# THE TRUSTFORTE CORPORATION

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## ACADEMIC EQUIVALENCY EVALUATION

Date: December 17, 2013

Name: **PENDYALA, Kumar Naidu**
Country: India

Degree: Bachelor of Technology
Institution: Jawaharlal Nehru Technological University
Dates: 2005-2009
Date of Completion: May, 2009

Educational Equivalent in the United States:

**BACHELOR OF SCIENCE DEGREE IN ELECTRONIC ENGINEERING**

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The following is an analysis and advisory evaluation of the academic credentials of Mr. Kumar Naidu Pendyala. As discussed herein, Mr. Pendyala completed a four-year bachelor's-level program in Electronics and Communication Engineering at Jawaharlal Nehru Technological University, in India. Based on the foregoing academic credentials, I find that Mr. Pendyala attained the foreign equivalent of a four-year Bachelor of Science Degree in Electronic Engineering from an accredited US college or university based on the single source of the Bachelor of Technology program completed by the candidate at Jawaharlal Nehru Technological University.

In 2005, Mr. Pendyala commenced post-secondary studies in a four-year Bachelor of Technology program at Jawaharlal Nehru Technological University, in India. Jawaharlal Nehru Technological University is an institution of higher education in India recognized by the University Grants Commission (UGC). Admission to the four-year bachelor's-level programs offered by Jawaharlal Nehru Technological University is based on the completion of secondary-level studies and competitive entrance examinations.

Mr. Pendyala completed the general studies and specialized studies which lead to a four-year Bachelor of Technology Degree at the University. The general studies included entry-level courses which are a requisite component of a bachelor's degree from an institution of higher education in the United States. Based on the subject matter and credit hours of these courses, most such courses would qualify as equivalent to courses in US institutions.

Additionally, from 2005 through 2009, Mr. Pendyala completed advanced bachelor's-level courses in his major area of concentration, Electronics and Communication Engineering. The curriculum of the program in Electronics and Communication Engineering at the University typically includes classes and examinations in Electronics, Electrical Engineering, Computer Programming, Electrical Circuits, Digital Circuits, Electronic Devices, Communication Systems, Computer Organization, Microprocessors, Computer System Software, and related subjects. Following his completion of the required classes and examinations, in May, 2009, Mr. Pendyala was awarded a Diploma for a four-year Bachelor of Technology Degree by Jawaharlal Nehru Technological University. The nature of the courses and the credit hours involved indicate that he attained the foreign equivalent of a four-year Bachelor of Science Degree in Electronic Engineering from an accredited US college or university.

I note that this finding has been confirmed by the Electronic Database for Global Education (EDGE) of the American Association of Collegiate Registrars and Admission Officers (AACRAO). According to EDGE, a Bachelor of Technology Degree awarded by an Indian university "represents attainment of a level of education comparable to a bachelor's degree in the United States."

Further, it is significant that the academic study of Electronic Engineering is closely related to the area of Computer Science and Computer Engineering. Indeed, the field of Electronic Engineering serves as the fundamental academic underpinning for the study of Computer Science. These fields include many of the same concepts and academic principles. Many courses completed in the discipline of Electronic Engineering include the use of computers and involve the study of principles of Computer Science. Further, the study of Electronic Engineering involves concepts of Computer Science, Engineering, and Mathematics. Most curricula in the field of Electronic Engineering include several courses in Computer Science and Computer Engineering.

Accordingly, based on the reputation of the academic programs offered by Jawaharlal Nehru Technological University, the number of years of coursework, the nature of the coursework, the grades attained in the courses, and the hours of academic coursework, it is the judgment of The Trustforte Corporation that Mr. Kumar Naidu Pendyala attained the foreign equivalent of a four-year Bachelor of Science Degree in Electronic Engineering from an accredited college or university in the United States based on the single source of the Bachelor of Technology program completed by the candidate at Jawaharlal Nehru Technological University.

This evaluation is based on copies of the original documents provided by Mr. Pendyala and represented to be authentic and true copies of the original documents. We have no reason to doubt the authenticity and accuracy of these documents. This is a true and correct evaluation to the best of our knowledge and belief, pursuant to requirements of the United States Citizenship and Immigration Services of the United States Department of Homeland Security ("USCIS"). The

Trustforte Corporation is a credentials evaluation service and academic advisory firm specializing in the evaluation of foreign educational credentials. Past academic equivalency evaluations of The Trustforte Corporation have been accepted regularly by the USCIS and various US educational institutions.

Corporate Seal

Natalie J. Araujo, M.A., Evaluator; Member, NAFSA: Association of International Educators and National Association for College Admission Counseling (NACAC); Corporate Member, American Association of Collegiate Registrars and Admissions Officers (AACRAO) and National Association of Graduate Admissions Professional (NAGAP).

***For detailed statement of qualifications and experience of evaluator, see attached resume.***

References:


1. AACRAO EDGE. *AACRAO Electronic Database for Global Education (EDGE)*. Online database. v.1.0. 2004-2006. AACRAO. August 19, 2008. www.aacraoedge.org
2. Central Intelligence Agency (CIA). *The World Factbook 2008*. Dulles, Virginia: Potomac Books, Inc., December 1, 2007.
3. International Association of Universities. *International Handbook of Universities*. 19th ed. Paris, France: UNESCO House, 1 Rue Miollis, October 16, 2007.
4. Association of Indian Universities. *Universities Handbook*. 31st ed. New Delhi, India: AIU House, 16 Kotla Marg, 2006.
5. The American Council on Education's College Credit Recommendation Service (CREDIT). *2004-2005 National Guide to Education Credit for Training Programs*. Westport, CT: Greenwood Publishing Group, Inc., August 30, 2004.
6. Feagles, Shelley, ed. *A Guide to Educational Systems Around the World*. CD. Washington, DC: NAFSA: Association of International Educators. 1999-2008.

Edge™

AACRAO Electronic Database for Global Education

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# Asia : India : Credential



**Bachelor of Engineering/Technology**

Bachelor of Engineering/Technology

Sample Documents

## Credential Description

Awarded upon completion of four years of tertiary study beyond the Higher Secondary Certificate (or equivalent).

## Credential Advice

The Bachelor of Engineering/Technology represents attainment of a level of education comparable to a bachelor's degree in the United States.

## Credential Author Notes

No author notes available.

Entrance requirement: Completion of Higher Secondary Certificate or equivalent

Leads to: Further tertiary education

**The AACRAO Electronic Database for Global Education (EDGE) is a dynamic database and credential advice is subject to change. Credential advice is modified when new studies of foreign countries' education systems have been undertaken. Based upon the research collected and analyzed, new placement recommendations are reviewed and approved by an acknowledged group of experts. If you have any questions, please contact edge@aacrao.org.**

# NATALIE ARAUJO

## EXPERIENCE

2007 - **The Trustforte Corporation**
*Evaluator and Vice President of Operations and Client Services*
Perform evaluations of foreign educational credentials; assess foreign credentials and educational systems; provide expert opinions on comparative educational credentials, direct research on foreign universities and educational systems; full-service client support and customer relations management

2004-2007 **The Trustforte Corporation**

*Junior Evaluator and Manager of Client Services*

Conduct research on foreign educational credentials equivalencies; provide analyses with respect to evaluation and education issues; assist clients with equivalency issues; facilitate client relationships.

2002-2004 **Clark University, English Department**

*Teaching Assistant*
Assisted professors with class preparation and correction of essays and exams; taught classes on British Literature, Drama of the Western Tradition, and Communications and Culture; tutored students in writing and composition

2003-2004 **Clark University, Professor Vaughan**

*Research Assistant*
Conducted library and internet research on 16th century British drama; compiled extensive bibliographies

## EDUCATION

May, 2004 **Clark University**, Worcester, MA
M.A. English, concentration in American Literature

1999-2002 **Johannes Gutenberg-University**, Mainz, Germany
Intermediate Degree in American Studies, December 2001
Major: American Studies \ Minors: British Studies and Media Studies

2002-2004 Awarded prestigious scholarship by the German Academic Exchange Service (DAAD) for 2002/2003 and 2003/2004

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**EXPERT OPINION LETTER**
**Analysis of Professional Position / Positional Requirements**

| | |
|---|---|
| Position: | Associate (Computer Systems Analyst),<br>Cognizant Technology Solutions U.S. Corp. ("Cognizant") |
| Degree Requirement: | Bachelor's Degree in a select group of directly related fields, including, but not limited to, Information Technology; Software, Computer, Electrical or Electronic Engineering; Computer Applications; Computer Science; Instrumentation Sciences; Physics; Mathematics; Mechatronics; or a related field of study |

*I. Introduction*

I offer this opinion letter on behalf of Cognizant, a leading provider of information technology services and solutions, as an assessment of the minimum necessary hiring requirements for the company's position of "Associate (Computer Systems Analyst)". The holder of this position will apply advanced technology and scientific theories and methods specific to networks and/ or computer systems technology to analyze, design, code, and/ or modify customized application software and perform quality control and engineering. These duties will be performed under the direction of a Cognizant team lead or manager, at a professional, world-class level. The given duties of the position (discussed in greater detail below) require the ability to apply the knowledge associated with the completion of bachelor's-level courses in computer science, information technology, information systems, systems analysis, electronic engineering, electrical systems engineering, instrumentation science, applied mathematics, mechatronics, and other technical subjects found in bachelor's program in the above-mentioned fields, or in related fields of the sciences.

In this letter, I will discuss that the position of Associate (Computer Systems Analyst) of Cognizant is a specialty occupation, entailing the day-to-day, theoretical and practical application of a body of highly specialized knowledge, and that the attainment of such a degree or its equivalent is a minimum requirement for entry into the occupation in the United States. Furthermore, I will discuss that the position is

correctly encompassed within the "Computer Systems Analyst" classification of O*Net, and exemplifies a specialty-caliber occupation in this classification. Indeed, to be qualified to reasonably perform the duties of Associate (Computer Systems Analyst) of Cognizant requires the attainment of a baccalaureate or higher degree or its equivalent in the specialty occupation. Such a requirement completely accords with modern operating practices for a large global company, such as Cognizant, when hiring professional-level Associates (Computer Systems Analyst) for these core technology development and analytical positions. Indeed, there are multiple tiers of justification -- including the actual/specified job duties, industry standards for a company of the magnitude of Cognizant, and reasonable expectations/requirements of Cognizant's global clientele -- for considering the position as a "specialty" occupation.

Further, I will evaluate the position in detail, and explain my finding that this position is a specialty occupation; explore the advanced industry standing of Cognizant, as a company with particular need for a specialty-trained individual in this Associate (Computer Systems Analyst) occupation; compare the position to the larger O*Net classification of a Computer Systems Analyst; and elaborate upon the relevance to the occupation of degrees not only in computing, IT, and software engineering, but also the relevant fields of electronic and electrical engineering, instrumentation sciences; physics; mathematics; mechatronics; and related sciences disciplines.

*II. My Credentials*

My qualifications to issue a judgment as to the specialty nature of this occupation are as follows: I am an accomplished researcher, professor (at Princeton University, in Princeton, New Jersey), and seasoned technology consultant. My many years of combined teaching, research, and consulting experience have provided me with insight into the nature of positions within the technology industry, and the correlation that exists between different levels of academic study and the ability to perform different technology functions.

With regard to my academic background, I obtained my Bachelor of Science Degree from Princeton University (in the fields of Electrical Engineering and Computer Science), and then obtained Master of Science Degree and Ph.D. Degrees at Stanford University (in Computer Science, in the Computer Systems Laboratory, which was a laboratory shared by the Electrical Engineering and Computer Science departments). I am currently a Professor in the Computer Science Department of Princeton University. I have an advanced academic background and the ability to review an individual's qualifications and determine the degree to which his or her qualifications have prepared him or her for further study and/or professional employment.

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With regard to my research experiences, they are plentiful. While in college, I participated as a Research Intern with IBM Research; I then served in roles as a Research Assistant and Research Associate at Stanford University, developing parallel scientific and engineering applications for research usage, and was invited to participate in the Stanford DASH/FLASH research groups. As an assistant professor, associate professor, and then (full) professor at Princeton, I have participated in numerous research committees, and pursued extensive research in parallel computer systems and applications and related areas. Further, I have served as Director of a multi-department, interdisciplinary program in Integrative Computer and Application Sciences, involving the research of the interrelation of computer science with other academic disciplines. Professionally, I have provided advisory research services to companies including Microsoft, the Intel Corporation, and Silicon Graphics.

Over the course of these professional experiences, including extensive research in information technology innovations and technologies, I have become familiar with the structures and operations of IT divisions within large multinational corporations, and have developed an in-depth understanding of the duties performed by different technical personnel (including Computer Systems Analysts); the distinctions between different classes and grades of Computer Systems Analyst position; and the particular hiring requirements specific to each of these positions. In acting as an advisor to graduating students, I have gained experience in assessing the academic and experiential requirements of different technology positions and the hiring standards observed and applied by business and technology service organizations. Furthermore, I have a long record (over ten years) as an independent consultant, writing Professional Position Positions for submission to the USCIS and other agencies. During this period, I have reviewed hundreds of occupations in order to determine whether the occupations were at the level of a specialty occupation, and (where the argument was appropriate, correct, and supportable) have then written position evaluations which, I understand, have been widely accepted by the reviewing agencies. From my perspective as a scholar, educator, and professional in the areas of computer science, engineering, and information systems, I believe that I am qualified to issue an opinion regarding the requirements for the subject position of "Associate (Computer Systems Analyst)" as held with Cognizant.

*III. The Position of Associate (Computer Systems Analyst) at Cognizant*

As an initial matter, the position of "Computer Systems Analyst" -- which Cognizant internally designates as "Associate" -- is clearly a professional systems position in the information technology industry. Cognizant is a Fortune 500 global provider of information technology (IT) application development, IT consulting and

business process services. The company has reported annual revenues in excess of $12 billion as of December 31, 2015, and $3.37 billion as of second quarter of 2016 (June 30, 2016). Cognizant among the world's leading technology services organizations. The company develops custom software solutions for enterprise business and works with clients to integrate these solutions within existing IT infrastructures – performing these services across multiple industry verticals on behalf of leading global corporations. In accord with these operations, Cognizant's important service contributors must have highly specialized expertise in a number of technical fields related to infrastructure design, implementation, and maintenance.

Most businesses strive to keep pace with evolving technology developments, and are currently embracing new intelligent automation, such as Robotic Process Automation (RPA) to achieve optimum performance, agility and competitive capabilities. To this end, Sumithra Gomatam, President of Cognizant's Global Process and Platform Solutions, and Matthew Smith, Assistant Vice President of Cognizant's Automation, Emerging Business Accelerators have opined: "In the digital era, speed is the new currency in business. Organizations need to address the fast-arriving enabling technologies, techniques and tools that will allow them to digitize their processes — and do so quickly. Embracing RPA may not be a one-size-fits-all solution for businesses. For example, tasks that rely on a significant amount of creativity or intelligence cannot easily be undertaken by a piece of software. Instead, business leaders should take the time to evaluate their business strategy and build plans to integrate RPA in ways that will help understand current and future opportunities to move forward." In short, Cognizant continues to be at the forefront with its innovative RPA solutions that serve as the framework to businesses automation journey.

Cognizant has created a whole host of internally developed and designed innovative products and platforms, including assetSERV™, B2B Conflux, CasKade, an assurance based learning solution, ClaimSphere™HEDIS®, Cloud Integration Brokerage, Cloud360, Cognizant OpimaWrite™, Cognizant S3P, Cspark Innovation Management Solution, fastest, GeoLocus, HealthActivate™, Interactive Exposure Map™, LifeEngage, MedVantage, Mobile Risk Assessment, ModelEye, OrderServ, SKUView, SmartTrials, Smaas, StarSERV™, targetSERV, TruMobi, WallSERV PHM, WorkPort, and ZKLC™ IT Knowledge Automation™. Cognizant is continuously innovating and driving next generation technology. Moreover, a key underlying foundation of Cognizant's differentiating services and operations is its internally developed Cognizant 2.0 and Mainspring platform, a proprietary web 2.0 based platform enabling knowledge sharing and collaboration across geographies to achieve foremost business growth and development. Hence, such unique technology solutions

can only be designed, developed and enhanced for market use across industries by individuals within the Computer Systems Analyst specialty occupation.

The position of "Associate (Computer Systems Analyst)" concerns the development of the software solutions that form the core basis of Cognizant's global operations and enable the company to sustain and expand its competitive positioning in the field. As set forth in a description provided by the employer, the duties of the position require comprehensive engagement across the entire software development lifecycle by which custom software applications are planned, developed, aligned with client and user business requirements, integrated into client environments, and utilized in order to upgrade the client's operational capabilities. These duties include (but are not necessary limited to) the following:

> *Applies advanced technology and scientific theories and methods specific to networks and/ or computer systems technology to analyze, design, code, perform quality control and engineering, and/ or modify customized application software under the direction of a Cognizant team lead or manager. Also may perform quantitative and qualitative analysis and/or provide business consulting services related to operational processes and best practices. May perform requirements gathering and/ or develop new applications, as necessary, in conjunction with assignment requirements. May coordinate and confer with a Cognizant point of contact offshore on the transmission of technical specifications, and timing and completion of assigned work and deliverables (i.e., agile, waterfall or similar methods).*

These job duties are indicative of a professional position in the field of systems design and analysis, requiring expertise in the application of technology to advanced business and organizational processes, the design and/or enhancement of computer applications and solutions, the execution of full-cycle development and quality control/ engineering procedures, and the professional use of advanced software development life cycle (SDLC) processes (including Waterfall and Agile). Based on my review of the aforesaid job duties, I believe that this position of "Associate (Computer Systems Analyst)" requires a bachelor's degree in Information Technology; Software, Computer, Electrical or Electronic Engineering; Computer Applications; Computer Science; Instrumentation Sciences; Physics; Mathematics; Mechatronics, or a related sciences field, inasmuch as it is fully reasonable (and indeed a matter of necessity) for a company providing innovative software and technology integration consulting services for many of the world's leading companies to ensure that their Associates (Computer Systems Analyst) operate in an optimal fashion, and to therefore hire professionals who are able to bring to bear a bachelor's-level background to the duties of such an occupation. Furthermore, it is clear that the duties are of a professional nature and could not be properly performed without the benefit of such an academic background.

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Generalized knowledge of the applicable technical, scientific, and operational concepts, alone, is not sufficient for an Associate (Computer Systems Analyst) to handle the functional requirements for the instant position at a company like Cognizant. Bachelor's-level training in a related technical field – such as Information Technology; Software, Computer, Electrical or Electronic Engineering; Computer Applications; Computer Science; Instrumentation Sciences; Physics; Mathematics; Mechatronics, or a related field -- allows an individual to collaborate effectively within the context of a team programming environment, as well as to analyze, code, test, and design the types of programs required in accordance with the advanced requirements of large global companies.

The position requires extensive use of several industry-leading applications and languages, and the analytical, quantitative, and conceptual knowledge (as would be gained via appropriate bachelor's study) to customize and deploy them. This requirement is evidenced by the wide ranging forms of development in which the incumbent will be called upon to participate, i.e. given the current broad constitution of Cognizant's client base and suite of provided software services. The job description thus requires a candidate who has obtained an appropriate bachelor's-level background, comprising concepts and techniques of advanced mathematics and algorithms, engineering, computer applications, computer science, computer information systems, IT, the technical sciences, electronic / electrical engineering, and related areas, and is trained to work in a wide range of varying technical formats. Indeed, only an individual with such a background could effectively gauge the developmental feasibility and design specifications of the different types of computer systems, and facilitate usage via the ongoing implementation of modifications to meet changing user needs. Given the analytical and technical specifications of the position, it would be impractical to employ an Associate (Computer Systems Analyst) who lacks a bachelor's-level educational background (or higher) in a suitable field, or the equivalent.

*IV. The Occupation of Associate is encompassed within the O*Net "Computer Systems Analyst" Classification*

As noted above, this Cognizant position comports appropriately with the definition of a Computer Systems Analyst. O*Net lists the following essential duties for the Computer Systems Analyst category[1]:

[1] http://www.onetonline.org/link/summary/15-1121.00

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*Analyze science, engineering, business, and other data processing problems to implement and improve computer systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software.*

On the same page, O*Net also confirms that a Computer Systems Analyst may realize this analysis through developing and documenting system design and testing procedures; expanding or modifying systems; testing and monitoring computer programs and systems; and other duties performed as part of the larger process of full lifecycle software design and analysis.

These O*Net descriptions provides a general overview of the varying methods by which Computer Systems Analysts contribute to the analysis of data problems and requirements, and then use this analysis in contributing to or otherwise facilitating the development of computer systems that meet operational needs. The field of computer systems analysis is a broad and wide-ranging field that will require different contributions, depending upon the nature of the operations, business processes / problems, or data needs to be addressed. That said, I find the provided job description to be entirely consistent with the O*Net definitions. The holder of the position will perform advanced duties of analysis, design, and implementation, in order to automate client business processes and functionalities by virtue of the application of custom software, systems, and/or technology. Put another way, the duties of this position are analytical in nature, and these analyses are focused on the definition of problems to be solved by a computer system, and on achieving the structure and function of a customized computer system to solve designated problems. Due to the focus on this position on applying analytical processes to the creation of a complex software system and other solutions, it is clear that the nature of this position fundamentally concerns computer systems analysis. The Cognizant job duties directly relate to Cognizant's core business operations, such as, but not limited to, project based application services, business and technology consulting, complex systems integration, application support services, business processing services, IT infrastructure and cloud services, digital strategy and marketing and operations solutions, and analytics, business intelligence, CRM, data warehousing, supply chain management, mobility, engineering and manufacturing solutions, enterprise resource planning, and quality and assurance engineering. As such, the proposed position is that of a Computer Systems Analyst.

It is also clear from the provided position description that the position of Systems Analyst is advanced, complex and professional in nature, and in keeping with a specialty-caliber Computer Systems Analyst position. According to the O*Net Summary Report for a Computer Systems Analyst, "most of these occupations require a four-year

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bachelor's degree, but some do not". As is the case with a majority of Computer Systems Analyst occupations – especially those held with large international technology corporations servicing major clients and working on custom computer systems of particular complexity and business impact – this position is certainly within the category of those requiring a four-year, relevant Bachelor's Degree.

*V. The Specialty Nature of the Larger Cognizant Environment*

Elaborating on this latter point, it should be noted that the operations of Cognizant comprise multiple global delivery centers, thousands of employees, and a roster of leading corporate (many of which operate multi-nationally) and governmental clients from around the world. Because of the importance of Computer System Analyst positions in the larger provisioning process that is used by Cognizant to meet the needs of clientele, it is incumbent upon the organization (in the interests of their internal managerial structures, team managers, shareholders, corporate partners, and corporate clients) to establish a specialty-level prerequisite for the position, and thereby ensure the hiring of a fully qualified candidate. The system projects executed by firms such as Cognizant are so broad in scale and scope – involving multiple offshore as well as onsite facilities, resources, utilities, technologies, and personnel – as to require a more stringent hiring standard. By the same token, the advanced operational, analytical, and technical duties of the position suggest a position that would be viewed as "specialty" at any tier of the larger IT industry. However, the fact that the position is held with an organization of the magnitude of Cognizant only serves to drive home the necessity of a bachelor's requirement.

Cognizant has appropriately identified the need for a minimum of a Bachelor's Degree level of education in its Computer System Analysts. Only employees with at least a Bachelor's level of education come into the company with a high level of technical and/or business skills and expertise, and the ability to further refine and hone these skills through Cognizant Academy and other on-the-job training opportunities.

Cognizant employees with a technical background at the Bachelor's Degree (or equivalent) level are also better prepared to learn about IT specific delivery models, cost management strategies related to IT methodologies, portfolio strategies specific to IT innovations, customer bases, pricing models, IT sales and distribution strategies, customer service strategies using IT solutions for business efficiencies, marketing of IT strategies, financial and funding models, and IT research and development activities within a variety of industries. Cognizant's ability to deliver highly specialized technology solutions and business consulting to customers has gained international recognition. For example, Cognizant ranked 230 in Fortune 500 (June 2016), named in

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Newsweek's Top 100 Green Companies in the U.S. (June 2016), ranked #529 in Forbes Global 2000 (May 2016), named among the Forbes' America's Best Management Consulting Firms (May 2016), named among the Forbes' 25 Fastest Growing Public Tech Companies (April 2016), named Fortune's World's Most Admired Companies (February 2016), named among the Forbes' World's Most Innovative Companies of 2015 (August 2015), and named a "Leader" in the "The Forrester Wave™: Business Transformation Consultancies" (3rd Quarter 2015). As well, Cognizant was named to the "Winner's Circle" for Intelligent Automation in the new HfS Research Report (October 2016), and the Everest Group named Cognizant a "Leader" and Star Performer" in digital services (October 2016).

A recent example of Cognizant's innovative IT solutions includes its engagement with Standard Life to implement next generation IT infrastructure to support its business expansion in its investment and pensions and savings business for its current 4.4 million customers. Cognizant is supporting Standard Life in deploying a private cloud infrastructure across two data centers and migrating business services to the new infrastructure using end-to-end capabilities in implementing next generation agile IT infrastructure to respond to changing business requirements. The migration involves mainframe transaction platforms, online trading systems, telephony platforms, contract centers, and investment links. The new private cloud solution enables Standard Life to achieve more efficient time to market and capital investment, deploy a pay-per-use pricing model, and improve operational resilience of business application. Cognizant's single customized approach to strategic IT infrastructure enhances visibility and managing strategic IT infrastructure. This cloud-based infrastructure will provide Standard Life with a competitive advantage in the increasingly digitalized industry. Another example is Cognizant's innovative solution to gain better customer insight and improve omni-channel brand and shopping experiences in the retail, online and mobile sales channels for PetSmart, Inc., the largest specialty pet retailer in North America. Cognizant's customized IT solution uses master and analytics demographic, behavioral, interactional and transactional data to create custom profiles for pets and pet parents. This digital endeavor builds an integrated, single view of customers and their pets to enhance PetSmart's ability to provide customers with consistent and relevant products and services, and improve the brand experience. Cognizant is employing its MDM-in-a-box™ solution with industry specific data models and other unique features for a single view of the entire data landscape.

Another key example of Cognizant's innovative IT solutions is its modernization and transformation of Kern Health Systems (a managed care health plan) technology infrastructure and operations using Cognizant's deep healthcare and technology consulting expertise coupled with TriZetter's, a Cognizant company, software.

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Cognizant's TriZetto QNXT Enterprise Core Administration Platfor effectively manages more members, meets changing Medicaid requirements and improves patient and provider experiences. The TriZetto QNXT platform is one of the most widely deployed software platforms supporting Medicaid Managed Care Organizations in the U.S.

These innovative IT solutions and accolades would not have been possible if Cognizant did not seek out talented individuals with advanced technical/analytical duties (like the Computer System Analyst), possessing a Bachelor's Degree (or equivalent) in a related field. Cognizant and its business partners rely heavily on individuals with this level of education to perform a variety of "specialty occupations" that require a combination of theoretical and practical specialized knowledge not exhibited by individuals without a Bachelor's Degree.

With the above in mind, it is instructive to examine some of the specific internal operating protocols, delivery mechanisms, and/or organizational structures that differentiate the services of Cognizant from other service-providers in the IT and business consulting field – providing the company with its competitive advantage and enabling the realization of the core global business and service model – but that could not be adequately realized were the company not able to staff its key contributory positions with "specialty-level" professionals (holders of a bachelor's degree, or the equivalent, in a relevant field). In facilitating the necessary real-time collaboration among the above-referenced facilities, resources, utilities, technologies, and personnel, Cognizant uses "Cognizant 2.0", a highly flexible Web-based delivery platform that enables globalized (yet virtual) collaboration among different internal units – for example, via knowledge-sharing, necessary integration of business and technology procedures, and access of business as well as technical artifacts (among other internal intellectual properties and assets) useful to a particular industry segment or application – while also figuring into the real-time processes by which project deliverables are provided to the client. A virtual network of this nature requires a consistency of service and quality among all contributory elements (much as a chain is only as strong as its weakest link) and could not be realized or leveraged, in the manner required by Cognizant, without the ability to apply specialty-level knowledge and ability across all key components and facets of the network. The instant occupation clearly will be relied upon a source of specialty-level knowledge and expertise within the context of a virtual delivery and collaborative network of the nature of Cognizant 2.0.

Another element of the Cognizant service model that clearly requires uniformity of excellence in service, and the ability to draw upon specialty-level resources in multiple areas of operation (including the area represented by the instant occupation), is in the company's dedication to Digital transformation, which includes robotics and a Cloud-

based service approach. Cloud computing entails the delivery of applications (typically business-related) over the Internet, with the software and data stored on servers. Users "rent" the services, paying either a subscription fee or usage fee. For a client of Cognizant, cloud-computing represents the opportunity for peer-to-peer sharing of larger-scale information, and the opportunity for collaborative projects, or common-based peer production. Examples of widely accessed Cloud methodologies that use peer-to-peer sharing include Linux, the computer operating system; Wikipedia, the online encyclopedia; and OpenStreetMap, a free map of the world. In the particular case of Cognizant, the company offers proprietary Cloud methodologies including Software-as-a-Service (SaaS), Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), or Business Process-as-a-Service (BPaaS). Cognizant's real-time business processes and (Cloud-based) service transformations could not be realized without the contributions of computer System Analysts and IT professionals who possess the specialty background necessary to perform in a rigorous, innovative Cloud computing environment. Cognizant's most recent initiative "The Robot and I" incorporates how new digital technologies are making smart people and businesses smarter by automating certain transactions. Its teams of professionals have completed research that establishes that when applied to automating core business processes, robotics can extend the creative problem solving capabilities and deliver superior business results.

The above are just a few examples of the larger, proprietary service structures of Cognizant which at once define the company as a cutting-edge, truly globalized provider of business transformation and consulting, and information technology products and services and require the contribution of specialty-level professionals in key developmental and analytical posts. In a larger sense, it is also true that the large businesses and organizations comprising Cognizant's client base must, in accord with generally-accepted modern standards and operating practices, contract professional-level specialists and analysts from IT firms (to develop contracted software systems and/or manage processes of analysis and integration); the end-client would certainly look to ensure that the holder of this particular occupation possess a specialty background.

Cognizant's business is distinctly different from an organization that supplements in-house information technology departments of other companies; Cognizant is not an organization involved in labor-for-hire. Instead, Cognizant drives business transformation using next generation technologies, creates and develops sophisticated, customized software solutions that enable the company's clients to achieve operating efficiencies and business growth in globally competitive fields. Cognizant focuses particularly upon the highly regulated healthcare, financial services, and manufacturing and logistics sectors. Engagements in these and other critical sectors are substantially managed by individuals at the Computer System

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Analyst level, and the Computer System Analyst must demonstrate a specialty level of knowledge in order to contribute to the process in a reliable and effective manner.

*VI. The Appropriate Fields of Study for an Associate (Computer Systems Analyst)*

The position is defined as specialized in nature not just because the position requires a bachelor's background, but because the position requires a background in a relevant field. The applicability of bachelor's-level backgrounds in Information Technology, Software or Computer Engineering, Computer Applications or Computer Science is clear and direct; indeed, such academic programs are designed to prepare students for career in computer programming and systems analysis. Furthermore, it is an industry standard to require and/or accept a bachelor's background in electronic engineering, electrical engineering, or other closely related engineering discipline, for a specialty position in the programming field. The study of Electronic Engineering and Electrical Engineering is closely related to the study of Computer Science and Computer Engineering. Indeed, these fields of Engineering serve as a fundamental academic underpinning for the study of Computer Science. These fields include many of the same concepts and academic principles. Many courses completed in these disciplines of Engineering include the use of computers and involve the study of principles of computer science. The study of Electronic Engineering and Electrical Engineering, among other related disciplines of applied engineering, involves concepts of Computer Science, Computer Programming, Computer Networks, Microprocessors, Data Communication, Engineering, and Mathematics.

Electronic Engineering and Electrical Engineering deal with behavior and capacity of electronic devices, equipment, and systems – as utilized for generating power, exchanging data or information, or enabling the automation of certain engineered processes. Given this point of emphasis, electronic and electrical engineers operate extensively within system environments, studying automatic control elements and signal processing technologies, and processes of interactive dynamics at a component/subsystem level. It is in this emphasis upon system environments and processes that the commonality between electronic engineering and computer science/systems is based (and evidenced, incidentally, in the duties and specifications of the instant position at Cognizant).

Electronic and Electrical Engineering curricula commonly include courses in subjects that are either (a) directly focused in or (b) heavily influenced by the field of computer science and automated systems. These curricula typically include courses in Computer Techniques, Advanced Computer Techniques and Applications, Industrial Instrumentation, Microprocessor Techniques, Computer Programming, Electronic Devices

and Circuits, Digital Techniques, Automatic Control Systems, Power Electronics, Control Systems, and related subjects. (In lieu of courses with these actual titles, some Electronic Engineering or Electrical Engineering curricula will involve courses which require an in-depth application of concepts and techniques of these same subject areas.) Because of the applicability of such subject areas (and the overall field) to studies or employment in computing, degrees in electronic and electrical engineering are often required by information technology firms as a prerequisite for the assumption of programming and system analyst positions (particularly those positions that include an emphasis upon process analysis, systems functionality testing, systems design, and/or the accordant correlation of automated functionalities and system dynamics to operational processes). Further, the presence of such concepts and subject areas within electronic / electrical engineering curricula evidence the common theoretical underpinnings that unite the field with computer science.

The average academic program in Electronic Engineering or Electrical Engineering will generally include multiple courses which may be cross-listed among academic departments dedicated to the provision of computational education, such as Computer Science or Computer Engineering departments. The Computer-oriented component that is inevitably found in any modern-day program in Electronic Engineering or Electrical Engineering provides an unambiguous framework for understanding the close relationship that exists between the fields of computer science and these engineering fields, and (moreover) would obviously correlate to the specifications of a computer systems or programming position, providing a specialist with the technical expertise required in the overall design and testing of software applications. Furthermore, Electronic Engineering and Electrical Engineering curricula contain other courses and areas of research emphasis which may be said to exist at the intersection, conceptually as well as functionally, of the study of Electronic Engineering and Computer Science.

It is also true that on a professional level, the large-scale software systems designed by programmers bear many conceptual and functional features in common with the multi-tier electronic systems studied by modern-day electronic engineering and electrical engineering students. The systems-oriented research that is performed within these engineering programs would be directly applicable to the research undertaken in a computing program, or to the work performed by a programmer or computer systems analyst in a commercial setting. Relative to other engineering disciplines, the study of electronic engineering and electrical engineering involves concepts and practical techniques of particular relevance to computer science, computer programming, electronics, engineering, and mathematics. The particular engineering education that is gained via the pursuit of a Bachelor's Degree in the electronic engineering and electrical engineering disciplines would enables an individual to pursue focused, graduate-level

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study in computer science, or to work in the computing industry as a programmer or computer systems analyst (responsible to analyze and design advanced programs and prototypes, and to apply advanced mathematical modeling techniques to the conversion of data into a format suitable for computerized processing).

Given these factors, it is a general practice within academia to view the fields of electronic engineering / electrical engineering and computer science as being substantially related, and within the professional field of information technology for firms to require as a prerequisite that individuals hired as programmers or system analysts possess at least a bachelor's-level degree in electronic engineering or electrical engineering (in addition to requiring degrees in computer science, computer engineering, or other closely related fields). In other words, because computer science and electronic / electrical engineering are related as academic fields, it is appropriate for employers of professional development positions to require not only a degree in the traditional IT/information system disciplines, but also a Degree in Electronic Engineering or Electrical Engineering, given the shared curricular emphasis and common underpinnings between the fields.

The relevance of bachelor's study in Instrumentation Sciences is clear given the fact that Cognizant focuses heavily on the manufacturing and logistics sectors. Accordingly, the study of information science or technology (which involves coursework in such subjects as electronics, metrology, instrumentation and control systems, digital systems and microcontrollers, programmable logic control, hydraulics and pneumatics, electrical power distribution and programming for instrumentation) would provide directly relevant expertise. Indeed, instrumentation and control engineering is often viewed as a sub-specialty of the broader field of Electronic Engineering, which (as discussed in depth above) is a common industry requirement for positions of this nature. Similarly, Mechatronics is a relatively new discipline that combines many of the skills of a mechanical engineer with those of a computer engineer and an electrical engineer so as to prepare graduates to design "intelligent" products and systems (including automated manufacturing solutions involving robotics, programmable controllers and integrated systems). Programs in this field include such subjects as logic design fundamentals, processor architecture and assembly language programming, electronics, digital systems design, computer interface circuits, computer hardware, manufacturing processes, process control, machine design, programmable logic controllers, industrial programming & networking, power electronics, digital applications, computer numerical control, and computer aided design & manufacturing. The relevance of these subject areas to the design and optimization of manufacturing systems (a key area of focus for Cognizant) is direct and unambiguous. In addition, the study of both Instrumentation Science and Mechatronics involves a substantial component of electronic engineering, programming, networking, logic

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design and systems engineering coursework, which would provide a suitable foundation for a computer systems analysis position in virtually any area of applied practice (i.e. in projects for the healthcare or financial services clients that Cognizant serves).

It is also appropriate (and fully accordant with industry-standard practice) to require a Degree in Mathematics or Physics as the foundational academic requirement for a position of this nature. The fields of Physics and Mathematics teach algorithmic methodologies and modeling techniques that are shared with the field of computer science and that are particularly crucial for positions that must analyze client requirements and then convert analytical conclusions (via algorithmic method) into specifications for assigned computer systems. Further, the use of computer simulation technologies is increasingly prevalent in physics and mathematics programs, providing students in these scientific fields with the opportunity to actually utilize many of the same tools and platforms that are studied in academic computer science programs, and that are deployed in commercial development industry. The process of resolving problems associated with the use of software for scientific as well as commercial purposes is one for which a background in concepts and theories of physics and mathematics would be particularly useful. The fields of Physics and Mathematics share several key features and underpinnings with Computer Science, and the analytical and quantitative knowledge gained through study in these scientific fields provides an excellent foundation, both practically and theoretically, for employment in computational employment positions.

By way of elaboration, the academic study of Mathematics includes an emphasis on the design and implementation of stochastic and mathematical models for analyzing, understanding, and executing complex operational functions in the context of differential equations. These models can be subsequently deployed within the professional realm in connection with operations in a wide range of disciplines and subject areas, including biology, the natural sciences, and computer science. Furthermore, the field of Mathematics teaches the use of algorithms for converting diverse forms of data into a quantifiable context, and for understanding the dynamics of complex numerical systems. Degree programs in Mathematics (along with certain other select quantitative disciplines) are viewed within academia as well as professional industry as "related", by a reasonable conceptual as well as functional standard, to programs in Computer Science, and appropriate for positions like the Associate (Computer Systems Analyst) position. The complex dynamics of numeric systems, a staple of academic study of Mathematics, correlates to the manner in which computerized components and information systems interrelate within multi-tiered automated environments. Furthermore, the algorithms and models taught in programs in applied mathematics and related fields play a key role in computer programming procedures. These and other related analytical tools are deployed

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toward the conversion of data from project specifications, problems, and procedures into an automated format suitable for the creation and modification of computer programs – all functions that will be performed by the Associate (Computer Systems Analyst).

The academic study of Physics, among other related fields in the physical or technical sciences, is also related to the study of computer science, particularly as taught in today's technology-laden life-science departments. This close relationship is vividly evinced by the computer-oriented project and research work performed by students in today's Physics programs. Moreover, the fields (of computing and physics) share a common quantitative and analytical emphasis, teaching the skills necessary to assess and integrate modular elements (including constants and variables, restrictions, alternatives, conflicting objectives, and numerical parameters), as are in turn required in constructing operational models and algorithmic approaches to problem-solving (and as are required in both the research of physics, and the study of computer science and development of computational solutions). Graduates of programs in both Physics and Computer Science show a strong numerical foundation and ability in algorithmic modeling, and are capable not only of the rigorous gathering and application of research data, but also of the development and modification of the tools and models utilized in the synthesizing and usage of data conclusions. These conclusions, in turn, provide the foundation for problem-solving, whether realized (for example) via the development of a program or application in Computer Science, or the creation of an equation that resolves dynamic interactions in Physics.

Even when a program in Mathematics, or Physics does not involve extensive study of computing or pronounced use of computational tools or methods, the program will still almost always involve a substantial mathematical, quantitative, and data-driven application that provides an appropriate foundation of knowledge and skill for ensuing study and/or employment in IT-related fields, such as the position of Associate (Computer Systems Analyst). As discussed above, these fields involve extensive use of numerical systems for performing in-depth calculations, gathering and sifting through different streams of data, and executing simulations. The key unifying feature of these Degree programs is that the programs teach students how to measure, quantify, and describe numerical or data-oriented systems (with the system(s) of relevance to be determined by the particular sub-discipline in which the student is studying). While completing coursework across different math, or physics disciplines, students in these fields learn how to evaluate data from multiple perspectives, and gain the ability to perform high-level mathematics, prepare advanced simulations and automations, and think about complex, quantifiable data using different mental frameworks. This skill is invaluable in the IT field as a means of anticipating and resolving operational problems and developing steps or sequences that can be executed in the context of a computer

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program in order to produce a particular automated result. This problem-solving skill is particularly applicable to the duties of the Associate (Computer Systems Analyst) position.

As described above, the subject position requires that the candidate have a bachelor's-level education background in a select group of directly related fields, such as, but not limited to, Information Technology; Software, Computer, Electrical or Electronic Engineering; Computer Applications; Computer Science; Instrumentation Sciences; Physics; Mathematics; Mechatronics; or a related sciences discipline. The job duties required for the position necessitate that an individual be familiar with theoretical and academic concepts in the courses that comprise curricula in these areas. These concepts typically are taught in bachelor's-level classes in computer science, information systems, information technology, computer-aided design, systems development, computer programming, mathematics, technical science, physics, operating systems, electrical/electronic engineering, systems engineering, computer-aided design, network administration, calculus, logic design, processor architecture, assembly language programming, electronics, digital systems design, computer interface circuits, computer hardware, manufacturing processes, process control, machine design, programmable logic controllers, industrial programming & networking, power electronics, digital applications, computer numerical control, instrumentation and related subjects. I believe that it is a general, industry-standard practice for companies of the profile and stature of Cognizant to hire an "Associate (Computer Systems Analyst)" who possesses a bachelor's-level background in such a field. Furthermore, based on my teaching in this field at the collegiate-level and on the job placement patterns of our graduating students and recruitment of employers nationwide, I note that it is a common industry practice for firms in the global technology industry (such as Cognizant) to hire or contract professional/specialty-level Computer Systems Analysts. Universities granting four-year degrees in computing, information technology, and related science and engineering disciplines devote their programs of study to prepare graduates for precisely such careers.

*VII. Conclusion*

In conclusion, I believe that it is a general practice within the field of systems development and analysis, and business consulting services provision, for a firm of the size and nature of Cognizant to hire an "Associate (Computer Systems Analyst)" with a bachelor's degree in a select group of directly related fields., such as, but not limited to, Information Technology; Software, Computer, Electrical or Electronic Engineering; Computer Applications; Computer Science; Instrumentation Sciences; Physics; Mathematics; Mechatronics; or a related sciences discipline. The educational requirements of the position, calling for a minimum of a baccalaureate degree, job duties

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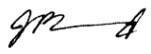
of the proffered position, and overall nature of the Cognizant environment mark the position as a "specialty occupation" requiring a bachelor's degree (or the equivalent) in a relevant technical or scientific field. Furthermore, the position is consistent with the larger classification of a Computer Systems Analyst, as defined by O*Net, and carries appropriate requirements for a specialty-caliber position within this classification.

Date: November 11, 2016

Sincerely,



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# Jaswinder Pal Singh

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## EDUCATION

Stanford University. Ph.D. in Electrical Engineering, 1993.
Stanford University. M.S. in Electrical Engineering, 1989.
Princeton University. B.S. in Electrical Engineering and Computer Science, 1987, summa cum laude.

## RESEARCH INTERESTS

- Boundary of applications and high-performance (parallel/distributed) systems, with interest in both. Includes development of effective parallel and distributed applications on many high-performance platforms, and studying the implications of these applications for the design of multiprocessor architectures, programming models and software systems. Interdisciplinary, collaborative research in this area.
- Electrical and electronics engineering
- Computer architecture and design
- Scalable Internet applications, services and infrastructure.
- Systems software, architecture, and programming environments for parallel and distributed systems.
- Solving problems on parallel and distributed systems; recent focus in biology, medicine and internet services.
- Benchmarking and performance evaluation methodology for high-performance computing.

*Ph. D. Dissertation: Parallel Hierarchical N-body Methods and their Implications for Multiprocessors.*

## EXPERIENCE

7/99 – present Associate Professor, Computer Science Department, Princeton University. Research, teaching, and participation in committees, including evaluation of domestic and international candidates for admission.

9/99 – present Director, Program in Integrative Computer and Application Sciences (PICASso), a multi-department, university-wide interdisciplinary program at the boundary of computer science and a broad range of application sciences.

5/02 – present Evaluation of international candidates for equivalence to domestic bachelors and masters degrees in Computer Science and Engineering, Electrical Engineering, Electronics Engineering, and other areas of science and engineering, for recommendation to the United States Government.

3/99 – present Consultant, NOAA Geophysical Fluid Dynamics Laboratory. Aiding in the shift from vector to parallel computing, and in the procurement of a large parallel computing and analysis infrastructure.

1/99 Consultant, Microsoft Inc.

2/95 – 6/99 Assistant Professor, Computer Science Department, Princeton University. Research, teaching, and participation in committees, including evaluation of domestic and international candidates for admission. Performing research in parallel computer systems and applications. Focus on (i) scalable multiprocessing in both the shared address space and message passing paradigms, including studying the programming and performance tradeoffs between the two, (ii) understanding how shared address space abstractions might be supported using commodity parts, and how applications might be restructured for such systems, and (iii) the use of high-performance computing in biology, medicine, cosmology and computer graphics. Advising several Ph.D. students in these areas.

2/93 - 1/95 Research Associate, Stanford University. Leading the parallel applications effort in the Stanford DASH/FLASH research groups, and studying the implications of these applications for the design of multiprocessor software and hardware systems. Evaluating performance of real and simulated systems, and developing methodologies for the above. Expanding the SPLASH suite of parallel applications to SPLASH-2. Advising several Ph.D. students.

1995 Consultant, Intel Corporation.

2/93 – 2/95 Consultant, Silicon Graphics, Inc., Mountain View, CA. Studying the implications of application characteristics for the design of future generations of multiprocessors. Setting up infrastructure for the above. Teaching a six-week course on parallel computing.

10/87 – 2/93 Research Assistant, Stanford University. Developing parallel scientific and engineering applications and studying their implications for parallel processing systems, software and architecture. Studying the scaling of applications and architectures. Creating and distributing the SPLASH suite of parallel applications.

6/88 – 8/88 Research Intern, IBM Research, Hawthorne, New York. Developed a model of uniprocessor workload behavior and applied it to predicting cache miss rates.

## HONORS

- *Presidential Early Career Award for Scientists and Engineers (PECASE)*, 1997. Awarded to twenty young scientists and engineers in the United States selected from all areas of science/engineering by the National Science Foundation.
- *Sloan Research Fellowship*, 1997. Awarded to about 10 young computer scientists every year.
- Paper selected for journal publication from the International Conference on Supercomputing, 1999.
- Paper selected for Journal of Computational Biology from the RECOMB computational biology conference, 1998.
- Paper selected for journal publication from the Symposium on Parallel Algorithms and Architectures, 1996.
- Paper selected for journal publication from the Symposium on Parallel Algorithms and Architectures, 1996.
- Paper nominated for Best Student Paper Award for Supercomputing'97.
- Two papers selected among best 5 submitted to the Intl. Symposium on Computer Architecture (1992 and 1993), one of them as "Impact Paper" for the Federated Computer Research Conferences, 1993.
- *Summa cum laude*, Princeton University. Princeton University Undergraduate Scholarship.
- Member of Phi Beta Kappa, Tau Beta Pi and Sigma Xi since 1987.

## TEACHING

| | |
|---|---|
| Fall 99 | Scalable Internet Services and Infrastructure, graduate course at Princeton University. |
| Fall 95 – 98 | Introduction to Programming Systems, sophomore course at Princeton University (4 times) |
| Spring 95 – 98 | Parallel Computer Architecture and Programming, graduate course at Princeton University (3 times) |
| 8/95 | Instructor, Parallel Computer Architecture, Western Institute in Computer Science, Stanford, CA. |
| 4/93 – 6/93 | Instructor, Distributed Shared Address Space Multiprocessing, a 6-week course on scalable parallel computing (hardware and software) for advanced engineers and researchers at Silicon Graphics Inc. |
| 4/91 – 6/91 | Project Advisor and Lecturer, Stanford University. CS 315B: Parallel Programming Project. Defined and closely advised three projects that produced realistic parallel applications. |
| 4/90 – 6/90 | Teaching Assistant and Lecturer, Stanford University. CS 315B: Parallel Programming Project. Defined and closely advised projects that produced realistic parallel applications in a 10-week course. |
| 1/90 – 1/95 | Project Advisor, Stanford University. EE 391: Special Studies in Electrical Engineering. Defined and guided projects to introduce graduate students into research in parallel processing. |

## Ph.D. DISSERTATIONS SUPERVISED

- Cheng Che Chen, Stanford University. Protein Structure Determination in the Presence of Uncertainty: Algorithms and Parallelism, 1999. With Russ Altman (Stanford Medical School).
- Steven Cameron Woo, Stanford University. Integrating Block Data Transfer in Cache-coherent Multiprocessors. 1997. With John Hennessy. Currently at Rambus, Inc.
- Angelos Bilas, Princeton University. Using Network Interfaces to Accelerate Software Shared Memory, 1998. Currently on faculty at University of Toronto.
- Liviu Iftode, Princeton University. Shared Virtual Memory using Automatic Update, 1998. With Kai Li. Currently on faculty at Rutgers University.
- Chris Holt, Stanford University. Application and Architectural Bottlenecks in Distributed Shared Memory Multiprocessors, expected 2000. Currently at Transmeta, Inc.
- Alexander Kozlov, Stanford University. Probabilistic Inference in Belief Networks: Algorithms and Parallelism, 1998. With John Hennessy and later Daphne Koller. Currently at Silicon Graphics, Inc.

Others in progress (Dongming Jiang, Steven Kleinstein, Rudrojit Samanta, Paul Martino, Yefim Shuf, Hongzhang Shan, all at Princeton).

## PROGRAM COMMITTEES

SIGMETRICS Conference on Measurement and Modeling of Computer Systems, 2000
International Parallel Processing Symposium, 2000
Workshop on Languages and Compilers for Parallel Computing, 2000
International Parallel Processing Symposium, 1999, Program Vice-Chair for Architecture
Symposium on Principles and Practice of Parallel Programming (PPoPP), 1999.
International Parallel Processing Symposium, 1998.
International Conference on Parallel Processing, 1998.
International Workshop on Parallel Data Mining, 1998.
CANPC Workshop, 1998.
Symposium on Parallel Algorithms and Architectures, 1997.
International Conference on Supercomputing, 1997.
International Symposium on Computer Architecture, 1995.

## INVITED EXTERNAL EVALUATIONS

Program Evaluator for the nationwide ARTES/PAMP research programs of the Swedish Government, 1999.
External Evaluator for faculty hiring for the Uppsala University, Sweden, 2000.

## INVITED PRESENTATIONS

- Indian Institutes of Technology, TECHFEST, January 2000.
- Siemens Laboratories, January 2000.
- SIAM Conference on Parallel Processing, March 1999.
- New York University, February 1999.
- State Univeristy of New York, 1998.
- Panel on "Future of Workstation Clusters and MPPs" at the Intl. Conf. on High Performance Computer Architecture (HPCA)'98.
- Panasonic Laboratories, 1998.
- DOE Princeton Plasma Physics Laboratory, 1998.
- University of California at Berkeley, 1997.
- AT&T Bell Laboratories, 1997.
- Institute for Mathematical Analysis, plenary presentation in Workshop on Parallel Algorithms, September 1996.
- Panel on "Distributed Shared Memory Architectures", ICCD'96.
- Panel on "Future of Distributed Shared Memory", ARPA PI Meeting, February 1996.
- University of Toronto, April 1995.
- SIAM Conference on Parallel Processing for Scientific Computing, February 1995.
- CS/Astronomy and CS Seminars, University of Washington, Seattle, WA., April, 1994.
- NAS New Technologies Seminar, NASA Ames, CA, July 6, 1993.
- Computer Systems Seminar, University of Washington, Seattle, WA. April 13, 1993.
- Computer Science/Astronomy Seminar. University of Washington, Seattle, WA. April 13, 1993.

## PROFESSIONAL ORGANIZATIONS

The Association for Computing Machinery.
The Institute of Electrical and Electronics Engineers, Inc.
Phi Beta Kappa, Tau Beta Pi, Sigma Xi