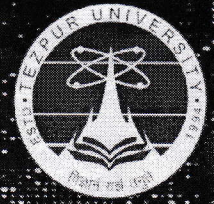




GIAN course on:



# WHEN GOOD ALGORITHMS YIELD BAD SOFTWARE

Tezpur University

Department of Computer Science and Engineering

20-24 November, 2017

Under

Global Initiative of Academic Networks (GIAN)

Ministry of Human Resource Development

Government of India



सत्यमेव जयते

**FACULTY**

*Prof. Ernst L. Leiss*

Professor, University of Houston, USA

**COURSE COORDINATORS**

**Prof. Bhogeshwar Borah**

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Department of CSE, Tezpur University, Napaam-784028,

Tezpur, Assam, INDIA

For details visit:

[http://www.tezu.ernet.in/event/GIAN\\_brochure\\_TezpurUniversity\\_CSE.pdf](http://www.tezu.ernet.in/event/GIAN_brochure_TezpurUniversity_CSE.pdf)

<http://www.gian.iitkgp.ac.in/ccourses/approvecourses3>

*B Borah*  
09/02/2017  
Department of Computer Science & Engg  
Tezpur University

# GIAN course on

## When Good Algorithms Yield Bad Software

(20 – 24 November, 2017)

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### Overview

Disciplined software development typically starts with one or more suitable algorithms that are then translated into code. These algorithms may be standard ones, taken from the literature, or they may be custom algorithms developed during the software design process. There exists a well-developed body of theory related to the question what constitutes a good algorithm. Apart from the obvious requirement of correctness, the most important quality of an algorithm is its efficiency. Computational complexity provides the tools for determining the efficiency of an algorithm; often, it is relatively easy to capture the efficiency of an algorithm in this way. However, for the software developer the ultimate goal is efficient software, not efficient algorithms. Here is where things can get complicated – it is often not well understood how to go from a good algorithm to good software. It is this transition that the course addresses.

Computational complexity is based on basic assumptions which help designers in analysing algorithms. Unfortunately, many of these assumptions are violated by modern computing environments. As a result, it is quite possible to start with a good algorithm and end up with bad software, either altogether incorrect or of unacceptable performance.


This course carefully examines the fundamental assumptions of algorithm analysis and explains, with concrete examples, how these assumptions may fail to hold for software. It explores the consequences and implication of these differences and proposes techniques that avoid the resulting pitfalls. The overarching objective is achieving the desired goal of producing software as efficient and effective as possible. Consequently, the course's emphasis is on practical aspects of the software development process, especially on the transition from good algorithms to efficient software

### Objectives

- Exposing the student to the fundamental assumptions made when designing and using algorithms
- Contrasting these assumptions with the reality of today's computational platforms, emphasizing the crucial differences with the assumptions underlying algorithm developments and analysis
- Reviewing the implications for software development of this discrepancy between the two worlds (algorithm development and software development)
- Explaining the implications of the assumptions in the algorithm world that cause problems for the software world
- Discussing methods of mitigating the resulting negative implications for the software arising in this process

*B. Bondh*  
08/02/2022  
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Tezpur University

<b>Schedule</b>	Duration : November 20 – 24, 2017 (20 hours) Place/Venue : Tezpur University, Tezpur, Assam, India <b>Number of participants for the course will be limited to 50.</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>You are a student at any level (BTech/MCA/MSc/MTech/PhD) or a Faculty from reputed academic institutions and technical institutions.</li> <li>You are an executive, engineer, researcher from private, service, and government organizations including R&amp;D laboratories who has had experience with large-scale industrial programming since it is only when doing this work that one becomes aware of the pitfalls that are addressed in this course</li> </ul>
<b>Fees</b>	The participation fees for taking the course is as follows: Participants from abroad : US \$500 Industry/ Research Organizations: INR 10000/- Academic Institutions: <ul style="list-style-type: none"> <li>➤ Faculty/staffs: INR 4000/-</li> <li>➤ Research scholars: INR 2500/-</li> <li>➤ PG Students: 1000/-</li> </ul> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 h internet facility. The participants will be provided with accommodation on payment basis in the University Guest House (current official rate is Rs.500/- per day for single occupancy; Rs.400/- per day for double occupancy and Rs.300/- per day in the dormitory of the guest house) and outstation research scholars/PG students will be accommodated in the University hostels (current official rate is Rs. 150/- per day with bed roll).</p>
<b>Modules</b>	<b>Tentative outline:</b>  <b>Part I: <i>The Algorithm World: Regularity, Predictability, and Asymptotics</i></b> <ul style="list-style-type: none"> <li>A taxonomy of algorithmic complexity, including time and space, worst case, average, and best case, bit and word, on-line and off-line, and I/O complexities of an algorithm</li> <li>Fundamental assumptions underlying algorithmic complexity</li> </ul> <b>Part II: <i>The Software Side: Disappointments and How to Avoid Them</i></b> <ul style="list-style-type: none"> <li>Sources of disappointments, including incorrect software, performance discrepancies, unpredictability, and infeasibility and impossibility</li> <li>Implications of non-uniform memory for software, including the influence of Virtual Memory Management</li> <li>Implications of compiler/system issues for software, including recursion and space complexity, garbage collection, and memory mappings</li> <li>Implications of the finiteness of the representation of numbers</li> <li>Infeasibility and undecidability: implications for software development</li> </ul>

  
 08/02/2022, Engr  
 Department of Computer Science  
 Tezpur University

## The Faculty



**Ernst L. Leiss** is Professor of Computer Science at the University of Houston. He earned degrees in computer science (M. Math., University of Waterloo, Canada, 1974), engineering (Dipl.-Ing., TU Vienna, Austria, 1975), and mathematics (Dr. techn., TU Vienna, Austria, 1976). He taught at Waterloo, the University of Chile in Santiago, and the University of Kentucky before joining the faculty at the University of Houston in 1979. His research interests include formal language theory, high-performance computing, and security. He has supervised and conducted research resulting in 17 doctoral dissertations, over 100 master theses, six books, and about 170 peer-reviewed publications in conferences and journals.

Leiss has lectured in 32 different countries, in three different languages. He has been an ACM Distinguished Lecturer from 1991 until 2014 (he was the first ACM Distinguished Lecturer to visit India) and the chair of the Houston chapter of the IEEE Computer Society since 1981.

**Registration:** Interested participants should register first with the GIAN website (<http://www.gian.iitkgp.ac.in>) for a one-time registration fees of INR 500 which will enable them to enrol for any number of courses being offered. Subsequent registration for this course will have to be done with Tezpur University by the **SHORTLISTED CANDIDATES AFTER GETTING CONFIRMATION E-MAILS FROM THE COURSE COORDINATOR**. They need to pay the requisite fees and fill up the Registration Form attached with this brochure. Duly filled in registration form can be sent to the coordinator both by online and offline modes.

**Travel Information:** The university campus is about 15 km east of Tezpur town which is located on the northern bank of mighty river Brahmaputra. Tezpur is the district headquarters of Sonitpur District of Assam, and is also known as cultural capital of Assam. It is well connected with Guwahati/Dispur, the capital city of Assam, which is about 200 km from Tezpur. Guwahati, the gate way to the Northeast India is well connected through major airlines and good trains with the rest of the country. Tezpur is connected with Kolkata by Air India flights thrice a week on Tuesday, Thursday and Saturday. Private buses and ASTC buses ply frequently from Guwahati ISBT to Tezpur. Tezpur (Dekargaon) is also connected by rail through the Dekargaon-Rangapara-Kamakhya route. However, preferred mode to reach Tezpur from Guwahati is by road.

### Course Coordinators

- Prof. Bhogeswar Borah
- Dr. Arindam Karmakar

Department of CSE  
Tezpur University, Napaam-784028,  
Tezpur, Assam, INDIA

Phone:

(+91)-3712-275355, 9435490984 (M)  
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E-mail:

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arindam@tezu.ernet.in


*B. Borah*  
08/02/2022  
Head  
Department of Computer Science & Engg.  
Tezpur University


**Global Initiative of Academic Network (GIAN) Programme  
Tezpur University, Napaam, Sonitpur, Assam-784 028, INDIA**

**Report on Conduct of GIAN Course**

<b>Title of GIAN Course</b>	When Good Algorithms Yield Bad Software	
<b>GIAN Course ID</b>	174016K01	
<b>Period of Course</b>	20-11-2017 to 24-11-2017	
<b>Name and Department of Faculty from &lt;host Institute&gt;</b>		
<b>Course Coordinator</b>		
Name	Prof. Bhogeswar Borah	
Department	Computer Science and Engineering, Tezpur University, Tezpur	
<b>Co-host Faculty, if any</b>		
Name	Dr. Arindam Karmakar	
Department	Computer Science and Engineering, Tezpur University, Tezpur.	
<b>Name and Affiliation of International Faculty</b>		
Name	Professor Ernst L. Leiss	
Affiliation	Department of Computer Science, University of Houston, Houston, Texas 77204-3010, USA.	
<b>Name and Affiliation of National Faculty, if any</b>		
Name	---	
Affiliation	---	
<b>Structure of the Course</b>		
Duration of course (1 week or 2 weeks)	1 Week	
Number of credits (1 or 2)	---	
Total number of lectures in the course	20	
Number of lectures by International Faculty	20	
Number of lectures by Host Faculty	00	
Number of hours of laboratory/tutorial sessions	00	
<b>Participants of the Course</b>		
Number of student participants	67	
Number of participants from Industry/ Research Organisations	00	
Number of Faculty participants	06	
<b>Total Number of participants</b>	<b>73</b>	

  
 07/02/2022  
**Head**  
 Department of Computer Science & Engg  
 Tezpur University

Number of participants who credited for the course	00
<b>Course Generated Fund</b>	
Sponsorship, if any (in Rs.)	00
Registration Fee Collected	00
<b>Total amount</b>	00
<b>Interaction with International Faculty</b>	
<u>Interaction of Host Faculty:</u>	
<p>Prof. Ernst Leiss had discussed various aspects of algorithmic engineering in a stretch of 20 hour lectures for this course. This course covers the essential information that every serious programmer/developer needs to know about algorithms and data structures, on the context of software side of engineering design situations. Lectures were designed to help students understand the difference between efficient and efficient programming solutions to problems and to become familiar with strategies to deal with incorrect software, performance discrepancies, unpredictability, and infeasibility and impossibility of handling software development issues. The course also included sessions where he discussed the impact of non-uniform memory, Virtual Memory, compiler/system issues, recursion, garbage collection memory mappings, finiteness of the representation of numbers etc. on software design cycle.</p> <p>All the lectures given by Prof. Ernst Leiss were highly interactive. The students got to know how the algorithms work and to master the art of programming. This ideas will really help them in the future when they actually design software for real world applications. We had discussions with Prof. Leiss about possible research collaborations with Tezpur University. We also gave him a proposal to be an Adjunct Professor in our University so that we can utilize his 40 years experience in software world in our research endeavour.</p>	
<b>Signature of Course Coordinators</b>	

  
 07/02/2022  
**Head**  
 Department of Computer Science & Engg  
 Tezpur University

Name of The Institute TEZPUR UNIVERSITY

**Utilization Certificate**  
under GFR 19-A , Rule 212(1) for GIAN Programme

SI No	Letter No & Date	Amount (Rs.)
1.	IIT/GIAN/S-17/881 dated 14/07/2017	5,44,000.00
TOTAL		5,44,000.00

1. Certified that out of **Rs. 5,44,000.00 (Rs. Five lacs forty four thousand only)** of Grant-in-Aid sanctioned for the GIAN programme in favour of ( TEZPUR UNIVERSITY) under MHRD/IIT, Kharagpur sanction vide letter Number given in the above, a sum of **Rs. 5,44,000.00 (Rs. Five lacs forty four thousand only)** has been utilized for the purpose of GIAN Course for which it was sanctioned and that the balance of Rs **NIL** remaining unutilized at the end of the course has been surrendered to Bank Account - GIAN IIT KHARAGPUR , Number. 35639268920 (IFSC Code. SBIN0000202) vide UTR No...NA..... dated.....NA.....

2. Certified that I have satisfied myself that the conditions on which the Grant-in-Aid was sanctioned have been duly fulfilled and that I have exercised the checks to see that the money was actually utilized for the purpose for which it was sanctioned.

3. Statement of Expenditure and Auditors Certificate are enclosed

Prepared by:

Signature.....  
Name.....**(C. BANI..... PATHEK)**  
Designation with Seal:  
(F.O./ A.O/ Equivalent officer in  
Finance & Account Department)  
Date:

**Finance Officer**  
**Tezpur University**

Signature :

**B. Bora**  
**14/12/2017**  
**Professor**  
**Department of Computer Science & Engg.**

GIAN Course Coordinator

Designation with Seal: **Professor**

Date: **14/12/2017**

Signature of GIAN Local Coordinator

**B. Bora**

Kinds of checks exercised

1. Ledgers.
2. Receipts and Payments Account.

Encl: As stated above

**B. Bora**  
**08/02/2022**  
**Head**  
**Department of Computer Science & Engg.**  
**Tezpur University**

**Name of the Institute TEZPUR UNIVERSITY**  
**Statement of Expenditure under GIAN Programme**  
**(Sanction Letter Number IIT/GIAN/S-17/881 Dated 14/07/2017)**

SI No.	Head of Expenditure	Amount (Rs.)
1	Honorarium to Foreign Expert	2,50,000/-
2	Travelling Expenditure, Accommodation including local hospitality of Foreign Expert	1,84,983/-
3	Expenditure on Lecture Note Preparation	8155/-
4	Expenditure on Video Recording of the Course	13,000/-
5	Contingency & Miscellaneous Expenses	87,862/-
<b>Total</b>		<b>5,44,000/-</b>

Prepared by:

Signature.....

Name.....

Designation with Seal:

(F.O./ A.O/ Equivalent officer in Finance & Account Department)

Dated:

*Finance Officer*  
*Tezpur University*

Signature :

GIAN Course Coordinator

Designation with Seal

Dated: 14/12/2017

Signature GIAN LC

**Auditors' Certificate**

This is to certify that Grant of Rs Five lacs forty four thousand only given to (TEZPUR UNIVERSITY) vide Sanction Letter no IIT/GIAN/S-17/881 Dated 14/07/2017 . by IIT, Kharagpur for the purpose of GIAN Programme . An amount of **Rs. 5,44,000.00 (Rs. Five lacs forty four thousand only)** has been spent as per details given above at the end of the course. The unspent balance of Rs..... at the end of the course has been surrendered to GIAN IIT KHARAGPUR Bank A/c No. 35639268920 ,IFSC Code. SBIN0000202, vide UTR No..... dated.....

We have checked all relevant vouchers, bank statements, bills, challans, letter & correspondences regarding the GIAN Programme conducted at (TEZPUR UNIVERSITY) and to the best of my knowledge and belief, the aforesaid figures are correct and in conformity with the books of accounts of the establishment.

Dated:

22.12.2017

Signature of Chartered Accountant with seal and membership number

For SURAJIT CHAKRABORTY & CO.  
 CHARTERED ACCOUNTANTS

CA, SURAJIT CHAKRABORTY

(Proprietor)

Membership No.- 305054

*B. Pathak*  
 08/02/2017  
 Department of Computer Science & Engg.  
 Tezpur University


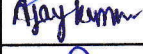




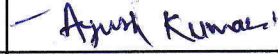
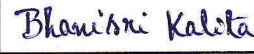



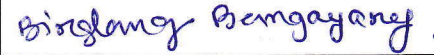

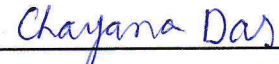
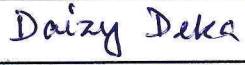


*[Signature]* 22.12.2017

# Tezpur University

GIAN Programme

When Good Algorithms Yield Bad Software

20th November 2017

#	App No	Name	Signature
1	2015150160368	AFZALUR RAHMAN	
2	2015150457135	AJAY KUMAR	
3	2015150363132	AJAY KUMAR SHARMA	
4	2015150247801	AKASH AWASTHI	x
5	2015150753352	ALEXY BHOWMICK	
6	2015150857588	ANJAN KUMAR SARMA	
7	2015150259136	ARUNDHATI DAS	
8	2015150016583	AWADHESH KUMAR VERMA	x
9	2015150656646	AYUSH KUMAR	
10	2015150261920	BHANISRI KALITA	
11	2015150057734	BHANITA ROY	
12	2015150459745	BIDYUT BIKASH GOSWAMI	
13	2015150963341	BINAYAK DUTTA	
14	2015150657986	BIRGLANG BARGAYARY	
15	2015150443406	BYOMAKESH MAHAPATRA	x
16	2015150361144	CARYNTHIA KHARKONGOR	
17	2015150460682	CHAYANA DAS	
18	2015150244447	CHRISTY V SUTHAN	x
19	2015150160414	DAIZY DEKA	
20	2015150556718	DEBASISH BORAH	x
21	2015150753488	DEBOJIT BORO	✓
22	2015150461517	DEEPALI SACHAN	x
23	2015150053975	DEEPTI	x
24	2015150657163	DHRITI MOHAN SARMA	
25	2015150156719	DINASHREE DUTTA	x
26	2015150063141	DIPJYOTI DEKA	

27	2015150258107	DOLLY BASUMATARY	✓
28	2015150053552	DR. SANJIB KUMAR DEKA	✓
29	2015150560412	DURLOV DAS	Durlov Das
30	2015150958918	HUSSAIN AHMED CHOWDHURY	Htc
31	2015150563147	JAMIL AHMED	Jamil Ahmed
32	2015150258872	KAUSHAL BHARDWAJ	Kaushal Bhardwaj
33	2015150162888	KAUSHIK RAY	Kaushik Ray
34	2015150058968	KOYEL MANDAL	Koyel Mandal
35	2015150655109	KRISHNA DAS	Krishna Das 20/11/22
36	2015150863559	KUNAL BASNET CHETRI	✓
37	2015150663878	LOITONGBAM BASANTAKUMAR SINGH	LBS
38	2015150463173	MAMPI DEVI	Mampi Devi
39	2015150560555	MANOJ DAS	Manoj Das
40	2015150462892	MEENAKSHI SHARMA	Meenakshi
41	2015150059066	MEHBOOB HASAN BEN SIRAJ BARBHUYAN	Mehboob Hasan
42	2015150762897	MONISHA DEVI	Monisha Devi
43	2015150457737	MURCHANAA ADHIKARY	Murchana Adhikary
44	2015150163870	NABAJYOTI MEDHI	NM
45	2015150655178	NARENDRA YADAV	Narendra Yadav
46	2015150559762	NILAKSHI DEVI	Nilakshi Devi
47	2015150358294	NIRANJAN KUMAR	Niranjan Kumar
48	2015150255220	NIYANTA PRASAD	Niyanta Prasad
49	2015150615362	P SRINIVASAN	X
50	2015150859910	PALLABI PATOWARY	Pallabi
51	2015150658651	PAMPI BORAH	Pampi Borah
52	2015150263160	PARTHAJIT BORAH	Parthajit
53	2015150451278	PAWAN KUMAR	X
54	2015150354591	PIYALI SEN	Piyali Sen
55	2015150754811	POOJA SHARMA	Pooja Sharma

Borah  
08/02/2022

56	2015150455544	POONAM	x
57	2015150158320	PRAKASH CHAUHAN	Prakash Chauhan
58	2015150256744	PRAKASH DAS	Prakash Dg.
59	2015150463763	PRARTHANA DUTTA	<del>Prashant Katiyar</del> Prarthana Dutta
60	2015150062671	PRASHANT KATIYAR	Prashant Katiyar
61	2015150428463	PRAVEENA KUMARA V	x
62	2015150656501	RAJAT SHARMA	<del>Rajata</del>
63	2015150436686	RAMKUMAR A	x
64	2015150713883	RATAN DAS	x
65	2015150253604	RAVI SHANKAR KUMAR	Ramhar
66	2015150657528	RIYA SAHA	Riya
67	2015150662519	ROHIT KUMAR CHOUDHARY	Rohit Kumar Ch.
68	2015150422785	RUP KUMAR DEKA	Rup
69	2015150256684	SAGARIKA BORAH	Sagarika Borah
70	2015150860833	SAURABH SONOWAL	✓
71	2015150359278	SAZZAD AHMED	Sazzad Ahmed
72	2015150760263	SHAFIUL ALOM AHMED	Shafiu
73	2015150163854	SHIVA SHANKAR SHANDILYA	Shandilya
74	2015150553577	SHOBHANJANA KALITA	Shobhanjana
75	<del>2015150553577</del>	<del>SHOBHANJANA KALITA</del>	
76	2015150758941	SHREE KANTI	Shree Kanti
77	2015150356926	SHREYOSHI BORAH	Shreyoshi Borah
78	2015150117289	SONAGRA SUMIT NANDKISHOR	x
79	2015150762885	SUKHEN SHIL	Sukhen Shil
80	2015150963143	SUMIT SRIVASTAVA	Sumit
81	2015150263158	UPASANA SARMAH	Upasana Sarma
82	2015150054028	UPASANA TALUKDAR	U. Talukdar
83	2015150058150	VIJAY KUMAR SINGH	Vijay
84	2015150458925	YUMNAM NIRMAL	Yumnam
85	2015150014178	YUVARAJU CHINNAM	x

88. DEENA HIJAM

Dear you  
Borrah

86. ROSY SARMAH

ad

87. Laujib ke deka

88. Chintamani Baruah

Chaitu

89. Saughamitrea Nath

Stallu

Borrah  
08/02/2022

Head  
Department of Computer Science & Engg.  
Tezpur University

no  
20