RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VIII-Semester

Departmental Elective – CS802 (A) Block Chain Technologies

Theory

1. Introduction: Overview of Block chain, Public Ledgers, Bit coin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain; Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic crypto currency

2. Understanding Block chain with Crypto currency: Bit coin and Block chain: Creation of coins, Payments and double spending, Bit coin Scripts, Bit coin P2P Network, Transaction in Bit coin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bit coin**:** Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, Hash Cash PoW, Bit coin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool

3. Understanding Block chain for Enterprises: Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

4. Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, and Identity on Block chain

5. Block chain application development: Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda

References:

1. Melanie Swan, “Block Chain: Blueprint for a New Economy”, O’Reilly, 2015
2. Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Block chainTechnology and Leveraging Block Chain Programming”
3. Daniel Drescher, “Block Chain Basics”, Apress; 1stedition, 2017
4. Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi.
5. Imran Bashir, “Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing
6. Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build SmartContracts for Ethereum and Block Chain”, Packt Publishing
7. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O’Dowd, VenkatramanRamakrishna, “Hands-On Block Chain with Hyperledger: Building DecentralizedApplications with Hyperledger Fabric and Composer”, Import, 2018

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Computer Science and Engineering, VIII-Semester

Departmental Elective – CS802 (B) Cloud Computing

Theory:

1. Introduction to Service Oriented Architecture, Web Services, Basic Web Services Architecture, Introduction to SOAP, WSDL and UDDI; REST ful services: Definition, Characteristics, Components, Types; Software as a Service, Plat form as a Service, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Study of a Hypervisor.

2. Utility Computing, Elastic Computing, Ajax: asynchronous 'rich' interfaces, Mashups: User interface, Services Virtualization Technology: Virtualization applications in enterprises, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi-schema approach, Multi-tenancy using cloud data stores.

3. Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, Features and comparisons among GFS, HDFS etc, Big Table, H Base and Dynamo. Map-Reduce and extensions: Parallel computing, The Map-Reduce model: Parallel efficiencyofMap-Reduce,Relationaloperations,Enterprisebatchprocessing, Example/Application of Map-Reduce.

3. Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud computing security architecture, General Issues, Trusted Cloud computing, Security challenges: Virtualization security management-virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

5. Issues in cloud computing; implementing real time application; QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. Agrid of clouds, Sky computing, load balancing, Resource optimization, Resource dynamic reconfiguration, Monitoring in Cloud, Installing cloud platforms and performance evaluation, Features and functions of cloud computing platforms.

TextBooks

1. Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing", Elseveir publication, 2012
2. Judith Hurwitz, R.Bloor, M.Kanfman,F.Halper, "Cloud Computing for Dummies", WileyIndiaEdition
3. RajkumarBuyya, Christian Vecchiola, S. Thamaraselvi, Mastering Cloud Computing, McGraw Hill, 2013

ReferenceBooks

1. ScottGranneman, “GoogleApps”, Pearson, 2012
2. TimMalhar,S.Kumaraswammy,S.Latif, “CloudSecurity&Privacy”, SPD, O’REILLY
3. RonaldKrutzandRussellDeanVines, “CloudSecurity”,Wiley-India, 2011

Research Journals

1. IEEE Transactions on Services Computing.
2. IEEE Translation of Cloud Computing.
3. IEEE Translation of Parallel and Distributed Computing.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VIII-Semester

Departmental Elective – CS802 (C) High Performance computing

Theory

1. Introduction to modern processors-: General Purpose cache based architecture-performance metric and bench marks, Moors Law, pipelining, super clarity, SIMD. Memory Hierarchies, Multi core processors, Multi threaded processors, Vector processors- Design principle , Max performance estimates, programming for vector architecture. Basic Optimizations for serial codes:- Scalar profiling, common sense optimizations, Simple measures and their impacts, role of compilers, C++ optimizations.

2. Data access optimizations: balance analysis and light speed estimates, storage order, Algorithm classifications and assess optimizations, case studies for data access optimizations. Parrall Computers: Shared memory computers, Distributed memory computers, hybrid systems, Network computers.

3. Basics of parallel computing: data and functional parallelism, parallel scalability- laws, metrics, factors, efficiency and load imbalance. Shared memory parallel programming with Open MP: Parallel execution, data scoping, work sharing using loops, synchronization, Reductions, loop scheduling and Tasking.

4. Efficient Open MP Programming: Program profiling, Performance pitfalls, improving the impact of open MP work sharing constructs, determining overheads for short loops, Serilisation and false sharing.

5. Distributed Memory parallel programming with MPI: Message passing, Message and point to point communication, collective communication, non blocking point-to-point communication, virtual topologies. Efficient MPI Programming: MPI performance tools, communication parameters, impact of synchronizations sterilizations and contentions, reductions in communication overhead.

Text Books :

1. George Hager and Gerhard Wellein , " Introduction to high performance Computing for scientists and engineers", CRC Press
2. Charles Severance, Kevin Dowd, "High Performance Computing", 2nd Edition, O'Reilly

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Computer Science and Engineering, VIII-Semester

Departmental Elective – CS802 (D) Object Oriented Software Engineering

Theory:

1. Review of Object Oriented Concepts and Principles: The Object Oriented Paradigm, Basic Concepts, Software Development Life Cycle and Model Architectures.

2. Introduction to RUP: Basic Concepts, Symptoms in Software Development and their Root Causes, Best Practices of RUP, RUP software life cycle, 4+1 view model, Various Workflows.

3. Introduction to UML, Notations, Relationships, Stereotypes, Study of UML based tools Like Rational Rose, Poseidon, etc. Object Oriented Analysis: Conventional v/s OO analysis approach,Requirement analysis, Use case diagram,, Activity diagram, Analysis class Model.

4. Object Oriented Design: Conventional v/s OO design approach, Design of CRC cards, Class diagram Behavioral Modeling: Interaction Diagram, State chart Diagram, Implementation Diagram: Component and deployment Diagram. Illustrative Case Studies like ATM, Payroll, Course and Registration System.

5. Object Oriented Testing: Correctness and consistency of OOA & OOD models, Testing Strategies and test cases for OO software process, Project Management, Rational Tool Mentors. Introduction to Design Patterns.

Text Books

1. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modelling Language User Guide”, Pearson Education
2. Stephen R. Schach, “Object Oriented Classical Software Engg.” Tata McGraw Hill, 2007.
3. Gamma G.Helm, Johnson, “Design Patterns, Elements of Reusable Object Oriented Software”, Addison Wesley.

Reference Books

1. Ivon Jacobson, “Object Oriented Software Engineering”, Addison Wesley. Booch G., “The Unfied Modelling User Guide”
2. Phillipe Kruchten, “The Rational Unified Process - An Introduction”, Pearson Ed. 2000.

3. Ivar J, Grady B, James R., “The Unified Software Development Process”, Pearson Ed. 2003.
4. Timothy C. Lethbridge, Robert Laganiere, “Object Oriented Software Engg.” , Tata McGraw Hill, 2004.
5. IBM Rational Modules