ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS

Master of Technology
(Computer Science and Engineering)

(Two Year Regular Programme)
(Applicable for the Batches admitted from 2014)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Gokaraju Rangaraju
Institute of Engineering and Technology, Hyderabad
M. Tech. GR14 Regulations

Gokaraju Rangaraju Institute of Engineering & Technology 2014 Regulations (GR14 Regulations) are given hereunder. These regulations govern the programmes offered by the Department of Computer Science and Engineering with effect from the students admitted to the programmes in 2014-15 academic year.

1. **Programme Offered:** The programme offered by the Department is M.Tech in Computer Science and Engineering, a two-year regular programme.

2. **Medium of Instruction:** The medium of instruction (including examinations and reports) is English.

3. **Admissions:** Admission to the M.Tech in Computer Science and Engineering Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the Institute/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in PGECET conducted by the APSCHE for M. Tech Programmes or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.

4. **Programme Pattern:**
   a) Each Academic year of study is divided into two semesters.
   b) Minimum number of instruction days in each semester is 90.
   c) The total credits for the Programme is 88.
   d) All the registered credits will be considered for the calculation of the final percentage of marks.

5. **Award of M.Tech Degree:** A student will be declared eligible for the award of the M. Tech Degree if he/she fulfills the following academic requirements:
   a) A student shall be declared eligible for the award of M.Tech degree, if he/she pursues the course of study and completes it successfully in not less than two academic years and not more than four academic years.
   b) A Student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the date of admission, shall forfeit his/her seat in M.Tech course.
   c) The Degree of M.Tech in Computer Science and Engineering shall be conferred by Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad, on the students who are admitted to the programme and fulfill all the requirements for the award of the degree.

6. Attendance Requirements

a) A student shall be eligible to appear for the end semester examinations if he/she puts in a minimum of 75% of attendance in aggregate in all the courses concerned in the semester.

b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted. A committee headed by Dean (Academic Affairs) shall be the deciding authority for granting the condonation.

c) Students who have been granted condonation shall pay a fee as decided by the Academic Council.

d) A candidate shall get minimum required attendance at least in three (3) theory subjects in the semester to get promoted to the next semester. In order to qualify for the award of M.Tech Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.

e) Students whose shortage of attendance is not condoned in any semester are detained and are not eligible to take their end examinations of that semester. They may seek re-registration for that semester when offered next with the academic regulations of the batch into which he/she gets re-registered.

7. Paper Setting, Evaluation of Answer Scripts, Marks and Assessment

a) Paper setting and Evaluation of the Answer Scripts shall be done as per the procedures laid down by the Academic Council of the College from time to time.

b) The following is the division of marks between internal and external evaluations.

Particulars	Internal	External	Total
Theory	40	60	100
Practical	40	60	100
Comprehensive Viva	--	100	100
Seminar	50	----	50
Project Work	Grade	-----	----
Project work & dissertation (Grading System)	------	Grade	----

c) Continuous Internal Evaluation and Semester End Examinations

The assessment of the student's performance in each course will be based on continuous internal evaluation and semester-end examinations. The marks for each of the component of assessment are fixed as shown in the following Table.

Assessment Procedure

S.No	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Examinations
1	Theory	40	Internal Exams & Continuous Evaluation	1. Mid-examinations: … 30 Marks (Two mid-semester examinations shall be conducted for 30 marks each for duration of 2 hours. Average of the two mid semester examinations shall be considered) 2. Tutorial: … … 5 Marks 3. Attendance: .. 5 Marks
		60	Semester-end examination	The semester-end examination is for a duration of 3 hours
2	Practical	40	Internal Exams & Continuous Evaluation	1) Lab Internal :15 marks 2) Record : 5 marks 3) Continuous Assessment : 15 marks 4) Attendance : 5 marks
		60	Semester-end examination	The semester-end examination is for a duration of 3 hours.

d) **Comprehensive Viva:** There shall be a Comprehensive Viva-Voce in II year I semester. The Comprehensive Viva-Voce will be conducted by the committee consisting of Head of the Department and two senior faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects he/she studies during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 100 marks by the committee. There are no internal marks for the Comprehensive Viva-voce.

e) **Seminar:** There shall be three Seminar Presentations by the student, one each in the I, II and III semesters. For the seminar, the student shall collect the information on a specialized topic other than his/her project and prepare a technical report, showing his understanding over the topic,

and submit to the department, which shall be evaluated by a Departmental committee consisting of the Head of the department, seminar Supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

f) **Project:** The work on the project shall be initiated in the beginning of the second year and the duration of the project is for two semesters (III & IV). Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee (PRC).
   i) PRC shall be constituted with HOD as chair person, two senior faculty members and project supervisor.
   ii) Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).
   iii) A candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the PRC for its approval. Only after obtaining the approval of PRC the student can initiate the Project work.
   iv) If a candidate wishes to change his supervisor or topic of the project he/she can do so with approval of PRC. However, the PRC shall examine whether the change of topic/supervisor leads to a major change of his initial plans of project proposal. If so, his date of registration for the project work starts from the date of change of supervisor or topic as the case may be.
   v) **Project Work:** The candidate should be continuously observed by the project supervisor. His performance is assessed by the PRC through a seminar and interim report. Full credits are awarded 'SAT' on satisfactory performance of the student. 'US' grade is given on unsatisfactory performance. If the performance is unsatisfactory, the PRC should redefined the project and the candidate is allowed to appear for the evaluation only after six months.
   vi) Project Work & Dissertation: A candidate shall submit status report (in a bound-form) in two stages at least with a gap of 3 months between them to the project supervisor.
   vii) A candidate is permitted to submit Project dissertation only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of dissertation to the Head of the Department and shall make an oral presentation before the PRC along with project supervisor.
   viii) Student has to submit to the department three copies of the Project dissertation along with a soft copy on CD certified by the supervisor.

ix) The dissertation shall be adjudicated by one examiner selected by the Controller of examination from the panel of 3 examiners as suggested by Head of the Department, who are eminent in that field with the help of the concerned guide and head of the department.

x) If the report of the Examiner is not favorable, the candidate shall revise and resubmit the dissertation, in the time frame as described by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

xi) If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner who adjudicated the dissertation. The Board shall jointly report candidates work as:

A. Excellent
B. Good
C. Satisfactory
D. Unsatisfactory

Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination.

If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination after three months. If he/she fails to get a satisfactory report at the second viva-voce examination, he/she will not be eligible for the award of the degree.

8. **Recounting of Marks in the End Examination Answer Books:** A student can request for re-counting of his/her answer book on payment of a prescribed fee.

9. **Re-evaluation of the End Examination Answer Books:** A student can request for re-evaluation of his/her answer book on payment of a prescribed fee.

10. **Supplementary Examinations:** A student who has failed in an end semester examination can appear for a supplementary examination, as per the schedule announced by the College/Institute.

11. **Malpractices in Examinations:** Disciplinary action shall be taken in case of malpractices during Mid/ End-examinations as per the rules framed by the Academic Council.

12. **Academic Requirements:** a)A student shall be deemed to have secured the minimum academic requirements in a subject if he / she secures a minimum of 40% of marks in the Semester-end Examination and a minimum aggregate of 50% of the total marks in the Semester-end examination and Internal Evaluation taken together.

b) In order to qualify for the award of M.Tech Degree, the student shall Complete the academic requirements of passing in all the Courses as per the course structure including Seminars and Project if any.

c) In case a Student does not secure the minimum academic requirements in any course, he/she has to reappear for the Semester-end Examination in the course, or re-register for the same course when next offered or re-register for any other specified course, as may be required. However, one more additional chance may be provided for each student, for improving the internal marks provided the internal marks secured by a student are less than 50% and he/she failed finally in the course concerned. In the event of taking another chance for re-registration, both the internal and external marks obtained in the previous attempt are nullified. In case of re-registration, the student has to pay the re-registration fee for each course, when next offered.

13. **Award of Class:** After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of M. Tech Degree by JNTUH, he/she shall be placed in one of the following three classes:

Class Awarded	% of Marks Secured
First Class with Distinction	Marks ≥ 70%
First Class	60% ≤ Marks < 70%
Second Class	50% ≤ Marks < 60%

14. **Withholding of Results:** If the student has not paid dues to the Institute/ University, or if any case of indiscipline is pending against him, the result of the student (for that Semester) may be withheld and he/she will not be allowed to go into the next Semester. The award or issue of the Degree may also be withheld in such cases.

15. **Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities:** Transfer of students from the Constituent Colleges of JNTUH or from other Colleges/ Universities shall be considered only on case-to-case basis by the Academic Council of the Institute.

16. **Transitory Regulations:** Students who have discontinued or have been detained for want of attendance, or who have failed after having undergone the Degree Programme, may be considered eligible for re-registration to the same or equivalent subjects as and when they are offered.

17. General Rules

a) The academic regulations should be read as a whole for the purpose of any interpretation.
b) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.
c) In case of any error in the above rules and regulations, the decision of the Academic Council is final.
d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute/ University.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
M.TECH (Computer Science Engineering)

CSE - M.Tech - I Year, I Semester

Group	Sub-Code	Subject	Credits	Int	Ext	Marks
PC	GR14D5001	Advanced Problem Solving	3	40	60	100
PC	GR14D5002	Object Oriented Modeling	3	40	60	100
PC	GR14D5003	Advanced Unix Programming	3	40	60	100
PC	GR14D5004	Distributed Databases	3	40	60	100
		Elective I	3	40	60	100
PE	GR14D5005	Multi-core Computers: Architecture and Programming				
	GR14D5006	Mobile Application Development				
	GR14D5007	Software Architecture and Design Patterns				
		Elective II	3	40	60	100
PE	GR14D5008	Image Processing and Pattern Recognition				
	GR14D5009	Soft Computing				
	GR14D5010	Computer System Design				
LAB	GR14D5011	Advanced Unix Programming Lab	2	40	60	100
SPW	GR14D5175	Seminar-I	2	—	—	—
		Total	**22**	**280**	**420**	**700**

CSE - M.Tech- I Year, II Semester

Group	Sub-Code	Subject	Credits	Int	Ext	Marks
PC	GR14D5012	Distributed Computing	3	40	60	100
PC	GR14D5013	Datawarehousing and Datamining	3	40	60	100
PC	GR14D5014	Information Security	3	40	60	100
PC	GR14D5015	Advanced Computer Networks	3	40	60	100
		Elective III	3	40	60	100
PE	GR14D5016	Big Data Analytics				
	GR14D5017	Information Retrieval Systems				
	GR14D5018	Cloud Computing				
		Elective IV	3	40	60	100
PE	GR14D5019	High Performance Computing				
	GR14D5020	Natural Language Processing				
	GR14D5021	Service Oriented Architecture				
LAB	GR14D5022	Datawarehousing and Datamining / IS Lab	2	40	60	100
SPW	GR14D5176	Seminar-II	2	—	—	—
		Total	**22**	**280**	**420**	**700**

CSE - M.Tech - II Year, I Semester

Group	Sub-Code	Subject	Credits	Int	Ext	Marks
SPW	GR14D5178	Comprehensive Viva	2	—	100	100
SPW	GR14D5177	Seminar-III	2	50	—	50
SPW	GR14D5179	Project work	18	Grade		
		Total	**22**	**50**	**100**	**150**

CSE - M.Tech - II Year, II Semester

Group	Sub-Code	Subject	Credits	Int	Ext	Marks
SPW	GR14D5180	Project work and Dissertation	22	Grade		

I-Year

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED PROBLEM SOLVING

Course Code: GR14D5001 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I
OOP Using Java-Class and Objects, Variables, Operators, Expressions, Methods, Decision statements, Loops, Arrays, OOP concepts- Encapsulation, Inheritance, Polymorphism, Abstraction, Modularity, Exception handling, Input and Output, Java and Pointers, Interfaces, Packages, Abstract classes, Casting in Inheritance hierarchy, Casting with Interfaces, Vectors in java.util,Data Structures And OOP, Writing a java program-Design, coding, testing and debugging.

Basic concepts (Review)- Abstract Data Types, Data structures, Algorithms-Characteristics of Algorithms, Performance analysis- Time complexity and Space complexity, Asymptotic Analysis- Big O, Omega and Theta notations.

Unit-II
Linear data structures- The List ADT, Array and Linked Implementations, Singly Linked Lists-Operations - Insertion, Deletion, Traversals, Doubly Linked Lists Operations - Insertion, Deletion, Skip Lists-implementation, Stack ADT, definitions, operations, Array and Linked implementations, applications-infix to postfix conversion, recursion implementation, tail recursion, nontail recursion, indirect recursion, Queue ADT, definitions and operations ,Array and Linked Implementations, Priority Queue ADT, Dequeue ADT, Implementation using doubly linked lists, Stacks and Queues in java.util.

Unit-III
Non Linear data structures-Trees-Basic Terminology, Binary tree ADT, array and linked representations, iterative traversals, threaded binary trees, Applications-Disjoint-Sets, Union and Find algorithms, Huffman coding, General tree to binary tree conversion, Realizing a Priority Queue using Heap.

Search Trees- Binary Search Tree ADT, Implementation, Operations- Searching, Insertion and Deletion, Balanced Search trees-AVL Trees, Operations Insertion and Searching-Trees, B-Tree of order m, Operations- Insertion, Deletion and Searching, Introduction to Red-Black Trees, Splay Trees*-Trees, B+-Trees(Elementary treatment), Comparison of Search Trees, Trees in java.util.

Unit-IV

Searching- Linear Search, Binary Search, Hashing-Hash functions, Collision-Handling schemes, Hashing in java. util, DictionaryADT, Linear list representation, Skip list representation, Hash table representation, Comparison of Searching methods. Sorting- Bubble Sort, Insertion Sort, Shell sort, Heap Sort, Radix Sort, Quick sort, Merge sort, Comparison of Sorting methods, Sorting in java.util.

Unit-V

Graphs Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multi lists, Graph traversals- DFS and BFS, Spanning trees-Minimum cost spanning trees, Kruskal's Algorithm for Minimum cost Spanning trees, Shortest paths- Single Source Shortest Path Problem, All Pairs Shortest Path Problem. Text Processing - Pattern matching algorithms- The Knuth-Morris-Pratt algorithm, The Boyer-Moore algorithm, Tries- Standard Tries, Compressed Tries, and Suffix tries.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Data structures and Algorithms in Java, Adam Drozdek, Cengage Learning.
2. Data structures and Algorithms in Java, Michael T.Goodrich and R.Tomassia, Wiley
3. India edition.
4. Data structures, Algorithms and Applications in Java, S.Sahani, Universities Press.

Reference Books

1. Data structures and algorithms in Java, Robert Lafore, Pearson Education.
2. Data structures with Java, W.H.Ford and W.R.Topp, Pearson Education.
3. Classic Data structures in Java, T.Budd, Pearson Education.
4. Data Structures using Java, D.S. Malik and P.S.Nair, Cengage Learning,
5. An Introduction to Data structures and Algorithms, J.A.Storer, Springer.
6. Data structures and Java Collections Frame Work, W.J.Collins, McGraw Hill.
7. Data structures with Java, J.R.Hubbard and A.Huray, PHI.
8. Data Structures using Java, Y.Langsam, M.Augenstein, A.Tanenbaum, Pearson Education.
9. Data structures with Java, J.R.Hubbard, Schaum's Outlines, TMH.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

OBJECT ORIENTED MODELING

Course Code: GR14D5002 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I

Introduction to UML: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture.

Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages.

Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, call back mechanism, broadcast messages.

Unit-II

Basic Behavioural Modelling: Use cases, Use case Diagrams, Activity Diagrams. Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

Unit-III

The Unified process: use case driven, architecture centric, iterative, and incremental

The Four Ps: people, project, product, and process

Use case driven process: why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases

Architecture-centric process: architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

Unit- IV

Iterative incremental process: iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration.**The Generic Iteration workflow:** phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed, assess the iteration and phases

Inception phase: early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.

Unit-V

Elaboration Phase: elaboration phase in brief, early in the elaboration phase, the architectural elaboration iteration workflow, execute the core workflows-Requirements to test.

Construction phase: early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.

Transition phase: early in the transition phase, activities in transition phase

Case Studies: Automation of a Library, Software Simulator application (2-floor elevator simulator).

Teaching methodologies

1. Board
2. Markers
3. Duster
4. LCD Projector
5. OHP Projector

Text Books

1. The Unified Modeling Language User Guide By Grady Booch, James Rumbaugh, Ivar Jacobson 2nd Edition, Pearson Education.
2. UML 2 Toolkit by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado WILEY-Dreamtech India Pvt. Ltd.
3. The Unified Software Development Process by Ivar Jacobson, Grady Booch, James Rumbaugh, Pearson Education

Reference Books

1. Fundamentals of Object Oriented Design in UML By Meilir Page-Jones, Pearson Education
2. Object Oriented Analysis & Design By Atul Kahate, The McGraw-Hill.
3. Practical Object-Oriented Design with UML By Mark Priestley, TATA Mc Graw Hill
4. Object Oriented Analysis & Design By Brett D McLaughlin, Gary Pollice and David West, O'REILY.
5. Object-Oriented Analysis and Design using UML by Simon Bennet, Steve Mc Robb and Ray Farmer, 2nd Edition, TATA Mc Graw Hill.
6. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, THOMSON Course Technology.
7. UML and C++, R. C. Lee, and W. M. Tepfenhart, PHI.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED UNIX PROGRAMMING

Course Code: GR14D5003 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I

Unix Utilities-Introduction to Unix file system, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, text processing utilities and backup utilities, vi editor.

Working with the Bourne shell: what is a shell, shell responsibilities, pipes and input Redirection, output redirection, here documents, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

Unit-II

Unix Files: Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, create, read, write, close, lseek, stat, fstat, umask, dup, dup2.,The standard I/O- fopen, fclose, fflush, fseek, fgetc, getc, fputc, putc, fgets, gets Formatted I/O - streams and file descriptors, File and directory maintenance-chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd, Directory handling system calls -opendir, readdir, closedir, rewinddir, seekdir, telldir.

Unit-III

Unix Process and Signals: What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management-fork, vfork, exit, wait, waitpid, exec, system, Signals- Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

Unit-IV

Interprocess Communication Overview: Introduction to IPC,IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other Unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC(system-V)-message queues, semaphores and shared memory. Message Queues-Unix system-V messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

Unit-V

Semaphores-Unix system-V semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores. Shared Memory-Unix system-V shared memory, Unix kernel support for shared memory, Unix APIs for shared memory, semaphore and shared memory example. Sockets-Berkeleysockets, socket system calls for connection oriented protocol and connectionless protocol, example client- server programs.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Unix the ultimate guide, Sumitabha Das, TMH
2. Unix Network Programming, W. R. Stevens, Pearson/PHI
3. Unix System Programming using C++,T. Cahn, PHI

Reference Books

1. Advanced Programming in the Unix environment, W. R. Stevens, Pearson education.
2. Unix system programming using C++, T. Chan, PHI
3. Unix for programmers and users, third edition, Graham Glass, King Ables, Pearson education.
4. Unix Programming, Kumar Saurabh, 1st Edition, Wiley India Pvt Ltd.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DISTRIBUTED DATABASES

Course Code: GR14D5004 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I
Features of Distributed versus Centralized Databases, Principles Of Distributed Databases , Levels Of Distribution Transparency, Reference Architecture for Distributed Databases , Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design.

Unit-II
Translation of Global Queries to Fragment Queries, EquivalenceTransformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.
Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries.

Unit-III
The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions.
Concurrency Control, Foundation of Distributed Concurrency Control,Distributed Deadlocks, and Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

Unit-IV
Reliability, Basic Concepts, No blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

Unit-V
Architectural Issues, Alternative Client/Server Architectures, Cache Consistency Object Management, Object Identifier Management, Pointer Sizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution , Transaction Management, Transaction Management in Object DBMSs , Transactions as Objects.

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues. Transaction Management Transaction and Computation Model Multi database Concurrency Control, Multi database Recovery, Object Orientation and Interoperability Object Management Architecture CORBA and Database Interoperability Distributed Component Model COM/OLE and Database Interoperability, PUSH-Based Technologies

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Book

1. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti McGraw-Hill

Reference Book

1. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez – Pearson Education.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE - I
MULTI-CORE COMPUTERS: ARCHITECTURE AND PROGRAMMING

Course Code: GR14D5005 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I

Introduction to Multi-core Architecture: Motivation, Parallel Computing Platforms, Differentiation between Hyper threading and Multi-Core architectures, Multi Threading on Single-Core and Multi-Core Platforms, Understanding the Performance.

System Overview on Threading: Definition, Application Programming Models and Threading, Virtual Environment.

Unit-II

Programming Paradigms: Fundamental Concepts of Programming: Task Decomposition, Data Decomposition and Data Flow decomposition, Parallel Programming Patterns.

Threading and Parallel Programming Constructs: Synchronization, Critical sections, Deadlock, Synchronization Primitives, Flow-Control based Concepts

Unit-III

Models: Threading APIs for Microsoft Windows, Microsoft .Net Framework, POSIX threads.

Open MP: Challenges in Threading a Loop, Data- race conditions, Performance Oriented Programming, Open MP Environment Variables, Compiling, Debugging.

Unit-IV

Algorithm Structure Design Space: Introduction, Choosing an Algorithm Structure Pattern, Task Parallelism Pattern, Divide and Conquer Pattern, Recursive Data Pattern, Pipeline Pattern and Event –Based Coordination Pattern.

Basics of MPI: Getting Started, Basic Point-to-Point Message Passing, Collective Operations and Single –Core Processor Fundamentals.

Unit-V

The Age of Parallel Processing, The Rise of GPU Computing, Applications of CUDA Development Environment Introduction to CUDA C, Querying Devices Using Device Properties Parallel Programming in CUDA C.

Text Books

1. Multi-Core Programming-: Increasing Performance through Software , by Shameem Akther and J. Roberts, Intel Press, 2006 Intel Corporation. (Unit I to Unit III)
2. Patterns for Parallel Programming, Timothy G. Mattson, Beverly A. Sanders, Berna L. Massingil, pearson education, 2004 (Unit –III)
3. Patterns for Parallel Programming by T.G Mattson, A. Sanders, an
4. Parallel Programming: Techniques And Applications Using Networked Workstations And Parallel Computers, 2/E, Pearson Education India, 01-Sep-2006 (Unit V)

Reference Books

1. Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall/CRC Computational Science, July 02, 2010 by CRC Press.
2. Computer Organization and Design, David A.Patterson, John L.Hennessy, Morgan Kaufmann Publishers, 1998.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
Elective-I
MOBILE APPLICATION DEVELOPMENT

Course Code: GR14D5006 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I

J2ME Overview: Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

J2ME Architecture and Development Environment:J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit.

Unit-II

J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices

Commands, Items, and Event Processing: J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

Unit-III

High-Level Display: Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

Low-Level Display: Canvas : The Canvas, User Interactions, Graphics, Clipping Regions, Animation.

Record Management System: Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

Unit-IV

JDBC Objects: The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of the JDBC Process, Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions. JDBC and Embedded SQL: Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data form a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Sub queries, VIEWs.

Unit-V

Generic Connection Framework: The Connection, Hypertext Transfer Protocol, Communication Management Using HTTP Commands, Session Management, Transmit as a Background Process

Text Book

1. J2ME: The Complete Reference, James Keogh, Tata Mc Graw Hill.

Reference Books

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009.
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005.
4. Kicking Butt with MIDP and MSA: Creating Great Mobile Applications, First Edition, J.Knudsen, Pearson.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE-I
SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

Course Code: GR14D5007 L:3 T:0 P:0 C:3
I Year I Semester

Prerequisites
Basic knowledge of Software Engineering and Unified Modelling Language.

Course Objectives: The objective of the course is to provide postgraduate students with a sound technical exposure to the concepts, principles, methods, and best practices in software architecture. Following is the key topics covered in this course:

- Introduction to the fundamentals of software architecture.
- Software architecture and quality requirements of a software system
- Fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
- Methods, techniques, and tools for describing software architecture and documenting design rationale.
- Software architecture design and evaluation processes.
- Rationale and architectural knowledge management in software architecting.
- Software architectures for product lines.
- Model Driven approaches and tools for designing and evaluating architectures.
- Service-oriented architectures.
- Future challenges and emerging trends in software architecture discipline.

Course Outcomes: At the conclusion of the course, the students are expected to be able to:

- Argue the importance and role of software architecture in large scale software systems
- Design patterns and motivate software architecture for large scale software systems
- Recognise major software architectural styles, design patterns, and frameworks
- Describe a software architecture using various documentation approaches and architectural description languages
- Generate architectural alternatives for a problem and select among them
- Use well-understood paradigms for designing new systems
- Identify and assess the quality attributes of a system at the architectural level

- Motivate the architectural concerns and approach for families of products
- Discuss and evaluate the current trends and technologies such as model-driven, service-oriented, and aspect-oriented architectures
- Evaluate the coming attractions in software architecture research and practice

Unit-I

Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

Unit-II

Analysing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

Unit-III

Moving from one system to many Software Product Lines, Building systems from off the shelf components, Software architecture in future.

Unit-IV

Patterns Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

Creational and Structural patterns Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight, Proxy.

Unit-V

Behavioral patterns Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Case Studies A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development

Teaching methodologies

1. Board
2. Markers
3. Duster
4. LCD Projector
5. OHP Projector

Text Books

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Karman, Pearson Education,2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference Books

1. Beyond Software architecture, Luke Hohmann, Addison Wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR,2001
3. Pattern Oriented Software Architecture, F. Buschmann & others, John Wiley & Sons.
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Software Design, David Budgen, second edition, Pearson education,2003

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE-II
IMAGE PROCESSING AND PATTERN RECOGNITION

Course Code: GR14D5008 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I
Fundamental steps of image processing, components of an image processing of system. The image model and image acquisition, sampling and quantization, relationship between pixels, distance functions, scanner.

Unit-II
Statistical and spatial operations, Intensity functions transformations, histogram processing, smoothing & sharpening – spatial filters Frequency domain filters, homomorphic filtering, image filtering & restoration. Inverse and weiner filtering, FIR weiner filter, Filtering using image transforms, smoothing splines and interpolation.
Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.

Unit-III
Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and Laplace operators, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.
Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding, Digital Image Water marking.

Unit-IV
Representation and Description: Chain codes, Polygonal approximation, Signature Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors

Unit-V
Pattern Recognition Fundamentals: Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

Pattern classification: Pattern classification by distance function: Measures of similarity, Clustering criteria, K-means algorithm, and Pattern classification by likelihood function: Pattern classification as a Statistical decision problem, Bayes classifier for normal patterns.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Digital Image Processing Third edition, Pearson Education, Rafael C. Gonzalez, Richard E. Woods
2. Pattern recognition Principles: Julus T. Tou, and Rafel C. Gonzalez, Addision-Wesly Publishing Company

Reference Books

1. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, Vaclav Hlavac and Roger Boyle. Thomson learning.
2. Digital Image Processing – Williamk. Pratl –John wiley edition
3. Fundamentals of digital image processing – by A.K. Jain. PH
4. Pattern classification, Richard Duda, Hart and David strok John Weily publishers.
5. Digital Image Processing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, TMH.
6. Pattern Recognition, R. Shinghal, Oxford University Press.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE-II
SOFT COMPUTING

Course Code: GR14D5009 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I

Introduction to Soft Computing and Neural Networks: Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

Unit-II

Genetic Algorithms: Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

Unit-III

Neural Networks: Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

Unit-IV

Fuzzy Logic Fuzzy: Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

Unit-V

Neuro-fuzzy Modelling: Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case studies.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.

3. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.

Reference Books

1. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
2. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to FuzzyLogic using MATLAB”, Springer, 2007.
4. S. N. Sivanandam • S. N. Deepa, “Introduction to Genetic Algorithms”, Springer, 2007.
5. Jacek M. Zurada, “Introduction to Artificial Neural Systems”, PWS Publishers, 1992.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE-II
COMPUTER SYSTEM DESIGN

Course Code: GR14D5010 L:3 T:0 P:0 C:3
I Year I Semester

Unit- I
Computer structure: Hardware, software, system software, Von-Neumann architecture – case study. IA -32 Pentium: registers and addressing, instructions, assembly language, program flow control, logic and shift/rotate instructions, multiply, divide MMX, SIMD instructions, I/O operations, subroutines. Input/output organization, interrupts, DMA, Buses, Interface circuits, I/O interfaces, device drivers in windows, interrupt handlers.

Unit-II
Processing Unit: Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control.
Pipelining: data hazards, instruction hazards, influence on instruction sets, data path & control consideration, and RISC architecture introduction.

Unit-III
Memory: types and hierarchy, model level organization, cache memory, performance considerations, mapping, virtual memory, swapping, paging, segmentation, replacement policies.

Unit-IV
Processes and Threads: processes, threads, inter process communication, classical IPC problems, Deadlocks.

Unit-V
File system: Files, directories, Implementation, UNIX file system
Security: Threats, intruders, accident data loss, basics of cryptography, user authentication.

Teaching methodologies
1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

Reference Books

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education.
3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
4. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED UNIX PROGRAMMING LAB

Course Code: GR14D5011 L:0 T:0 P:3 C:2
I Year I Semester

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given integer.
8. Write an awk script to count the number of lines in a file that do not contain vowels.
9. Write an awk script to find the number of characters, words and lines in a file.
10. Write a c program that makes a copy of a file using standard I/O and system calls
11. Implement in C the following UNIX commands using System calls
    A. cat B. ls C. mv
12. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.
    A. File type. B. Number of links.
    C. Time of last access. D. Read, Write and Execute permissions.
13. Write a C program to emulate the UNIX ls –l command.
14. Write a C program to list for every file in a directory, its inode number and file name.
15. Write a C program that demonstrates redirection of standard output to a file.Ex: ls> f1.

16. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.
17. Write a C program to create a Zombie process.
18. Write a C program that illustrates how an orphan is created.
19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:ls –l |sort
20. Write C programs that illustrate communication between two unrelated processes using named pipe
21. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
22. Write a C program that receives the messages (from the above message queue as specified in (21)) and displays them.
23. Write a C program to allow cooperating processes to lock a resource for exclusive use, using a) Semaphores b) flock or lockf system calls.
24. Write a C program that illustrates suspending and resuming processes using signals.
25. Write a C program that implements a producer-consumer system with two processes.(Using Semaphores).
26. Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets.
27. Write client and server programs (using c) for interaction between server and client processes using Internet Domain sockets.
28. Write a C program that illustrates two processes communicating using shared memory
29. Write a C Program for TCP client Server Communication
30. Write a C Program for UDP client server Communications

Text Books

1. Unix the ultimate guide, Sumitabha Das, TMH
2. Unix Network Programming, W. R. Stevens, Pearson/PHI
3. Unix System Programming using C++,T. Cahn.PHI

Reference Books

1. Advanced Programming in the Unix environment, W. R. Stevens, Pearson education.
2. Unix system programming using C++, T. Chan, PHI
3. Unix for programmers and users, third edition, Graham Glass, King Ables, Pearson education.
4. Unix Programming, Kumar Saurabh, 1st Edition, Wiley India Pvt Ltd.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DISTRIBUTED COMPUTING

Course Code: GR14D5012 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

Introduction: The different forms of computing Monolithic, Distributed, parallel and cooperative computing, the meaning of Distributed computing, Examples of Distributed systems, the strengths and weaknesses of Distributed computing, operating system concepts relevant to distributed computing, the architecture of distributed applications.

Unit-II

Distributed computing Paradigms: Paradigms for Distributed Applications Message passing Paradigm, The Client-Server Paradigm (JAVA Socket API), The peer-to-peer paradigm, Message System (or MOM) Paradigm the Point-to-point message model and the publish/subscribe message model, RPC model, The Distributed Objects Paradigms-RMI,ORB, the object space Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The collaborative application (Groupware Paradigm), choosing a Paradigm for an application.

Unit-III

Distributed Objects Paradigm (RMI): Message passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, RPC, RMI, The Java RMI Architecture, Java RMI API, A sample RMI Application, steps for building an RMI application, testing and debugging, comparison of RMI and socket API

Distributed Object Paradigm (CORBA): The basic Architecture, The CORBA object interface, Inter-ORB Protocols, object servers and object clients, CORBA Object references, CORBA Naming Service and the Interoperable Naming Service, CORBA object services, Object Adapters, Java IDL, An example CORBA application.

Unit-IV

Distributed Document-based Systems: WWW, Lotus Notes, comparison of WWW and Lotus Notes, Distributed Coordination-based systems- Introduction to coordination models, TIB, JINI, comparison of TIB and JINI Software Agents, Agent Technology, Mobile Agents.

Distributed Multimedia Systems characteristics of multimedia data, QOS of service management, Resource Management, Stream Adaption.

Unit-V

Grid Computing: Definition of grid, grid types computational grid, data grid, grid benefits and applications, drawback of grid computing, grid components, grid architecture and its relation to various Distributed Technologies.

Cluster Computing Parallel computing overview, cluster computing Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Distributed, Computing, Principles and applications, M.L.Liu, Pearson Education
2. Distributed Systems, Principles and paradigms, A.S. Tannenbaum and M.V. Steen, Pearson Education
3. Client-Server Programming with Java and CORBA 2nd edition, R.Orfali & Dan Harkey, John Wiley &Sons
4. Grid Computing, J. Joseph & C. Fellenstein, Pearson Education
5. High Performance cluster computing, RajKumar Buyya, Pearson Education

Reference Books

1. A Networking Approach to grid computing, D.Mimoli, Wiley & Sons
2. Grid Computing: a practical guide to technology and applications, A. Abaus, Firewall media
3. Java Network Programming, E.R. Harold, 2nd Edition, O. Reilly, SPD.
4. Distributed systems, concepts and Design, 3rd edition, G. Coulouris, J. Dollimore, and Tim Kindbirg, Pearson Education
5. Java programming with CORBA, 3rd Edition, Brose, Vogel, Duddy, Wiley Dreamtech.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA WAREHOUSING AND DATA MINING

Course Code: GR14D5013 L:3 T:0 P:0 C:3
I Year II Semester

Prerequisites: Knowledge about the Databases is needed.

Course Objectives

- To introduce the concept of how to design and construct a data warehouse.
- To teach various principles and techniques for Dimensional modeling, ETL, Data Quality and Cleansing, and OLAP.
- To emphasize more on Star schema, fact tables and dimension tables.
- Multi-dimensional databases are emphasized. Course Outcomes:
- Ability to design and build a data warehouse.
- Ability to apply data mining techniques to solve problems in other disciplines.
- Master the fundamental concepts and algorithms needed for knowledge discovery process
- Solve real data mining problems by using the right tools to find interesting patterns
- Obtain hands-on experience with some popular data mining software.
- Understand the latest applications and trend in data mining.

Unit-I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining. Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

Unit-II

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

Concepts Description: Characterization and Comparison: Data Generalization and Summarization- Based Characterization, Analytical Characterization:

Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

Unit-III

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit-IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, and Classifier Accuracy.
Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

Unit-V

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

Teaching methodologies

1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.

Reference Books

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques – ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

INFORMATION SECURITY

Course Code: GR14D5014 L:3 T:0 P:0 C:3
I Year I Semester

Unit-I
Security Goals, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs

Unit-II
Conventional Encryption Principles & Algorithms (DES, AES, RC4), cipher modes of operation, location of encryption devices, key distribution
Public key cryptography principles, public key cryptography algorithms (RSA, RABIN, ELGAMAL, Diffie-Hellmann, ECC), key distribution

Unit-III
Approaches of Message Authentication, Secure Hash Functions (SHA-512, Whirlpool) and HMAC.
Digital signatures: Comparison, Process-Need for Keys, Signing the digest, Services, Attacks on digital Signatures, Kerberos, X.509 Directory Authentication Service.

Unit-IV
Email privacy: Pretty Good Privacy (PGP) and S/MIME.
IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Unit-V
Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats.
Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

Teaching Methodologies
The course will be based on the following teaching and learning activities:
1. Lectures using PowerPoint presentations
2. Practical work
3. Student Presentation selected topics

4. Class lectures, lecture notes, and quizzes are designed to achieve the Course objectives.
5. Case studies
6. Review questions

Text Books

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn I do Dubrawsky, Steve W.Manzuik and Ryan Permeh, wiley Dreamtech

Reference Books

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED COMPUTER NETWORKS

Course Code: GR14D5015 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks.
Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Equal-Sized Packets Model-ATM

Unit-II

The Link Layer and Local Area Networks: Link Layers: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access protocols, Link Layer Addressing, Point to Point Protocol (PPP).
Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.
Routing and Internetworking: Network-Layer Routing, Least –cost-path algorithms, non-least-cost-path algorithms, Intra-domain Routing Protocols, Inter-domain Routing Protocols, Congestion control at Network Layer

Unit-III

Logical Addressing: IPV4 Addresses, IPV6 Addresses – Internet Protocol: Internetworking, IPV4, IPV6, Transitions from IPV4 to IPV6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra-domain Multicast Protocols, Inter-domain Multicast Protocols.
Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocols (TCP),User Datagram Protocol (UDP) Applications, The Web and HTTP, FTP, Electronic Mail in the Internet, Domain Name System (DNS) , P2P File sharing, Socket Programming with TCP and UDP

Unit-IV

Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs)
Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large- Scale Optical Switches, Optical Routers, Wavelength Allocations in Networks, Case Study: An All-optical Switch

Unit-V

VPNs, Tunneling and Overlay Networks: Virtual Private Networks(VPNs) , Multiprotocol Label Switching(MPLS), Overlay Networks –VoIP and Multimedia Networking : Overview of IP Telephony , VoIP Signaling Protocols, Real-Time Media Transport Protocols, Stream Control Transmission Protocol-Mobile A-Hoc Networks : Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks.

Teaching methodologies

1. Power point presentation
2. Interactive sessions through self assessment tests
3. Assignments

Text Books

1. Computer Networking: A Top Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Third edition, Pearson Education,2007
2. Computer and Communication networks, Nader F. Mir, Pearson Education, 2007

Reference Books

1. Data communications and Networking, Behrouz Z. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, Greg Tomsho, Ed Title, David Johnson, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, S. Keshav, Pearson Education.
4. Campus Network design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education (CISCO Press)
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
6. The Internet and Its protocols, A. Farrel, Elsevier

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE-III
BIG DATA ANALYTICS

Course Code: GR14D5016 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

Introduction To Big Data: Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

Unit-II

Mining Data Streams: Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies.

Unit-III

HADOOP: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

Unit-IV

Hadoop Environment: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks-Hadoop in cloud.

Unit-V

Hadoop Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services–HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations-Visual data analysis techniques, interaction techniques; Systems and applications.

Reference Books

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
5. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big
6. Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGraw Hill Publishing, 2012
7. Anand Rajaraman and Jefrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
8. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
9. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
10. Pete Warden, “Big Data Glossary”, O’Reily, 2011.
11. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edit on, Elsevier, Reprinted 2008.
12. Michael Mineli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013.
13. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hil Publications, 2011.
14. Raghu Kodali, Peter Zadrozny , “Big Data Analytics Using Splunk: Deriving Operational Intelligence from Social Media, Machine Data, Existing Data Warehouses, and Other Real-Time”, Apress ,2013
15. Arvind Sathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
16. Da Ruan, Guoquing Chen, Etien e E. Kere, Gert Wets, Intelligent Data Mining, Springer,2007
17. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , Harnes the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ELECTIVE III
INFORMATION RETRIEVAL SYSTEMS

Course Code: GR14D5017 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I
Introduction: Definition, Objectives, Functional Overview, And Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities: Search, Browse, Miscellaneous

Unit-II
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure. Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

Unit-III
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters. User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

Unit-IV
Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.
Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

Unit-V
Multimedia Information Retrieval- Models and Languages- Data Modeling, Query Languages, Indexing and Searching – Libraries and Bibliographical Systems – Online IR Systems, OPACs, Digital Libraries.

Teaching methodologies
1. Power Point presentations
2. Tutorial Sheets
3. Assignments

Text Books

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.

Reference Books

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval by Yates Pearson Education.
3. Information Storage &Retrieval by Robert Korfhage – John Wiley & Sons

GOKARAJU RANGARAJU
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ELECTIVE III
CLOUD COMPUTING

Course Code: GR14D5018 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

Understanding Cloud Computing: Cloud Computing –Introduction about Cloud Computing –Cloud Architecture–Cloud Storage–Why Cloud Computing Matters–Advantages of Cloud Computing –Disadvantages of Cloud Computing –Companies in the Cloud Today –Cloud Services

Unit-II

Developing Cloud Services: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud service Development –Software as a Service –Platform as a Service –Web Services –On-Demand Computing –Discovering Cloud Services Development Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds

Unit-III

Cloud Computing For Everyone Centralizing Email: Communications –Collaborating on Schedules–Collaborating on To-Do Lists–Collaborating Contact Lists –Cloud Computing for the Community –Collaborating on Group Projects and Events –Cloud Computing for the Corporation

Unit-IV

Using Cloud Services: Collaborating on Calendars, Schedules and Task Management –Exploring Online Scheduling Applications –Exploring Online Planning and Task Management –Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing -Collaborating on Databases –Storing and Sharing Files

Unit-V

Other ways to Collaborate Online: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools –Collaborating via Social Networks and Groupware –Collaborating via logs and Wikis.

Text Books

1. "Cloud Computing: Principles and Paradigms", Raj Kumar Buyya, James Bromberg, Andrej Kosciusko, Wiley, New York, USA

Reference Books

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work nd Collaborate Online, Que Publishing, August 2008.
2. Kumar Saurabh, "Cloud Computing –Insights into New Era Infrastructure", Wiley Indian Edition,2011.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

GOKARAJU RANGARAJU
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ELECTIVE-IV
HIGH PERFORMANCE COMPUTING

Course Code: GR14D5019 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

Parallel Processing Concepts: Levels of parallelism (instruction, transaction, task, thread, memory, function), Models : SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc, Architectures: N-wide superscalar architectures, multi-core, multi-threaded, Motivating high performance applications

Unit-II

Designing Parallel Programs: Automatic vs. Manual Parallelization, Understand the Problem and the Program, Partitioning, Communications, Synchronization, Data Dependencies, Load Balancing, Granularity, Limits and Costs of Parallel Programming, Performance Analysis and Optimization tuning

Unit-III

Shared memory programming: Fundamentals of Shared Memory Programming, Basic OpenMP concepts, PARALLEL directive, Data scoping rules, Basic OpenMP constructs/directives/calls, Examples: Parallelizing an existing code using OpenMP, More advanced OpenMP directives & functions, OpenMP Performance issues, Running threaded/OpenMP programs on multicore system.

Unit-IV

Distributed memory programming, Fundamentals of message passing concepts, MPI message passing APIs, send, receive, collective operations. Groups, Contexts and Communicators, Topologies, Runtime and Environment Management, MPI profiling interface and tracing, OpenMP 3.0 enhancements.

Unit-V

GPGPU Programming with CUDA and OpenCL – Introduction to GPGPU Programming and CUDA: Programming Model, CUDA API, CUDA Memory Model, Short introduction to OpenCL. Application case study. Future of Computing: Petascale computing.

Text Books

1. Parallel Computer Architecture: A hardware/Software Approach", by David Culler Jaswinder Pal Singh, Morgan Kaufmann, 1999.
2. CUDA by Example: An Introduction to General Purpose GPU Programming, by Jason Sanders and Edwards Kandrot, Addison Wesley, 2011.
3. Using MPI - 2nd Edition: Portable Parallel Programming with the Message Passing Interface by, William Gropp, Ewing L. Lusk, and Anthony Skjellum. Scientific and Engineering Computation, 2nd edition, 1999

Reference Books

1. Parallel Programming: Techniques and Application Using Networked Workstations and Parallel Computers, 2nd edition, by B. Wilkinson and M. Allen, Prentice Hall Inc., 2005
2. Using OpenMP: Portable Shared Memory Parallel Programming by Barbara Chapman, Gabriele Jost and Rudvander Pas. Scientific and Engineering Computation, 2nd edition.
3. Heterogeneous Computing with OpenCL. Benedict Gaster, Lee Howes, David R. Kaeli, PerhaadMistry, Dana Schaa, Elsevier, 2011.
4. Scalable Parallel Computing, by Kai Hwang, McGraw Hill 1998.
5. Introduction to Parallel Computing, AnanthGrama, Anshul Gupta, George Karypis, and Vipin Kumar, 2nd edition, Addison-Welsey, 2003.
6. Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman & Hall/CRC Computational Science Series, 2007.

GOKARAJU RANGARAJU
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ELECTIVE-IV
NATURAL LANGUAGE PROCESSING

Course Code: GR14D5020 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

Introduction: NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, ques-tion answering and machine translation, problem of ambiguity, role of machine learning, Brief history of the field.

Unit-II

N-gram Language Models: The role of language models, Simple N-gram models. Estimating parameters and smoothing, Evaluating language models.

Part of Speech Tagging and Sequence Labelling: Lexical syntax, Hidden Markov Models, Maximum Entropy Models, Conditional Random Fields . UNIT-III Syntactic parsing: Grammar formalisms and tree banks, Efficient parsing for context-free grammars (CFGs), Statistical parsing and probabilistic CFGs (PCFGs), Lexicalized PCFGs.

Unit-IV

Semantic Analysis: Lexical semantics and word-sense disambiguation. Compositional semantics, Semantic Role Labelling and Semantic Parsing.

Unit-V

Information Extraction (IE) and Machine Translation (MT): Named entity recognition and Relation extrac-tion, IE using sequence labelling, Basic issues in MT. Statistical translation, word alignment, phrase-based translation, and synchronous grammars. Dialogues: Turns and utterances, grounding, dialogue acts and structures

Natural Language Generation: Introduction to language generation, architecture, discourse planning (text schemata, rhe-torical relations).

Text Book

1. D. Jurafsky & J. H. Martin – “Speech and Language Processing – An introduction to Language processing, Computa-tional Linguistics, and Speech Recognition”, Pearson Education

Reference Books

1. Allen, James. 1995. – “Natural Language Understanding”. Benjamin / Cummings, 2nd edition. 2. Bharathi, A., Vineet Chaitanya and Rajeev Sangal. 1995. Natural Language Processing- “A Pananian Perspective”. Prentice Hall India, Eastern Economy Edition. 3. Eugene Cherniak: “Statistical Language Learning”, MIT Press, 1993. 4. Manning, Christopher and Heinrich Schutze. 1999. “Foundations of Statistical Natural Language Processing”. MIT Press.

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ELECTIVE IV
SERVICE ORIENTED ARCHITECTURE

Course Code: GR14A5021 L:3 T:0 P:0 C:3
I Year II Semester

Unit-I

SOA and Web Services Fundamentals: Introducing SOA-Fundamental SOA, Common characteristics of Contemporary SOA, Common tangible benefits of SOA, Common pitfalls of adopting SOA. Evolution of SOA- an SOA timeline, the continuing evolution of SOA, The roots of SOA. Web Services and primitive SOA- the Web Services frame work, Services, Service descriptions, messaging.

Unit-II

Web Services Extensions: Web Services and Contemporary SOA-- Message exchange patterns, Service Activity, Coordination, Atomic transactions, Business Activities, Orchestration, Choreography, Addressing, Reliable messaging, Correlation, Policies, Metadata exchange and Security.

Unit-III

SOA and Services – Orientation: Principles of Service Orientation -- Anatomy of SOA, Common Principles of Service-Orientation, interrelation between Principles of Service-Orientation, Service-Orientation and Object Orientation, Native Web Services support for Principles of Service-Orientation.
Service Layers - Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

Unit-IV

Building SOA (Planning and Analysis): SOA Delivery Strategies-- SOA delivery lifecycle phases, the top-down strategy, The bottom-up strategy, The agile strategy. Service Oriented Analysis-- Introduction to Service Oriented Analysis, Benefits of a Business Centric SOA, Deriving Business Service, Service Modeling, Service Modeling guidelines, Classifying Service model logic, Contrasting Service modeling approaches.

Unit-V

Building SOA (Technology and Design): Service Oriented Design-- Introduction to Service-Oriented design, WSDL related XML schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.

Service Design--Service Design overview, Entity-centric business Service Design, Application Service Design, Task-centric business Service Design, Service Design guidelines. SOA Platforms--SOA Platform basics, SOA support in J2EE and .NET, Integration Considerations.

Text Books

1. Service-Oriented Architecture-Concepts, Technology, and Design, Thomas Erl, Pearson Education.
2. Understanding SOA with Web Services, Eric Newcomer, Greg Lomow, Pearson Education.

Reference Books

1. The Definitive guide to SOA, Jeff Devies & others, A press, Dreamtech.
2. Java SOA Cook book, E.H Hewitt, SPD.
3. SOA in practice, N. M. Josuttis, SPD.
4. SOA for Enterprise Applications, Shankar. K, Wiley India Edition.
5. SOA-Based Enterprise Integration, W. Roshen, TMH.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DATA MINING & INFORMATION SECURITY LAB

Course Code: GR14D5022 L:0 T:0 P:3 C:2
I Year II Semester

Data Warehousing and Data Mining:
Task 1: Credit Risk Assessment
Description:
The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant. Case histories.Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:
Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data.In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)A few notes on the German dataset.

DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter). owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones. foreign_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents.

There are 20 attributes used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

Subtasks : (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessement Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision Tree - train a Decision Treebusing the complete dataset as the training data. Report the model obtained after training.
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly ? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy ?
5. Is testing on the training set as you did above a good idea ? Why or Why not ?
6. One approach for solving the problem encountered in the previous question is using cross-validation ? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease ?Why ?
7. Check to see if the data shows a bias against "foreign workers" (attribute 20),or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifcations equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees ? How does the complexity of a Decision Tree relate to the bias of the model ?
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain ? Also, report your accuracy using the pruned model. Does your accuracy increase
12. (Extra Credit): How can you convert a Decision Trees into "if-then- else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules.PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset ?OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

Task Resources

- Mentor lecture on Decision Trees
- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)

Weka resources:

- Introduction to Weka (html version) (download ppt version)
- Download Weka
- Weka Tutorial
- ARFF format
- Using Weka from command line

Task 2: Hospital Management System

Data Warehouse consists of Dimension Table and Fact Table.REMEMBER The following Dimension The dimension object (Dimension): _ Name_ Attributes (Levels) , with one primary key _ Hierarchies One time dimension is must. About Levels andHierarchiesDimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:
H1: YearL>QuarterL>MonthL>WeekL>DayL H2: YearL>WeekL>DayL
The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

About Unique Key Constraints
When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level) Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are ' NO UNITS', UNIT PRICE.
Assume the Relational database (SOURCE) table schemas as follows TIME (day, month, year),

PATIENT (patient_name, Age, Address, etc.,)
MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,) SUPPLIER :(Supplier_name, Medicine_Brand_name, Address, etc.,)
If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.
Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

INFORMATION SECURITY LAB
List of programs:

1. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher
2. Write A C/ JAVA program to implement the DES algorithm logic.
3. Write a C/JAVA program to implement the Blowfish algorithm logic.
4. Write a C/JAVA program to implement the AES algorithm logic.
5. Write the RC4 logic in Java.
6. Implement DES-2 and DES-3 using Java cryptography package.
7. Write a Java program to implement RSA algorithm.
8. Implement the Diffie-Hellman Key Exchange mechanism 9. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
10. Calculate the message digest of a text using the MD5 algorithm in JAVA.
11. Explore the Java classes related to digital certificates.
12. Write a program in java, which performs a digital signature on a given text.