Academic Course Description

BHARATH UNIVERSITY

Faculty of Engineering and Technology

Department of Electronics and communication Engineering

BCS701- GRID AND CLOUD COMPUTING

Seventh Semester, 2017-18 (odd Semester)

Course (catalog) description

- Identify the technical foundations of cloud systems architectures.
- Analyze the problems and solutions to cloud application problems.
- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance.

Compulsory/Elective course : Elective for ECE students
Credit & Contact hours : 3 & 45
Course Coordinator : Mr.B.Sundarraj, Asst Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr.B.Sundarraj	Final Year	**SA 019**			9.00-9.50 AM
Ms.Priya	Final Year	**SA 020**		priyams@yahoo.co.in	12.45-1.15 PM

Relationship to other courses:

Pre –requisites **:** Computer Communication and Networks

Assumed knowledge : The students will have a electronics and network background obtained at a high school (or Equivalent) level. In particular, working knowledge of networks including Communication systems, computing systems are assumed.

Following courses : information technology

UNIT- I GRID COMPUTING **9**

Introduction - Definition and Scope of grid computing, Computational and Data Grids, Current Grid Activities – Overview of Grid Business Areas, Grid Applications, Grid Computing Anatomy- Concept of Virtual Organization, Grid Architecture- Fabric layer, Connectivity layer, Resource Layer, Collective Layer, Application Layer, Layered Grid Architecture

UNIT-II CLOUD ARCHITECTURE AND MODEL **9**

Technologies for Network Based system-System Models for Distributed and Cloud Computing-NIST Cloud Computing Reference ArchitectureCloud models: Characteristics-Cloud Services-Cloud Models (IaaS, PaaS, SaaS)-Public vs. Private Cloud-Cloud Solutions-Cloud ecosystem-Service Management-Computing on demand.

UNIT-III CLOUD INFRASTRUCTURE **9**

Architectural Design of compute and Storage Clouds-Layered Cloud Architecture Development-Design Challenges-Inter Cloud Resource Management-Resource Provisioning and Platform Deployment-Global Exchange of Cloud Resources.

UNIT-IV PROGRAMMING MODEL **9**

Parallel and Distributed Programming Paradigms-Map Reduce-Twister and Iterative Map Reduce-Hadoop Library from Apache-Mapping Applications-Programming Support-Google App Engine, Amazon AWS-Cloud Software Environments-Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT-V SECURITY IN THE CLOUD **9**

Security Overview-Cloud Security Challenges and Risks-Software-as-a-Service-Security Security Governance-Risk Management-Security Monitoring-Security Architecture Design-Data Security-Application Security-Virtual Machine Security-Identity Management and Access Control-Autonomic Security.

TOTAL NO OF PERIODS: 45

TEXTBOOKS:

1**.** Joshy Joseph & Craig Fellenstein, “Grid Computing”, PHI, PTR-2003(UNIT I)

2.Kai Hwang, Geoffrey C Fox,Jack G Dongarra “Distributed and Cloud Computing ,From parallel processing to the Internet of Things” Morgan Kaufmann Publishers,2012(Unit-II to Unit-V)

REFERENCE BOOKS:

1. John W.Rittinghouse and James F.Ransome, “Cloud Computing Implementation, Management and Security”, CRC Press, 2010

2. Toby Velte, Anthony Velte, Robert Elsenpeter,”Cloud Computing, A Practical Approach”, TMH, 2009.

3. Kumar Saurabh,”Cloud Computing –Insights into New-Era Infrastructure “, Wiley India, 2011

4. George Reese, “Cloud Applications Architectures: Building Applications and Infrastructure in the Cloud” O’Reilly.

5**.** https://benzology.files.wordpress.com/2013/05/grid-computing-joshy-joseph-ebook.pdf

6. http://cloudipedia.com/files/2009/11/cloud_computing_made_easy.pdf

Computer usage: yes

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Instrumentation | Electronics | Transmission Lines and Networks | Biomedical

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1st week	Session 1 to 12	2 Periods
2	Cycle Test-2	March 2nd week	Session 17 to 25	2 Periods
3	Model Test	April 2nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems. This course emphasizes:	Correlates to program outcome		
	H	M	L
Understand the fundamental principles of distributed computing.	b,k	c,d,e	
Understand how the distributed computing environments known as Grids can be built from lower level services.	c,l	h,i	
Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.	a		
Analyze the performance of Cloud Computing.	k	b,c	
Understand the concept of Cloud Security.		d,e,l	

H: high correlation, M: medium correlation, L: low correlation

Draft lecture schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**GRID COMPUTING**		
1.	Introduction - Definition and Scope of grid computing	No	[T1]
2.	Computational and Data Grids, Current Grid Activities	No	
3.	Overview of Grid Business Areas, Grid Applications	No	
4.	Grid Computing Anatomy- Concept of Virtual Organization	No	
5.	Grid Architecture- Fabric layer, Connectivity layer, Resource Layer, Collective Layer	No	
6.	Application Layer, Layered Grid Architecture	No	
UNIT II	**II CLOUD ARCHITECTURE AND MODEL**		
7.	Technologies for Network Based system-System Models for Distributed and Cloud Computing	No	[T1]
8.	NIST Cloud Computing Reference Architecture Cloud models:	No	
9.	Characteristics-Cloud Services-Cloud Models	No	
10.	IaaS, PaaS, SaaS)-Public vs. Private Cloud-Cloud Solutions-Cloud ecosystem	No	
11.	RPC exception handling, Security issues	No	
12.	Service Management-Computing on demand	No	
UNIT III	**CLOUD INFRASTRUCTURE**		
13.	Architectural Design of compute and Storage Clouds	No	[T1]
14.	Layered Cloud Architecture	No	
15.	Inter Cloud Resource Management-	No	
16.	Development-Design Challeng	No	
17.	Resource Provisioning	No	
18.	Platform Deployment-Global Exchange of Cloud Resources.	No	
UNIT IV	**PROGRAMMING MODEL**		
19.	Parallel and Distributed Programming Paradigms-Map Reduce	No	[T1]
20.	Twister and Iterative Map Reduce-Hadoop Library from Apache	No	
21.	Mapping Applications-Programming Support-Google App Engine	No	
22.	Amazon AWS-Cloud Software Environments-Eucalyptus	No	
23.	Open Nebula, Open Stack, Aneka, CloudSim.	No	
UNIT V	**SECURITY IN THE CLOUD**		
24.	Security Overview-Cloud Security Challenges and Risks-Software-as-a-Service-Security	No	[T1]
25.	Security Governance-Risk Management-Security	No	
26.	Monitoring-Security Architecture Design-Data Security	No	
27.	Application Security-Virtual Machine Security	No	
28.	Identity Management and Access Control-Autonomic Security	No	
29.	Security in Distributed File system	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment /Seminar/online test/quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: Mr.B.Sundarraj, Asst Professor **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate*:*

a. An ability to apply knowledge of mathematics, science, and engineering

b. An ability to design and conduct experiments, as well as to analyze and interpret data

c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d. An ability to function on multidisciplinary teams

e. An ability to identify, formulate, and solve engineering problems

f. An understanding of professional and ethical responsibility

g. An ability to communicate effectively

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i. A recognition of the need for, and an ability to engage in life-long learning

j. A knowledge of contemporary issues

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Electronics Engineering graduates are provided with a strong foundation to passionately apply the fundamental principles of mathematics, science, and engineering knowledge to solve technical problems and also to combine fundamental knowledge of engineering principles with modern techniques to solve realistic, unstructured problems that arise in the field of Engineering and non-engineering efficiently and cost effectively.

PEO2: CORE COMPETENCE

Electronics engineering graduates have proficiency to enhance the skills and experience to apply their engineering knowledge, critical thinking and problem solving abilities in professional engineering practice for a wide variety of technical applications, including the design and usage of modern tools for improvement in the field of Electronics and Communication Engineering.

PEO3: PROFESSIONALISM

Electronics Engineering Graduates will be expected to pursue life-long learning by successfully participating in post graduate or any other professional program for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or educational sector.

PEO4: SKILL

Electronics Engineering Graduates will become skilled in soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, interpersonal relationship, group discussion and leadership ability to become a better professional.

PEO5: ETHICS

Electronics Engineering Graduates are morally boosted to make decisions that are ethical, safe and environmentally-responsible and also to innovate continuously for societal improvement.

Course Teacher	Signature
Mr.B.Sundarraj	

Course Coordinator **HOD/ECE**