar, gzip/gunzip, accessing pen drive, CD

**Chapter 13 : Users and Groups** [2]

- Concept of users & groups
- Owner creator
- Primary and Secondary group
- Types of file and directory permission

**Chapter 14 : Startup/shut down** [2]

- Booting
- Run Levels
- /etc/init tab
- shut down
- handling crashes

**Chapter 15 : Basic system Administration** [6]

- Managing Users and groups (from console & GUI modes) Using command like adduser, userdel, groupadd, groupdel etc.
- Basic Network Setup Setting hostname, IP address of the machine. Setting a dialup connection.

- Installing and removing packages. Using the RPM, source package installation, URPMI.
- Managing Partitions
- Boot loader management Understanding the lilo and grub boot loader and its configuration files.
- Configuring services, chkconfig, ntsys,  start, Resart & stop Service

### Chapter 16 : Networking                                   [2]

- Internetworking with windows (samba)
- Ping Telnet, ftp program
- NIS, NFS, Tomcat web server

### Chapter 17 : Print Services                                   [2]

- Printers Installation
- Print command

### Reference Books

1. Linux System Administrator's guide  by Lars Wirzenius, Joanna Oja, Stephen Stafford, Alex Weeks
2. Linux Administration Made Easy by Steve Frampton
3. MySQL 5 for Professionals By Ivan Bayross, Sharanam Shah [SPD Publications]
4. High Performance MySQL By Jeremy D. Zawodny, Derek J. Balling [O'Reilly Media Publications]
5. MySQL in a Nutshell By Russell Dyer [O'Reilly Media Publications]

### Important Links

1. http://www.thegeekstuff.com/2008/11/overview-of-mysql-information_schema-database-with-practical-examples/
2. http://www.learn-mysql-tutorial.com/Identifiers.cfm

### Note: -

- ➢ **Some chapters are practical oriented so faculty should teach those chapter with demonstration.**
- ➢ **And, those chapters are kept for internal evaluation.**
- ➢ **Hence, hands on must be taken for these chapters.**

# (ELECTIVE) CS 307: Functional Programming

**No of Lectures: 48**

## Prerequisites

Anyone who has a mature understanding of programming in an imperative language (e.g., Java, C/C++, or Pascal), of basic algorithms and data structures (e.g., sorting, searching, lists, stacks, and trees), and of basic discrete mathematics (e.g., sets, relations, functions, induction, and simple algebraic concepts)

## Objectives

- Understand what functional programming is, what different variants are there and have some grasp of their history;
- Explain the semantics of different functional languages using precise formal specifications;
- Know how to implement functional languages and what optimizations are important;
- Be able to state and critique what it means for an implementation of a functional programming language to be correct;
- Be able to (in principle) formally prove correctness of their implementations, including their compilers and garbage collectors

## Chapter 1 : Introduction to FP & Mathematical Functions                    [6]

Principles of FP, History, Varieties of FP languages, Declarative style of programming, Declarative style of programming, Why functional programming Mathematical functions : definition, lambda expression, Functional Forms or a higher-order function :- Function Composition, Construction, Apply-to-all, Disadvantages of FP

## Chapter 2 : Introduction to Lambda calculus                    [12]

Introduction, The benefits of lambda notation, Lambda calculus as a formal system - Lambda terms (Variables, Constants, Combinations, Abstractions), Free and bound variables, Substitution, Conversions (Alpha conversion, Beta conversion, Eta conversion), Lambda equality, Lambda reduction, Reduction strategies, Combinators

## Chapter 3 :  Reduction strategies and lazy evaluation                    [8]

Reduction, Evaluation in a strongly typed language, What is reduction?, 2 types of reduction rules, Reduction rules, Alternate reductions, Reduction strategies - Eager evaluation and  Lazy Evaluation, Advantages and disadvantages of  reduction strategies, Graph Reduction, Reduction of higher order functions and currying

## Chapter 4 : Introduction to Python
### Scripting versus Traditional Programming                    [2]

Why Scripting is Useful in Computational Science, Classification of Programming Languages, Productive Pairs of Programming Languages, Gluing Existing Applications, Scripting Yields Shorter Code,  Efficiency, Type-Specification (Declaration) of Variables, Flexible Function Interfaces,  Interactive Computing, Creating Code at Run Time, Nested Heterogeneous Data Structures, GUI Programming, Mixed Language Programming, When to Choose a Dynamically Typed Language, Why Python?,  Script or Program?

## Chapter 5 :  Basic Python                                   [2]
Python identifiers and reserved words, Lines and indentation, multi-line statements, comments, print and raw_input()/input, command line arguments and processing command line arguments, standard data types - basic, none, boolean (true & False), numbers, Python strings, data type  conversion, Python basic operators (Arithmetic, comparision, assignment, bitwise logical), Python membership operators (in & not in), Python identity operators (is & is not),  Operator precedence,  Control Statements, Python loops, Iterating by subsequence index, loop control statements (break, continue, pass) , Mathematical functions and constants (import math), Random number functions

## Chapter 6 :  Python strings                                 [4]
Concept, Slicing, escape characters, String special operations, String formatting operator, Triple quotes, Raw String, Unicode strings, Built-in String methods.

Python Lists - concept, creating and accessing elements, updating & deleting lists,  basic list operations, reverse, Indexing, slicing and Matrices, built-in List functions, Functional programming  tools - filter(), map(), and reduce(), Using Lists as stacks and Queues, List comprehensions

## Chapter 7 :  Python tuples and sets                         [1]

Concept (immutable), creating & deleting tuples, accessing values in a tuple, updating tuples, delete tuple elements, basic tuple operations, Indexing, slicing and Matrices, built-in tuple functions. Sets - Concept, operations.

## Chapter 8 :  Python Dictionary                              [1]

Concept (mutable), creating and accessing values in a dictionary , updating dictionary, delete dictionary elements, properties of dictionary keys, built-in dictionary functions and methods.

## Chapter 9 :  Functions                                      [3]

Defining a function (def), calling a function, Function arguments - Pass by value, Keyword Arguments,  default arguments,  Scope of var - basic rules and , Documentation Strings,   Variable Number of Arguments, Call by Reference, Order of arguments (positional, extra & keyword), Anonymous functions,  Recursion, Treatment of Input and Output Arguments, Unpacking argument lists, Lambda forms,   Function Objects, function ducktyping & polymorphism, generators (functions and expressions)  and iterators, list comprehensions

**Chapter 10 : Working with Files and Directories**                              **[3]**

Creating files, Operations on files (open, close, read, write), file object attributes, file positions, Listing Files in a Directory,  Testing File Types, Removing Files and Directories, Copying and Renaming Files , Splitting Pathnames,  Creating and Moving to Directories, Traversing Directory Trees

**Chapter 11 : Python Classes / Objects**                                        **[3]**

Object oriented programming and classes in Python - creating classes, instance objects, accessing members, data hiding (the double underscore prefix), built-in class attributes, garbage collection,  the constructor, overloading methods and operators, inheritance - implementing a subclass, overriding methods, Recursive calls to methods, Class variables, class methods, and static methods

**Chapter 12 : Python regular expressions**                                      **[1]**

Matching Vs searching, match & search functions, search & replace, option flags, RE patterns, non-greedy repetitions, grouping, back references, alternatives, anchors.

**Chapter 13 : Python Exceptions**                                               **[1]**

Exception handling, assert statement, except clause - with no exceptions and multiple exceptions, try - finally, raising exceptions, user-defined exceptions

**Reference Books**

1. Functional Programming: Practice and Theory by Bruce J. Maclennan
   - ISBN-10: 0201137445
   - ISBN-13: 978-0201137446
2. An Introduction to Functional Programming Through Lambda Calculus (Dover Books on Mathematics) Paperback by Greg Michaelson
   - ISBN-10: 0486478831
   - ISBN-13: 978-0486478838
3. Computational Semantics with Functional Programming by Jan van Eijck (Author), Christina Unger (Author)
   - ISBN-10: 0521757606
   - ISBN-13: 978-0521757607
4. Programming Languages: Principles and Practice By Kenneth C. Louden
   - ISBN-10: 1575864967
   - ISBN-13: 978-1575864969
5. E-Books : python_tutorial. pdf, python_book_01.pdf

**Note: -**

> **For Internal Evaluation ,
> 20M Theory + 30M Programming**

# (ELECTIVE) CS 308: Business Intelligence

**No of lectures: 48**

**Pre-requisites**

- Relational database concepts, database design and entity-relationship (E-R) modeling, data normalization, and Structured Query Language (SQL).
- Data Mining techniques

**Objectives**

- Understand the role of BI in enterprise performance management and decision support.
- Understand the applications of data mining and intelligent systems in managerial work.
- Understand data warehousing and online analytical processing (OLAP) concepts, including dimensional modeling, star and snowflake schemas, attribute hierarchies, metrics, and cubes.
- Learn data analysis and reporting using an available BI software.

**Chapter 1  : Introduction to Business intelligence                         [6]**

Definition and History of BI, Transaction processing versus analytical processing, BI implementation , Major tools and techniques of BI

**Chapter 2 : Data warehousing                                             [10]**

Definition and concepts, , Data warehouse architecture, ETL process,  data warehouse development, Top down vs. Bottom up, Data Mart vs. EDW, Implementation issues, Real-time data warehousing

**Chapter 3 : Business performance management                          [14]**

Key performance indicators and operational metrics,  Balanced scorecard , Six Sigma , Dashboards and scorecards

**Chapter 4 : Data Mining for Business Intelligence                    [10 ]**

Data mining process, Data mining methods, ANN for Data Mining

## Chapter 5 - Text, and Web mining for Business intelligence        [08]

Text mining  Applications, Process and Tools, Web content, structure and usage mining

## Chapter 6 : BI implementation , Integration and emerging trends        [10]

Implementing BI, BI Application Life Cycle , Connecting BI to Enterprise systems, On-demand BI, Issues of legality, privacy and Ethics, Emerging topics in BI, Social Networking and BI, RFID and BI

**Reference Books**

1.  Business Intelligence: A Managerial Approach, 2nd Edition, PEARSON 2012
    Authors: EfraimTurban, Ramesh Sharda, Dursun Delen, and David King
    ISBN-10: 0-13-610066-X
    ISBN-13: 978-0-13-610066-9

2.  Oracle Business Intelligence Applications, McGraw Hill Education 2013

    Authors : Simon Miller, William Hutchinson ISBN-10: 93-5134-153-4
    ISBN-13: 978-93-5134-153-6

**Note : -**

➢ **Group wise Case studies can be given for Internal Evaluation.**