2018 IEEE/ACM TCF Information Technology Professional Conference (TCF-ITPC)

Program Book

Date: Friday, March 16, 2018 to Saturday, March 17, 2018
Time: 8:30AM to 5:00PM
Location: The College of New Jersey, Ewing, NJ

Sponsors:

Princeton / Central Jersey Chapter of the IEEE Computer Society

Princeton Chapter of the Association for Computing Machinery

IEEE Region 01 - Northeastern USA

IEEE Region 02 - Eastern USA

Princeton / Central Jersey Section of the IEEE

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TCF Chair	Al Katz

Thank you to our Sponsors, Speakers, Volunteers and Participants!

Also, thank you to the Trenton Computer Festival and the College of New Jersey.

Conference Logistics

Dear Participants,

Welcome to the **2018 13th Annual IEEE/ACM Information Technology Professional Conference at TCF**! We have an exciting program this year and are looking forward to seeing you.

Schedule:

The ITPC Conference program schedule is posted on our web site at: http://princetonacm.acm.org/tcfpro/pc2018.html.

Our conference presentations are scheduled to at **begin 8:30 AM to 5:00 PM on Friday, March 16, 2018** and include **extended sessions at 10:15 AM to 5:00 PM on Saturday, March 17, 2018** combined with the Trenton Computer Festival.

Registration:

Registration is in **Armstrong Hall on Friday at 8:15 AM in the Reception area near Room 154**. Your badge will be good for both Friday and Saturday sessions. Your registration also includes general admission to the Trenton Computer Festival.

On Friday, a continental breakfast will be available from **8:15 AM until 9:00**, prior to the start of the presentations in **Armstrong Hall near the registration area**.

Presentations:

All *Friday* presentations will be given in **Armstrong Hall rooms AR-154, AR-148, and AR-144.** All *Saturday* presentations will be given in the **Education Building**. The talks will be in classrooms equipped with a projector with a VGA style connector. We will also have a spare projector, just in case of a failure. Each presentation is 50-55 minutes and the audience averages 30 people including a diverse mix of practicing professionals, educators, interested engineers and students.

Lunch:

Lunch will be served on **Friday, March 16, 2018**, at **12:00 PM to 1:30 PM** in Armstrong Hall room AR-136. Our lunch will include a facilitated networking session as well as some door prizes.

TCF Keynote:

The TCF keynote featured speaker, Dr. Nick van Terheyden on "Healthcare Innovation Incremental and Exponential". In addition, George Harris will be giving a talk on "Medical Tricorders – Taking Science Fiction into Reality".

Banquet:

There is a **Banquet on Saturday evening at 6:00 PM** and you are invited! We hope to see you there! The keynote at the banquet will be given by Dr. Nick Van Terheyden.

Advanced reservations are requested. The cost for the banquet $30. Payments are accepted and required at registration. Please make your reservation as soon as possible by sending an email to: Al Katz alkatz@tcnj.edu.

Posted Presentations:

Some of the presentations may be posted on the website: http://princetonacm.acm.org/tcfpro/

Maps:

The **TCNJ Campus** map can be found at: http://tcnj.pages.tcnj.edu/about/campus-info/campus-map/

The **Education Building (ED)** floor plan will be provided at the TCF registration desk on Saturday.

Parking:

Parking for Friday, March 17, 2015 is in **Lots 1 and 2**, which are the closest to Armstrong hall, but you are free to use any other open parking lot on the campus. Parking for Saturday is **in Lots 17 and 18** by the Education Building (ED).

Lodging:

Please refer to the TCF website: http://tcnj.pages.tcnj.edu/about/campus-info/hotels/ for more information. There is a group discount for "The College of New Jersey Conference."

TCF:

The **42th Annual Trenton Computer Festival** will be held at The College of New Jersey, Ewing Township, NJ on Saturday, March 18, 2015 between 9 am and 5 pm. This year's theme is "Autonomous Vehicles". The program includes over 50 panel sessions, workshops, tutorials, demonstrations, educational events and a Flea market. For more information go to: www.tcf-nj.org.

Thank you for your participation,

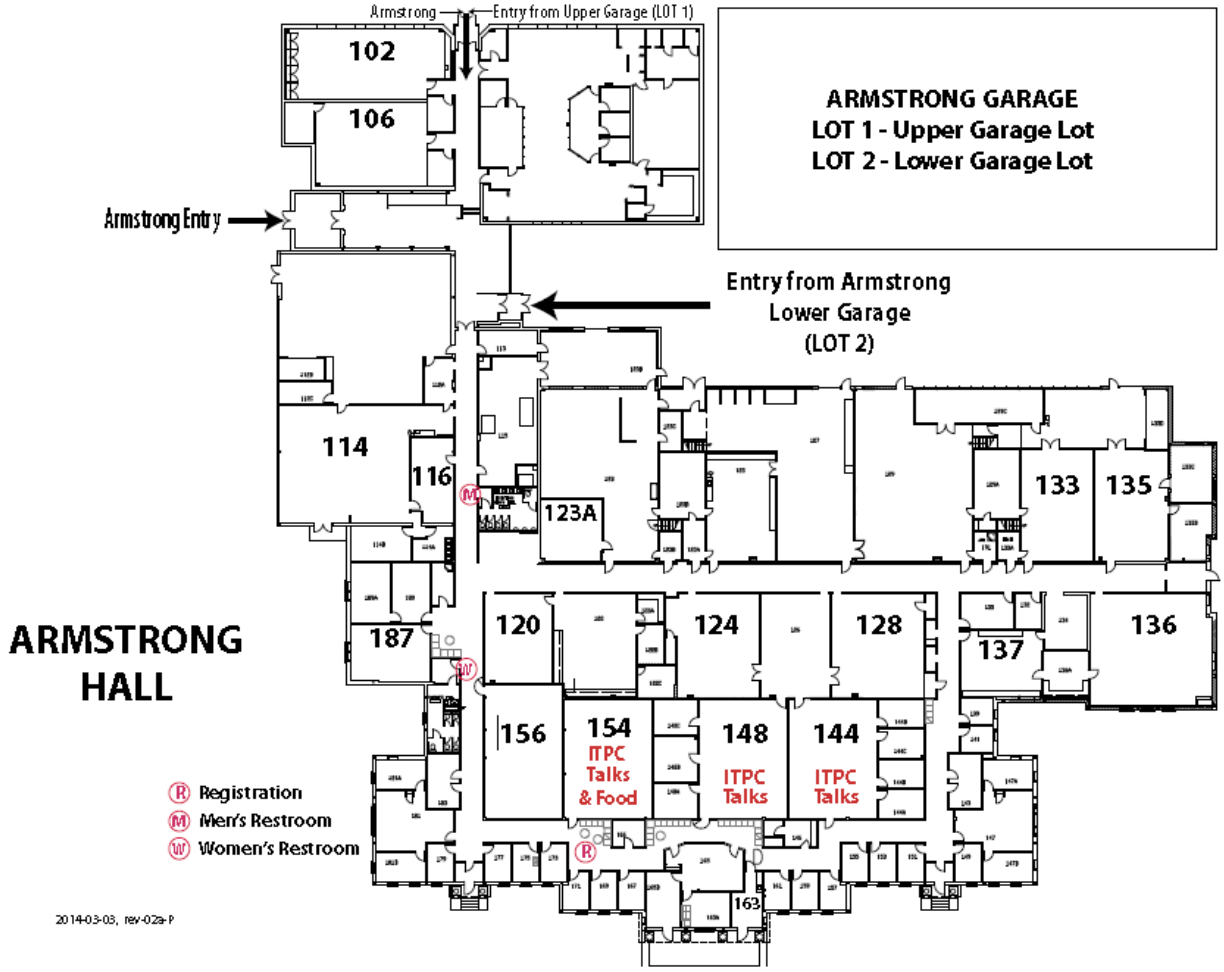
David Soll

Conference Chair

IEEE Information Technology Professional Conference
http://princetonacm.acm.org/tcfpro/

TCNJ Campus Map

Armstrong Hall Map



Presentation Schedule

	Friday, March 16, 2018 Information Technology Professional Conference		
	Track 1 **AR-154**	**Track 2** **AR-148**	**Track 3** **AR-144**
8:00 AM	REGISTRATION		
9:00 AM	Accelerate Your Technical and Cultural Transformation with Visual Planning Greg Tutunjian	Critical issues of IOT empowered by 5G – A case study on self-driving vehicles Amruthur Narasimhan	Careers at the Rapidly Shifting Human-Technology Frontier: Global Engagement, Local Impact Fahmida N. Chowdhury
10:00 AM	Professional Networking for Engineers: Design Patterns for Success Jaron Rubenstein	New Corporate Wireless Security Risks and Spectrum Signal Processing Tools Joe Jesson	Experiential Lessons and Insights from an Innovative Technology Initiative Sridhar Raghavan
11:00 AM	Keep Your Technical Debt Under Control Dennis Mancl	Embedded Systems Methodologies Dwight Bues	Product Development Methodologies for Success! Jerry Bellott
12:00 PM	LUNCH & FACILITATED NETWORKING SESSION		
1:40 PM	Micro-services Architecture Methodology Jyothi Salibindla	Big Data Market Research in Today's Economy Donald Hsu	The Actor Model and Queues or “Batch is the New Black” Brad Whitehead
2:40 PM	Unikernels and Wearable Devices – Win,Win,Win*! Brad Whitehead	An Ethical HIT Capability Sabatini J. Monatesti	Modeling the Future of Bitcoin Samuel J. Bouiss
3:40 PM	Building Realtime Access to Data Apps with jOOQ Michael Redlich		Better Business Graphics: Avoiding Death by PowerPoint Joe Levy

9:00 AM Sessions

Accelerate Your Technical and Cultural Transformation with Visual Planning

By Greg Tutunjian

Visual planning tools and techniques have proven to be much more effective when you need to accelerate your planning, development and delivery cycles, engage a broader audience of technical contributors and create evolutionary road maps to transform your culture, organization, products and teams. In this presentation, we'll examine proven tools and techniques including real-world examples and identify steps you can take for successful adoption. You will leave this presentation with checklists of actions you can take and pointers to additional information for your continued success. Stop planning tomorrow's solutions with yesterday's tools and techniques.

About Greg Tutunjian:

Greg Tutunjian is a Lean-Agile Coach and Consultant who has helped organizations plan and deliver innovative products that differentiate them from their competitors for more than 20 years. He takes an applied approach to Lean and Agile so that the adoption of principles, practices and tools is based on common sense, real world experience and inherent wisdom. Greg has coached, mentored and trained individuals, teams and organizations as diverse as Angel-funded startups, privately owned technology companies and Fortune 100 multinationals. He has also planned and led enterprise-wide programs introducing and adapting Agile frameworks, principles, practices and tools. Prior to working in leadership roles and as a coach, Greg was a software engineer engaged in software, hardware and systems engineering programs. Greg is an IEEE Life Member in addition to being a member of a diverse set of technology, management and personal development professional organizations

Critical issues of IOT empowered by 5G – A case study on self-driving vehicles

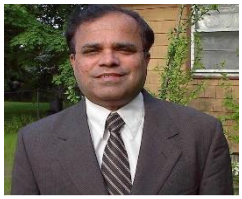
By Amruthur Narasimhan

The proliferation of Internet of Things (IoT) devices in connected automobile systems creates challenges of harnessing large data empowered by 5G while maintaining security and confidentiality, as well as business, social and legal challenges. The sheer scope of IoT carries countless security and privacy implications for businesses, individuals and organizations. The proliferation of IoT devices creates challenges of harnessing large data empowered by 5G while maintaining security and confidentiality, as well as business, social and legal challenges.

In this talk some use cases of autonomous vehicles will be discussed for their implications on security, privacy, social and legal challenges.

Proliferation of large-scale deployment of IoT devices without proper design for solutions to security, privacy and big-data challenges has attracted the auto industry's attention. Proper administrative, social and legal changes are needed by people, government and businesses.

About Amruthur Narasimhan:



Amruthur Narasimhan is a consultant in Information Security, Cyber Security and privacy areas. He has over 25 years of experience in System Engineering, Architecture, Technical Leadership and Management, Software Development, Communication Protocols, and Project Management. He has held various positions in multinational companies: Software Engineer Manager Chief at SAIC, Security Consultant at Northrop Grumman, President of Amrutek Services, Technical Manager at Avaya, Principal Technical Staff Member at AT&T, and Associate Professor in Department of Computer Science at Stevens Institute of Technology.

Narasimhan was chair of the IEEE conference on Mobile Security/Cyber Security and Privacy held in 2014 and 2015. He received the IEEE third Millennium Medal for contributions in Electronic Commerce and Multimedia Technology in May 2000. He also received IEEE Region 1 award for technical achievement in 2002, and for eBusiness and Internet Technologies and technical achievements for Innovation in Artificial Intelligence Technology in 1997. He has been coordinator and speaker for various IEEE conferences on VoIP security, WLAN security and Multimedia security. He was chair of IEEE NJ coast section consultant's network, chair of IEEE NJ Coast Section PACE, Chair of IEEE NJ Coast Section (1996-2002) and Chair of IEEE NJ Computer Chapter (1993-1996).

Narasimhan has good communication skills being a coach for Dale Carnegie courses on Human relations. He has graduated as Competent Toast Master in Public Speaking from Toast Masters International. He received a Ph.D. in Computer Science from Indian Institute of Science, Bangalore, India, one of the prestigious institutions in India.

Careers at the Rapidly Shifting Human-Technology Frontier: Global Engagement, Local Impact

By Fahmida N. Chowdhury

The last decade has witnessed some rapid progress in science and technology, and the human-technology frontier has shifted considerably. In this talk, I argue that in the engineering community, career paths in this changed world should include not only technical fields but also administrative fields, entrepreneurship, science and technology education, and very importantly, policy and diplomacy at local, national and international levels. Adopting such a broad viewpoint would open up many interesting and highly satisfactory career paths, and may bring personal and professional fulfillment in unexpected ways. Technical education and training should provide a highly transferable skill-set that can be valuable in many other fields, including that of national and international science and technology policy.

About Fahmida Chowdhury:

Dr. Fahmida N. Chowdhury is a Program Director in the Office of International Science and Engineering (OISE) at the US National Science Foundation (NSF). Prior to joining NSF in 2008, she was a Professor of Electrical and Computer Engineering at the University of Louisiana, Lafayette, USA, where she held the W. Hansen Hall and Mary O. Hall Endowed Chair in Computer Engineering. Dr. Chowdhury has been active in IEEE for many years; she served on the editorial boards of two IEEE Transactions: on Control Systems Technology and on Neural Networks. She was an elected member of the IEEE Control System Society's Board of Governors, and also IEEE Computational Intelligence Society's AdCOM. Her research interests include complex systems modeling and analysis, non-traditional applications of dynamic systems theory, and detection of abnormal conditions (faults) in dynamic systems. She has deep interest in international science, technology and educational collaborations, science and engineering diplomacy, and serving society through humanitarian technologies and policy-level engagements.

10:00 AM Sessions

Professional Networking for Engineers: Design Patterns for Success

By Jaron Rubenstein

Engineers have a reputation for being exceptional problem solvers, identifying challenges they encounter and applying past approaches to ensure successful solutions. Those exceptional problem-solving skills often fall down when it comes to building, maintaining, and leveraging one's professional network.

In software engineering, a software design pattern is a general reusable solution to a commonly occurring problem within a given context. In this presentation, you'll learn proven design patterns that have worked for the speaker over the span of his 20-year career as a software engineer, CTO, and now CEO of a small software company. New and veteran engineers and IT professionals will gain a toolbox of patterns they can apply to their own professional network efforts, along with ideas, strategies, and tactics to those efforts are more effective, more productive, and more fun.

About Jaron Rubenstein:

As President of RubensteinTech, Jaron leads the growth and development of the business while also setting the strategic vision. Since founding the company in 2002, he has seen his small startup expand beyond consulting services into a 30-person, best-in-class enterprise software firm. In addition to his leadership responsibilities, Jaron takes an active role in client relationships and product innovation. Trained as a software engineer, his expertise runs the gamut from advising C-suite officers on information technology strategy to managing the details of complex code in modern development languages and systems. Jaron also mentors junior team members on topics ranging from Linux systems administration to network security. Before founding RubensteinTech, Jaron was CTO at Logicept and a software engineer at Lockheed Martin. He is an Eagle Scout, an avid camper, and has a weakness for Nerds (the candy).

New Corporate Wireless Security Risks and Spectrum Signal Processing Tools

By Joe Jesson

Joe discusses the latest portable interception tools and signal process knowledge now possessed by hackers (both black hat and white hat) are employing. Motivated by low-cost FPGA SDR transceivers, rainbow software tables, Van Eck radiation interception/demodulation hardware, and the various tools and techniques revealed in Wikileaks, the techniques Joe will illustrate was previously the exclusive domain of the NSA and CIA . Tools such as low-cost ($15) spectrum analyzers and open source data SDR baseband correlation tools is employed to receive, demodulate, decode, analyze, and store, and display the data protocols. New and portable wireshark pcap sniffers and tiny WiFi deauth tools will be shown... Finally, Joe will give suggestions how to protect your assets, how firewalls are bypassed.and to review the design and use of cellphone man-in-the-middle attacks (e.g. Stinger) and what can be done to protect corporate information and IP assets..Good luck sleeping the night after hearing this talk!

About Joe Jesson:

Joe Jesson is currently the CEO of RFSigint Inc, a Wireless IP/Patent advisory service. Patent claims are compared and mapped and expert witness offerings on IoT, M2M, Telematics, and Telemetry patents. Also, Joe is CTO for Assurenet Inc, a NY video telematics company and CTO of Able Devices, a wireless software expert on a SIM card. Joe is an engineering researcher on a DOT grant and teaches, as Adjunct and Visiting Professor at TCNJ, engineering classes and Labs. In 2007, Joe received the GE Edison Award by the Chairman of GE, Jeff Immelt, while CTO and co-founder of GE's Asset Intelligence (now ID System's Asset intelligence) IoT business. Joe was Instrumentation Engineer at the University of Chicago Jones laboratory and has advanced degrees from DePaul University and currently finishing a PhD in security at NJCU.

Experiential Lessons and Insights from an Innovative Technology Initiative

By Sridhar Raghavan

In this talk, Dr. Raghavan will share his experiential insights from leading a major innovation called SMILE at Motorola/NSN. In a nut-shell SMILE (for Smart Mobile Innovations for Life Style Enrichment) technology consisted of a wafer thin SIM add-on accessory embedding an advanced Micro Controller, Secure Element & NFC Chip, Smart Router and Open-standards based Secure Application Development and Execution. Though initiative has ended now, the underlying technology and products paradigm remain relevant for domains such as Mobile Payment and Remittances, Bit Coin, IOT and Healthcare domains, But what is far more valuable is the data point it has created for furthering the understanding of the practical realities of innovative technology development and product engineering, that can be counter to and challenging conventional wisdom.

About Sridhar Raghavan:

Dr. Sridhar Raghavan is currently engaged in Technology Incubation and entrepreneurial activities. His interests span a wide range of technologies with industrial scale Software Engineering & Management as the common underlying anchors. Prior to his incubation activities, he served in leadership capacities as Fellow of Technical Staff at Motorola, Nokia Siemens, Nortel and Digital. Sri earned his PhD in Computer Science and Business from Georgia State University and MTech/BTech in Electrical Engineering from IIT Mumbai. He is a Senior Member of IEEE and an active contributor to standards working groups at IEEE (and formerly at W3C and OMG).

11:00 AM Sessions

Keep Your Technical Debt Under Control

By Dennis Mancl

Technical debt is a term that was coined by software design pioneer Ward Cunningham in 1992 to explain certain kinds of complexity in the process of software development. Technical debt is some redesign or recoding work that developers defer to a later date. They might say "it would be nice to make this search operation faster" or "we have to clean up our device handlers", but then decide to work on something else instead. In the twenty-first century, this "debt" concept has been talked about more often as agile and iterative development methods have become more popular. Technical debt has become a popular and powerful metaphor for small teams, projects with very short development cycles, and teams following agile development practices, but it can apply to development projects of any size or circumstances. It can be hard to avoid technical debt, but there are ways to reduce the risk that massive technical debt will be a long-term drag on new feature development. This talk will present a set of good practices for monitoring and keeping technical debt under control.

About Dennis Mancl:

Dennis Mancl is a New Jersey-based software process and software design expert. He worked as a Distinguished Member of Technical Staff at Alcatel-Lucent, where he has been involved in object oriented design techniques, design patterns, software architecture, and agile development practices for over 20 years. Dennis is now an independent writer and researcher on software engineering topics.

Embedded Systems Methodologies

By Dwight Bues

Since Embedded Systems commonly have low development overhead, minimal memory or storage per unit, and are heavily cost-driven, there are significant market pressures to "shoot the Engineer and put it into production" and not heavily invest in design rigor. The Internet of Things (IoT) has proved that while capabilities can be delivered inexpensively, releasing products that have Safety or Security vulnerabilities can cost hundreds of thousands of dollars in rework or MILLIONS in lawsuits.

Jay Thomas, in the Embedded magazine article "Software Standards 101: Tracing Code to Requirements," stated that it is an industry standard that making systems safe or secure includes "ten steps" of design rigor, such as using a formal requirements capture process, tracing code back to source requirements, tracing test cases to requirements, and collecting artifacts for certification needs.

This session is designed to provide the audience with several methodologies for Integration, Verification, Validation, and Transition that, when employed, will ensure that the target system will support the Safety and Security needs of the Customer.

About Dwight Bues:

Dwight Bues is a Georgia Tech Computer Engineer with 35 years' experience in computer hardware, software, and systems and interface design. He has worked in Power Generation, Communications, RF, Command/Control, and Test Systems. He is the author of numerous technical articles in Design News, EE Times, and IoT Institute magazines and blogs. He has presented at ESC conferences in 2013, 2014, 2016, and 2017.

Dwight is a Certified Scrum Master and teaches courses in Architecture, Requirements, and IVV&T. He is also a certified Boating Safety instructor with the Commonwealth of Virginia and the United States Power Squadrons. He has worked several STEM projects, sponsoring teams for competitions in the Aerospace Industries Association's (AIA) Team America Rocketry Challenge (TARC) and the Robotics Education and Competition Foundation's, Vex Skyrise Robotics Challenge, and presented Engineering and Design information in several Middle and High School venues.

Product Development Methodologies for Success!

By Jerry Bellott

Electrical Engineers can increase their ability to innovate, plan, and develop new products that succeed in the marketplace by following product development methodologies, using current standards and practices, and continuing education. They can also facilitate success by understanding how marketing, engineering, and business financial planners work together to plan products that address customer needs and expectations plus devise a schedule and budget that will lead to company profit.

"*Product Development Methodologies for Success!*" will empower you to:

- Position yourself to be innovative by planning continuing education on current technologies, standards, and practices to fuel creative thinking.
- Position your company for success by using your creative potential to plan new products that address customer needs well.
- Improve product quality by addressing customer needs and expectations.
- Succeed at producing quality products on time by following a structured methodology to break the execution phase down into steps.
- Increase peer interaction to have fun and learn from others through formal and informal peer discussion and review.

Students will gain insight into the corporate world they will be working in after graduation.

About Jerry Bellott:

Jerry Bellott has an MSEE from Georgia Tech with a computer design emphasis. He also has a BSEE from WVU (cum laude). Mr. Bellott has more than 30 years experience designing, testing, and writing about products for the Personal Computer, office communication systems, data networking, broadband switch, wireless, and DSP multi-processor circuit industries. He is a former member of the AT&T PC Development Department. Mr. Bellott was on the team that designed the first truly compact 2G digital cell phone circuits which were used by Motorola in the StarTac in 1993. He served as Senior Systems Engineer at ViaGate Technologies in 2000, where he co-designed a 2Gbps broadband switch that used IP over ATM and could deliver HDTV and Ethernet connectivity to up to 240 rooms. Mr. Bellott co-designed the VT-4000 1 GHz 64-core MathStar DSP circuit board for Valley Technologies in 2004, and designed test plans and wrote project documentation for PC, PowerPC, LAN and fibre channel SAN equipment, plus application GUI's for DSP analysis at DSPCon between 2005 and 2008. He has also written documentation for microwave HD video links and streaming video over LAN products at IMT, Inc. Mr. Bellott currently delivers talks on design topics and is a book author.

1:40 PM Sessions

Micro-services Architecture Methodology

By Jyothi Salibindla

Micro-services became the hot term since 2014. Micro-services involve an architectural approach that emphasizes the decomposition of applications into single purpose and is a new software development style that has grown from recent trends in software development/management practices. Micro services are composable fine-grained modules which can be independently deployable and scaled up or down both vertically and horizontally which empowers the development, manageability and speed to market by adopting to Agile methods, DevOps culture, cloud, Linux containers, and Continuous Integration/Continuous Development methods. Also I will present the API security options and need for securing the all back-end Micro-services. I will present this new approach which will be useful for many people.

About Jyothi Salibindla:

Jyothi Salibindla is currently a Java/J2EE and BPM lead for Karsun Solutions LLC. She has 15 years of experience in the Information Technology industry, specializing in Analysis, Design, Development, Implementation and Testing of enterprise applications using Java/J2EE, BPM technologies. She has played a critical role in the success of several Agile BPM implementations and have extensive expertise in all facets of the J2EE/BPM lifecycle. She's spearheaded complex cloud to cloud integration strategies and solution architecture touching several existing, internal, and external systems. Jyotha is also a volunteer in IEEE and mentor in Women in Technology in Washington DC area, in addition to working as a reviewer for IJERT international Journal. She enjoys learning new technologies and spending time in researching and solving the problems.

Big Data Market Research in Today's Economy

By Donald Hsu

Big Data is hot these days. There are two aspects: one is technical, and one is business side. For technical skills, you need to verse in Database, Data Mining, SQL server, Hadoop, MapReduce, Hive and many other new buzzwords. Learning each of them takes weeks, if not month. On the business side, there are thousands of jobs in Data, Analyst, and Marketing using Big Data.

This talk deals with the collection, evaluation, and analysis of the big data market-related information. Topics are: market research industry, problem definition, research process, focus group, secondary database, quantitative research, questionnaire design, sampling techniques, statistical modeling, bivariate and multivariate correlation, communicating results and management reports. Using SPSS software, you will learn to perform detailed data analysis. You can work as a market researcher, data analyst, and similar titles.

The speaker will demonstrate real-life IBM SPSS projects. Bring a friend to learn more!

About Donald Hsu:

Donald Hsu, PhD., Professor, Consultant and CEO.

Professor Dominican College and Chair/Instructor at IEEE Education Committee. Donald trained/taught 70 subjects - Accounting to Unix 13,000+. They work at Amazon, AT&T, Bank America, Citibank, Ford, Goldman Sachs, Google, IBM, JPMChase, Mercedes Benz, Microsoft, Morgan Stanley, New York Presbyterian, Oracle, Siemens, Sony, Toyota, Union Bank Switzerland, United Parcel Service, Verizon and other Fortune 100 firms.

Donald is an online mentor for 16 PhD students, at School Advanced Study, University of Phoenix. Many of them are doing quantitative analysis using IBM SPSS software. IBM SPSS is a major tool for Big Data Analytics. In USA, thousands of PhD candidates are using this tool for their PhD thesis, in Business Administration, Education, Healthcare, Information System and Technology, Management, Marketing, Mathematics, Nursing, Psychology, and Social Science. .

In addition, Donald is the President of Chinese American Scholars Association (CASA). CASA ran 24 successful E-Leader conferences in Asia and Europe, http://www.g-casa.com. 1300+ attended and raved about the experiences. Donald traveled to 87 countries in Africa, Asia, and Europe for international business. Don's profile is here, with 7,300+ partners/clients on Linkedin, https://www.linkedin.com/in/dohsu.

The Actor Model and Queues or "Batch is the New Black"

By Brad Whitehead

In 1974, Carl Hewitt published his paper on the Actor model. In computing, an Actor is a computer program that uses information fed to it in messages to 1) create new Actors, 2) send messages to other Actors, and 3) make limited, often binary, decisions. Just as the binary on-off state of a single transistor can be built into the 2.6 billion(!) transistor Intel i7 Haswell Complex Instruction Set Computer (CISC), Actors can be built into the most complex processing systems. If the Actor model sounds familiar, it's because it is the basis for Microservices, one of the hottest new topics in cloud computing. Just another example that "…what has been will be again, what has been done will be done again; there is nothing new under the sun"

The Actor Model is only half of the solution. The key to using Actors to build infinitely scalable real-world systems is how you connect them together. Typically, in Microservices, you send or "push" messages from one Microservice to another. When you reach the throughput of a Microservice instance, you clone a few more instances. When you reach the CPU or memory utilization limits of the virtual machine, you fire up more VMs. The key is that you "push" messages. This however, is the wrong approach. We all know what happens when you push something hard enough - it will fall over. Think of the classic scene from the "I Love Lucy" television program where Lucille Ball is wrapping chocolate candies on a conveyer belt (https://www.youtube.com/watch?v=8NPzLBSBzPI). This graphically demonstrates that the "push" model is the wrong approach.

In Douglas Adam's "The Hitchhiker's Guide to the Galaxy", the quote is "We'll be saying a big hello to all intelligent lifeforms everywhere and to everyone else out there, the secret is to bang the rocks together, guys." To paraphrase Mr. Adams, the secret to scalable processing systems is really to "pull", not "push" messages between Actors. Rather than send messages directly between Actors, the messages are deposited into queues from which Actors can "pull" messages. As each Actor becomes available, it pulls the next message out of the queue and processes it. This has a number of advantages over "pushing" messages, such as increased Actor process stability, load balancing, predictive monitoring, and transparent redundancy.

Actors are computer programs and as such they aren't lazy. An Actor will process messages as fast as its execution environment permits. If messages begin to back up in a queue, then you know, long before it becomes critical, that more Actor processes are required. As these new Actor processes become available, there is no need to add them to a load balancer. Each new Actor connects to the same queue and starts asynchronously removing and processing messages. Similarly, when queues become empty, redundant Actors can be terminated. Finally, by using network routing, it's possible to route messages to redundant queues. If the primary queue fails, Actors can "failover" to a redundant queue and continue processing without message loss. While the Actor model is 42 years old, the queue data structure was originally described by Alan Turing 70 years ago, in a paper published in 1947!

While these two "ancient" computing paradigms form the basis for modern, infinitely scaling systems, there are a number of details that must be dealt with, including how to handle work lost when Actors fail; how to maintain state or context; how to handle long-running processes; how to handle "split brain" network failures in light of redundant messages queues; synchronization of redundant message queues, etc. This presentation will discuss these issues. The goal of the presentation is to outline for

software developers, the framework they can use to develop highly scalable, highly resilient processing systems.

About Brad Whitehead:

Brad Whitehead is Chief Scientist for Formularity, an electronic forms company dedicated to the secure collection and processing of personal information. Formerly, he was a Partner and Master Technology Architect with Accenture. Brad has architected and implemented several national-scale information processing systems based on the Actor model and queues. One such system processes billions of biometric transactions per day for the Republic of India, while another handles millions of biometric transactions each day while safeguarding the borders of the United States. He has served as a security advisor to several Federal agencies. Brad holds a BS from Carnegie Mellon University and an MS from the University of Liverpool. He can be reached at brad.whitehead@formularity.com.

2:40 PM Sessions

Unikernels and Wearable Devices – Win,Win,Win*!

By Brad Whitehead

(*And for a 4th win - all attendees will be given a chance to win $15,000** :-) **based on current Bitcoin exchange rate of 1BTC=$1,500USD

It is rare that security comes with bonuses, rather than at a price. So, what are unikernels and why are they the perfect operating system for the Internet of Things (IOT) in general and wearable devices in particular? The answer is simple!

In the 1970s, Ken Thompson, Dennis Ritchie, and others at Bell Labs developed UNIX. From the very beginning UNIX has been a multi-user, multi-tasking operating system. In 1995, Microsoft upgraded their single user, single process MS-DOS operating system to Windows, a true multi-user, multi-tasking operating system. Since then, both of these operating systems, and their descendants such as Linux and MacOS, have grown both bigger and more flexible. These operating systems now operate from the largest multi-core supercomputers down to the smallest embedded Internet-of-Things (IoT) devices, often without the addition of any drivers or modifications from the stock installation image. However, for IOT devices and wearables, our current needs are simple: a small, secure, reliable platform to run a single user's processes on power- and size-constrained microcomputers. Frankly, our latest operating systems are way too big for our wearable needs! Their sheer size and complexity make them impossible to secure, while all the extra computing cycles being devoted to needless functions drain precious battery power and take up memory.

What if we sliced our current massive operating systems into a "Chinese restaurant menu", and picked only the items we needed from only the columns that applied to our wearable requirements? If we only run a single set of cooperative processes, we don't need a task scheduler. Or, for that matter, virtual memory management. We only need the drivers for our embedded hardware (the standard Linux kernel includes the driver code for a floppy drive – neither my insulin pump nor my workout tracker came with a floppy drive option ;-). Of the 14 million lines of Linux kernel code and the 50 million lines of Windows code, for an embedded application we might only use the 10,000 lines of code in the functions we need, or only 0.07 percent of the Linux kernel. Remember, we are just talking about the kernel here. A standard Android installation adds an additional 12 million lines of utility code. Compare this 26 million lines of C++ embedded Linux code against our wearable application's 10, 000 lines of code and the 10,000 lines of kernel code it actually uses and we have still eliminated 99.92% of the typical embedded Linux software – and its inherent security risk!

Unikernels, also called "library operating systems", are these Chinese menu operating systems. Using both menus and dependency graphs, only the necessary portions of the operating system are linked into the application they support. This yields complete runnable images of only a couple of hundred kilobytes. Not only does the unikernel reduce our attack surface by 99.99%, it also increases reliability and power efficiency! Manufacturing costs plummet and reliability skyrockets! Not to mention "instant-on" boot times of < 40 milliseconds. How much smaller can an IoT device be if it only has to run a few thousand lines of code? How much smaller can its battery be when you don't have to power a memory management unit or even much memory? How more secure and reliable will a wearable be when the

complete application and operating system are small enough that they can be formally, mathematically verified?

While unikernels have been around for a number of years, as research projects, they have been difficult to work with and have often required special application development languages such as Haskell and OCaml. In recent years, the number of unikernels and their maturity have grown till it is now perfectly feasible to use them in everyday development and commercial applications. Thanks to the work of Idit Levine and her team at Dell-EMC, we now even have the UniK project, a build system that provides an abstract interface supporting four different unikernels, six different programming languages, and nine different operating environments. Check a few boxes and run it against your application code and you get an executable image that will run on either Intel or ARM processors, as well in the cloud. Microkernels are certainly not restricted to wearables. The same security, reliability, size, and resource advantages are available when unikernels are used with server-side applications in the cloud. Imagine the reduction in your Amazon AWS or Microsoft Azure operating costs if you could run 10 times as many servers in each virtual machine. IoT scalability takes on new meaning when you can launch new server instances in less than 50 milliseconds.

In addition to defining and delving into the security, cost, and reliability aspects of unikernels, the presentation will include a live demonstration of the building and running of a unikernel-based application. The goal is to pique the audience's interest in unikernels and to point them to the resources they need in order to build and use unikernel-based solutions. In this day and age of computer hacking, we need to use every silver bullet in our holsters. (*- Ah yes, the chance for attendees to win $15,000 - As part of the security discussion of unikernels, we will visit the BTC Piñata, a unikernel-powered website that has been protecting 10 BitCoins from all internet attacks for over 4 years now. The attendees are encouraged to try their hand at cracking the site and taking those BitCoins ;-)

About Brad Whitehead:

Brad Whitehead is Chief Scientist for Formularity, an electronic forms company dedicated to the secure collection and processing of personal information. Formerly, he was a Partner and Master Technology Architect with Accenture. Brad has architected and implemented national-scale information processing systems, and served as a security advisor to several Federal agencies. Brad holds a BS from Carnegie Mellon University and an MS from the University of Liverpool. He can be reached at brad.whitehead@formularity.com.

An Ethical HIT Capability

By Sabatini J. Monatesti

Our 21st Century world demands that technologists develop and deliver Ethical HIT capability. This capability must modernize healthcare delivery, so that, it is patient centrist, least cost, and value driven. This presentation describes our Ethical HIT approach, promotes Ethical HIT architecture, and presents how we construct this capability using a new framework, SSF.

To fashion out Ethical HIT capability we:

- Build on a patented, secured node-to-node network,
- Leverage artificial intelligence to perform analytics and to rearrange least cost, high value, patient centrist healthcare delivery,
- Use business intelligence to ensure global understanding of disease conditions, and
- Maximize knowledge transfers between patient and caregiver using an intelligent patient-machine-caregiver interactive interface.

The goal of Ethical HIT is to place the patient in the driver's seat regarding health and wellness education and management, early disease assessment and procedure awareness, plan of care development and treatment possibilities for specific conditions.

About Sabatini Monatesti:

Sabatini Monatesti, MS is a system architect and a certified PERFORM Project Manager with an MS degree in Information Systems Engineering from Polytechnic University (Tadon School of Engineering @NYU) and a BSEE degree from Pennsylvania State University. Mr. Monatesti is the President of ES Enterprises Inc. and the Director of Religious Education at Immaculate Conception BVM Church, Berwick, PA. He serves as a senior member of IEEE, and he was a charter member of PAeHI (Pennsylvania eHealth Initiative) and NEPA HRTF (North Eastern Pennsylvania Health Reform Taskforce). Mr. Monatesti was instrumental in developing a HIPAA compliant health information portal that included EHR (electronic health record) and CPOE (computerized physician order entry) applications. His most recent contribution to healthcare reform was the launch and management of the NEPA RHIO, Inc. (North Eastern Pennsylvania Regional Health Information Organization) a consumer focused, patient centric non-profit RHIO. Mr. Monatesti's publications include: Complementing Sick-Care with Well-Care; A Cure for American Healthcare; Toward a Patient-Centric Medical Information Model: Issues and Challenges for US Adoption; Methodology: Fast Track RHIO; Business Risk & Cyber Warfare; and B2B in eCommerce. He was a contributor to a PAeHI BAT (Pennsylvania eHealth Initiative's Business Analysis and Technology) committee paper on eRX-EHR and HIE sustainability. He has published numerous articles on Ethics and is a recent contributor to IEEE publications, i.e., Introduction of Ethics in Systems Design and Architecture Development, Person Integrated Care (WPIC): A Healthcare Transformation Strategy Supported by a Novel Spreadsheet-Based Software Framework and a recent Ethics in Biology, Engineering and Medicine article: An International Journal piece, DOI: 10.1615 / EthicsBiologyEngMed.2017013292, Forthcoming, Ethics in Health Information Technology: Problems and Solutions.

Modeling the Future of Bitcoin

By Samuel J. Bouiss

According to some, block chain could be as big of a technological innovation as the Internet, and be responsible for an even larger bubble. On December 11, 2017, the Chicago Board Options Exchange began listing Bitcoin futures, followed by the Chicago Mercantile Exchange six days later. Bitcoin futures could mark the beginning of crypto legitimacy, or the end of the crypto bubble. This presentation will begin with a brief overview of cryptocurrencies, derivative contracts and their implications for cryptocurrencies, followed by a demonstration of the pricing methods associated with derivative contracts, targeting Bitcoin and their newly listed futures as a case study. As our understanding of financial systems grows, so does the complexity of our models and their computing demands. The presentation will show some powerful techniques currently employed to model financial instruments.

About Samuel Bouiss:

Samuel J. Bouiss is a class of 2019 student, majoring in quantitative modeling and statistics, attending the Business Administration program of the CUNY Bernard M. Baruch College. A member of the Baruch Traders Club, he was part of the team that won the 1st prize at the 2017 MIT trading competition. He is conversant in C++, Python, VBA, and other programming languages, as well as experienced with various numerical libraries. His focus is employing calculus, numerical methods, and stochastic simulations to price financial contracts.

3:40 PM Sessions

Building Realtime Access to Data Apps with jOOQ

By Michael Redlich

jOOQ is one of several open source projects offered by Data Geekery. As defined on the website, “jOOQ generates Java code from your database and lets you build typesafe SQL queries through its fluent API.”

This seminar will provide a brief introduction and overview of jOOQ followed by a live demonstration on how to build a small database application in real time.

About Michael Redlich:

Michael Redlich is currently a Senior Research Technician at ExxonMobil Research & Engineering in Clinton, New Jersey (views are his own) with experience in developing custom scientific laboratory and web applications. He also has experience as a Technical Support Engineer at Ai-Logix, Inc. (now AudioCodes) where he provided technical support and developed telephony applications for customers.

Mike has been a member of the Amateur Computer Group of New Jersey (ACGNJ) since 1996 and currently serves on the Board of Directors as President. He has also been facilitating the ACGNJ Java Users Group since 2001.

Mike’s technical expertise includes object-oriented design and analysis, relational database design and development, computer security, C/C++, Java, and other programming/scripting languages. His latest passions include Meteor and MongoDB.

Mike currently serves as a Java Community news editor for InfoQ and has co-authored nine (9) articles with Barry Burd for Java Boutique (now jGuru). He has presented at venues such as Emerging Technologies for the Enterprise (ETE), Trenton Computer Festival (TCF), TCF IT Professional Conference, Capital District Java Developers Network, and Princeton Java Users Group. Mike also served on the TCF 2018 steering committee.

Mike is a member of Toastmasters International and is also involved in volunteer efforts such as United Way of Hunterdon County and his company’s local Science Ambassador program. He is also an avid marathon runner and cyclist. Mike holds a Bachelor of Science in Computer Science from Rutgers University.

Better Business Graphics: Avoiding Death by PowerPoint

By Joe Levy

Do you deliver your own presentations?

Do you prepare content for your managers and executives to present?

Do you deliver summary business analytics data, in any form, up through your reporting chain?

In this talk, Joe Levy will "show and tell" what works, and what doesn't work, when using Powerpoint (or other slide deck presentation software).

- We will see how lighting and contrast affects perception.
- We will examine what's wrong with the default settings we see so often.
- We will look at human factors: seeing vs. hearing.
- We will learn how to maintain engagement over a long presentation.
- We will discuss organizing information.
- We will demonstrate the effect of font size, and motion, on emphasis.

Joe will also demonstrate some of his favorite tricks for packaging business analytics data for ease of use in "core competency" business units.

About Joe Levy:

Joe Levy is a Management Consultant, I.T. Project Manager, and Business Analyst. He has extensive experience as liaison and quantitative analyst between core competency business units and the engineering and I.T. resources that support their operation. Joe is also an active volunteer in the IEEE Princeton / Central Jersey Section, and in FIRST Robotics.