Strange Loop Program, Sept 30-Oct 2, 2021

TLA-plus Workshop
9/29 9:00 am-6:00 pm, Frisco Burlington

This workshop will show developers of concurrent and distributed systems how to model algorithms with TLA+. Its focus is on applying TLA+ rather than the TLA+ language itself. In other words, the workshop will follow Lamport's video course style and introduce TLA+ as we go. At the end of the day, you will have written a specification of a termination detection algorithm (EWD998), checked safety and liveness properties, stated fairness constraints, and encountered refinement. This workshop is a fast-paced, hands-on simulation of real-world spec writing. A detailed agenda is at https://github.com/lemmy/ewd998/issues/3. The workshop material is made available at https://github.com/lemmy/ewd998.

Markus Kuppe @lemmster - gh:lemmy - Microsoft Research

Markus Kuppe is a principal research software engineer at Microsoft Research. He has been part of the TLA+ core team for a decade and is one of the organizers of TLA+ pre-conf.

TLA-plus Conference
9/30 9:00 am-5:30 pm, Grand F

TLA+ Conference brings together industrial and academic users of the TLA+ specification language and its associated tools; it complements the biannual TLA+ workshops with a stronger focus on applying TLA+. Talks should present work of interest to users of TLA+ or PlusCal, such as but not limited to:

- Industrial and academic case studies
- Use of the TLA+ tools or reports on their shortcomings
- Novel tools & techniques exploiting TLA+ and its existing tools
- Teaching TLA+ and its combination with other (software) engineering methodologies

Building Generative Art Tools with Observable
9/30 9:30 am-12:00 pm, Grand ABC

Generative art systems can be understood as functions that combine (human) inputs with computational randomness to render creative output. While the output is generated using computational randomness, there are myriad human decisions that underlie this process. In this workshop, participants will learn to identify the parameters (number of visual marks, degree of randomness, etc.) that underlie generative art creation, and build interfaces that control these parameters. One of the most time consuming processes in generative art design is traversing the potential design space using available tools. In this workshop, participants will learn how to build interactive art systems to quickly explore possible artistic outputs. Observable, a JavaScript notebook platform, will be used as a way to develop generative art tools. This JavaScript based notebook is well positioned to support generative art projects given its reactive infrastructure and ability to generate Canvas or SVG files. Rather than arduously flip back and forth between a code editor and a web browser, Observable notebooks enable a smooth design process where code and output live side-by-side. Moreover, the tools created can be instantly published and shared so those without programming skills can generate art!

Michael Freeman @mf_viz - gh:mkfreeman - Observable

Mike Freeman is a Developer Advocate at Observable working to make visualization more accessible and impactful. Prior to this role, he held a position as an Associate Teaching Professor at the University of Washington Information School, and worked as a Data Visualization Specialist at the Institute for Health Metrics and Evaluation.

Anjana Vakil @AnjanaVakil - gh:vakila - Observable

Anjana suffers from a chronic case of curiosity, which led her from philosophy to English teaching to computational linguistics to software development. As a developer advocate at Observable, these days she codes & teaches from her home base in San Francisco; in the before-times, you could find her speaking at events around the world. She loves to share the joy of programming and advocate for a more diverse, equitable, and ethical tech industry. Ask her about the Recurse Center & Outreachy, she's an alumna of both!

Introduction to Data Science with Python
9/30 9:30 am-12:00 pm, Grand DE
Have data you wish you could analyse to make informed decisions? Want to learn about putting Data Science in practice but don't know where to begin? You are in the right place! This workshop takes you through the entire Data Science pipeline - exploring data, creating hypotheses, using Machine Learning algorithms, proving and debunking hypotheses and finally, deriving insights from created models. We will be using popular tools in Python like Jupyter, pandas, sklearn and numpy to get a better understanding of the data.

Some amount of exposure to programming is required, especially knowledge of data structures like lists and dictionaries. Familiarity with Data Science tools is not required as that will be covered during the course of the workshop.

**Grshima Jena @DebateLover - IBM**

Grshima Jena is a Data Scientist with the UX Research Operations team under Cloud & Cognitive Software User Research and Design at IBM. She works across portfolios in conjunction with user research and design teams and uses data to understand users’ struggles and opportunities to enhance their experiences. Grshima earned her Masters in Computer Science at University of Pennsylvania, and her research interests are in Machine Learning and Natural Language Processing. Outside of IBM, she delivers talks and workshops at conferences and indulges in cooking in her free time.

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**Jumpstart Your Open Source Journey**

9/30 9:30 am-12:00 pm, Regency A

Getting involved in Open Source Software (OSS) can seem mysterious, elusive, cryptic. While about all of the tools and information for major projects and with established foundations can be found in the (you guessed it) Open, it may still seem unapproachable. Yes, there is a bit more to things than just posting code on GitHub for others to see - but not necessarily much of a higher bar than that.

In this workshop, Aizhamal and Austin will share their experiences with various Open Source projects, and especially drawing upon experiences with the Apache Software Foundation. We will demystify the process and share helpful tips for getting started and becoming community members. Finally, we will help those interested to make their first git-based/`code`-contribution(s) to existing open source projects.

**Austin Bennett**

Austin Bennett designs systems to help move, share, gather insights from data and develop products efficiently. He is also a Cognitive Linguist with a focus on multimodal communication. He is passionate about education and sharing knowledge; having reached thousands of people in interactions ranging from one-on-one to large group training. Austin is an Apache Beam committer; he encourages people to get involved with Open Source Software however sensible. When not on a computing machine, Austin can most often be found on the water in the San Francisco Bay, in the nearby hills on a bike, or on a doubles squash court.

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**Aizhamal Nurmatat kyzy @iamaijamal - gh.aijamalnk - Google OSPO**

Aizhamal is a Program Manager at Google Open Source Programs Office, where she works with product teams and open source communities on strategies to promote community health, project adoption, diversity and inclusion. She is a member of the Apache Software Foundation, a Committer in the Apache Beam project, and a PMC member in the Airflow project. Aizhamal is originally from Kyrgyzstan, but currently lives in Seattle.

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**Introduction to OpenTelemetry**

9/30 9:30 am-12:00 pm, Regency C

No matter what language you program in, observability of the code is critical. OpenTelemetry is an open-source and vendor-agnostic project set on democratizing instrumentation and data collection of telemetry signals. Telemetry data is critical in solving both availability and performance issues, especially in distributed, polyglot architectures. Unfortunately, telemetry data has often been proprietary, at least when it comes to ease of use or combining different signals. OpenTelemetry looks to solve this problem by offering flexibility and choice as well as an open-standards approach.

Beyond providing the ability to generate and emit traces, metrics, and eventually logs, the project provides other core concepts, including the notion of resources, semantic conventions, and a collector component. In this workshop, you will learn all about OpenTelemetry and get hands-on instrumenting the language of your choice, enriching the data collected, and sending it to a variety of different back-ends. With this approach, you will never need to worry about instrumenting your code again and will have full control over how the data is processed and where it is sent. By the end of the workshop, you will understand the components of OpenTelemetry and be familiar with how to instrument your application.

**Steve Flanders @smflanders - gh.flands - Splunk**

As Engineering Director at Splunk, Steve leads Observability "Getting Data In". the top contributor to the CNCF OpenTelemetry project. Previously, he served as a founding member and Head of Product at Omnition; and Global Engineering Manager for log analytics at VMware. Steve's background includes business strategy, software development, product management, user experience, and

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operations management. He uses data-driven decision-making, agile development processes, and teamwork to create innovative and sustainable solutions; and is distinctly passionate about open-source software and democratizing data. Steve authors SFlanders.net, a technology-centric weblog, and presents regularly at international conferences including KubeCon and Google Cloud Next.

TLA-plus and Paid Lunch

9/30 12:00 pm-1:30 pm, Regency B

Lunch is provided in Regency A for TLA+ Conference attendees or those who purchased the preconf lunch.

- Grilled Burgers (Beef and Turkey)
- Slow Cooked Pulled Pork
- Vegetarian/vegan option TBD
- Buttermilk Biscuits
- Potato Salad with Mustard Dressing, Pasta Salad, and Spicy Cole Slaw
- Molasses BBQ Pork and Beans
- Individual Ms. Vickies Potato Chips
- Grilled Corn on the Cob, Smoked Paprika Condiments Bar
- Peach Cobbler and Gooey Butter Cake

An introduction to text-based music with Alda

9/30 1:30 pm-4:00 pm, Grand ABC

Alda is a text-based programming language for music composition. The markup-like syntax is easy to understand, designed both for musicians with no programming experience and programmers with no music theory knowledge. With Alda, you can leverage the tight feedback loop of your text editor and the command line to quickly discover and iterate on musical ideas.

In this hands-on, introductory workshop, we will learn the Alda language through a series of examples. Along the way, we will learn some basic music theory concepts and how to apply them when writing music with Alda. We will also discover how Alda can be used as a vehicle for algorithmic music.

Attendees should bring headphones and a Mac, Windows, or Linux laptop, preferably with Alda already installed. A little bit of prior knowledge of programming and/or music theory is helpful, but by no means required!

Dave Yarwood @dave_yarwood - gh:daveyarwood - Kevel

Dave Yarwood is a composer, musician, and software engineer at Kevel, where he uses Clojure and ClojureScript to build UIs, APIs, and backend services. In addition to Alda (an open-source music composition programming language), he maintains a number of open-source Clojure libraries such as ezzmq (a high-level ZeroMQ library for Clojure) and Mantra (a ClojureScript Web Audio API music library).

Dave holds a Bachelor of Music degree from the University of North Carolina at Chapel Hill, with focuses in Music Composition and Bassoon Performance. He is endlessly fascinated by the intersecting worlds of music and programming.

Mitigating Bias in ML Models with Constraints

9/30 1:30 pm-4:00 pm, Grand DE

We train machine learning models so that they learn relationships in the data. The expectation is that these learned latent relationships are true and, by extension, fair. But what if the data is biased, or the data is accurate, but the truth is biased? Wouldn't we want to correct the bias?

There are a collection of lesser-known machine learning techniques called monotonic, interaction, and shape constraints. We can use them for bias-mitigation and for injecting domain knowledge into the model, placing guardrails so that it reflects the truth we want it to reflect.

The first part of the session outlines the many reasons we would want to use constraints. During the second part, we will dive into a criminal recidivism prediction. Authorities want to predict what defendants are at the highest risk of recidivism, and we know defendants with the highest amount of priors are the most likely to recidivate. Employing monotonic constraints in XGBoost and TensorFlow Lattice will place the guardrails so that defendants with the least priors aren't unfairly classified as high risk. Additionally, we will examine interaction constraints, which can allow us to restrict learning for interactions between features based on domain knowledge to improve fairness.

Attendees are expected to have a fundamental knowledge regarding machine learning and the Python programming language. An attendee will use Pandas, XGboost, and Tensorflow in this workshop.
Serg MasÂ­s has at the confluence of the internet, application development, and analytics for the last two decades. Currently, he's a Climate and Agronomic Data Scientist at Syngenta, a leading agribusiness company with a mission to improve global food security. Before that role, he co-founded a startup, incubated by Harvard Innovation Labs, that combined the power of cloud computing and machine learning with principles in decision-making science to expose users to new places and events. Whether it pertains to leisure activities, plant diseases, or customer lifetime value, Serg is passionate about providing the often-missing link between data and decision-making â€“ and machine learning interpretation helps bridge this gap more robustly. His book titled "Interpretable Machine Learning with Python" was released March 2021 by UK-based publisher Packt.

Introduction to VisiData

9/30 1:30 pm-4:00 pm, Regency A

VisiData is a fast, powerful, keyboard-driven tool for quickly exploring and summarizing datasets. It's an ideal tool for data journalists, scientists, sysadmins, ML/AI practitioners; anyone who has to interact with a variety of data on a regular basis. In this hands-on workshop, you'll learn VisiData's essentials commands - including how to sort, filter, aggregate, clean, join, and convert datasets from many different sources.

This workshop is good for people who have a basic familiarity with the computer terminal interface. No programming ability is necessary, but basic knowledge of Python and/or regular expressions (regex) will make VisiData even more useful.

Jeremy Singer-Vine @jsvine - gh:jsvine - Buzzfeed News

Jeremy is a journalist and computer programmer based in New York City, currently working as the data editor for BuzzFeed News. He also publishes Data Is Plural, a weekly newsletter of useful/curious datasets.

Previously, Jeremy worked at The Wall Street Journal and, before that, at Slate Magazine.

Saul Pwanson @saulfp - gh:saulpw

Saul is a software engineer and data nerd, and the creator of VisiData and other open-source software. In 2016 he scraped thousands of crosswords and discovered long-standing plagiarism by a major crossword editor. Saul lives in Seattle but the terminal is his home.

Self-Documenting Coders: Writing Workshop for Devs

9/30 1:30 pm-4:00 pm, Regency C

Being able to use language effectively saves so much coding trauma. You should learn to file good bug reports, write up problems, and describe what you're doing. I'll teach you in less than half a day!

What is a documentation structure, and why does it matter to developers? Lots of developers get asked to write their own documentation, especially internal documentation and onboarding. In theory, this is good because they know the problems they are writing about and don't need to spend time explaining them. In practice, developers avoid this work because they don't have a good idea of how to start and can't evaluate whether they have succeeded.

This workshop is designed to teach you a few basic theories of technical documentation, such as task-based topics, reusable content, and writing for an audience. After the overview, you'll learn techniques for writing bug reports, error messages, and onboarding instructions in a tool-agnostic, repeatable way. You'll leave this workshop with a handful of techniques, templates, and tests that will improve your team's communication and your life as a developer.

Heidi Waterhouse @wiredferret - gh:wiredferret - LaunchDarkly

Heidi is a transformation advocate with LaunchDarkly. She delights in working at the intersection of usability, risk reduction, and cutting-edge technology. One of her favorite hobbies is talking to developers about things they already knew but had never thought of that way before. She sews all her presentation shirts so they match the pajama pants.

Strange Loop Party

9/30 7:00 pm-9:30 pm, City Museum

We're taking over the City Museum for the Strange Loop party! The City Museum is a warehouse packed full of explorable art made from repurposed materials. The museum is fractal in nature and difficult to describe. It features all manner of slides, tunnels, and beautiful weirdness. They have a strict "No Maps!" policy - it's up to you to find your own path.
Shuttles

Shuttles will be available continuously going to/from City Museum to Union Station (20th Street) and the Hilton Ballpark.

Welcome

0/01 9:30 am-9:40 am, Grand DE

Alex Miller

Why security is the biggest benefit of using the Cloud

0/01 9:40 am-10:30 am, Grand DE

When organizations migrate to the cloud we usually hear about the cost and scalability benefits. However, I believe that the biggest benefit of moving to the cloud is the ability for companies to improve the security of their applications and data. In this talk, we will discuss the ways companies can improve their security at scale when moving to the cloud.

AJ Yawn @ajyawn - ByteChek

AJ Yawn is the Co-Founder and CEO of ByteChek. He is a seasoned cloud security professional that possesses over a decade of senior information security experience with extensive experience managing a wide range of cybersecurity compliance assessments (SOC 2, ISO 27001, HIPAA, etc.) for a variety of SaaS, IaaS, and PaaS providers.

AJ advises startups on cloud security and serves on the Board of Directors of the ISC2 Miami chapter as the Education Chair, he is also a Founding Board member of the National Association of Black Compliance and Risk Management professions, regularly speaks on information security podcasts, events, and he contributes blogs and articles to the information security community including publications such as CISOmag, InfosecMag, HackerNoon, and ISC2.

Artisanal, machine-generated API libraries

0/01 10:50 am-11:30 am, Grand ABC

Stripe recently began generating API libraries in seven different programming languages, after maintaining them by hand for eight years. We wanted the generated code to offer just as good a user experience and be no less readable than the handcrafted code, while keeping breaking changes to a minimum, so we built a tool for this ourselves: a compiler of sorts. This talk is a deep dive into how we built our tool and lessons we learned along the way.

Richard Marmorstein @twitchard - gh:twitchard - Stripe

Richard Marmorstein is an autonomous, general-purpose problem solving and entertainment system, implemented chiefly in deoxyribonucleic acid, that exposes a rich natural language interface.

He presently resides in New York and works as a software engineer on the API Experience team at Stripe. When he is not API Experiencing, he is hanging out with his two dogs, Mozzarella and Gouda.

Near-Realtime Monitoring of Drones at Sea

0/01 10:50 am-11:30 am, Grand DE

Saildrone designs, manufactures and operates a fleet of wind and solar-powered autonomous science vehicles which make cost-effective ocean data collection possible at scale. Our vehicles are capable of operating in exotic locales, in less than hospitable conditions, for long endurance missions. In this talk, we'll discuss some of the challenges associated with monitoring drones at sea and the systems we've built to help operators keep tabs on the health of the fleet thousands of miles from shore over satellite communications.

Todd Bealmear @toddbealmear - gh:ttodd - Saildrone

Todd Bealmear is the engineering manager of the Fleet Operations Software team at Saildrone. Prior to that, he was a senior engineer at Saildrone who built and maintained many of the early systems that powered the company. Todd currently cohabitates in Oakland with an elderly Dachshund.
Program Synthesis: A Dream Realized?

0/01 10:50 am-11:30 am, Grand F

The dream of program synthesis seeks to automatically create programs that conform to a user's intent. Classically, a program synthesis has been framed as a problem of generation of correct-by-construction programs from complete, formal specifications of their expected behavior. An increasingly favored and more tractable paradigm of program synthesis, however, is inductive program synthesis. Broadly construed, inductive program synthesis can be framed as a problem of generalizing partial specifications of program behavior, such as a set of input-output examples, into programs that are potentially correct over the entire input domain. Unfortunately, similar to other inductive reasoning engines such as AI-based systems, inductive synthesis engines encounter challenges like overfitting, ambiguity, and brittleness. Thus, while the synthesized program may indeed conform to its partial specification, it may not exhibit the intended behavior on unseen inputs. PL researchers have been trying to tackle these problems through syntactic inductive biases applied to the space of candidate programs. However, the dream of program synthesis is yet to be realized. In this talk, I will present a gentle introduction to classical and inductive program synthesis, illustrate common problems faced by inductive reasoning engines and common inductive biases used to offset the problems, and describe my group's semantics-guided approach to improve the generalizability and robustness of inductive synthesis engines.

Roopsha Samanta @roopshasamanta

Roopsha Samanta is an Assistant Professor the Department of Computer Science at Purdue University. She leads the Purdue Formal Methods (PurForM) group and is a member of the PurPL group. Before joining Purdue in 2016, she completed her PhD at UT Austin in 2013, advised by E. Allen Emerson and Vijay K. Garg, and was a postdoctoral researcher at IST Austria from 2014-2016 with Thomas A. Henzinger. She is a recipient of the 2019 NSF CAREER award.

Roopsha's research interests are in program verification, program synthesis, and concurrency. She like to work at the intersection of formal methods and programming languages to develop frameworks to assist programmers write reliable programs. Her current research agenda is centered around two themes-formal reasoning about distributed systems and semantics-guided inductive program synthesis and repair.

Whoops! I Rewrote it in Rust

0/01 10:50 am-11:30 am, Regency AB

Three engineers, at various points, each take their own approach adding Rust to a C codebase, each being more and more ambitious. I initially just wanted to replace the server's networking and event loop with an equally fast Rust implementation. We'd reuse many core components that were in C and just call into them from Rust. Surely it wouldn't be that much code...

Pelikan is Twitter's open source and modular framework for in-memory caching, allowing us to replace Memcached and Redis forks with a single codebase and achieve better performance. At Twitter, we operate hundreds of cache clusters storing hundreds of terrabytes of small objects in memory. In-memory caching is critical, and demands performance, reliability, and efficiency.

In this talk, I'll share my adventures in working on Pelikan and how rewriting it in Rust can be more than just a meme.

Brian Martin - gh:brayniac - Twitter

Brian is a software engineer at Twitter where he focuses on performance and optimization projects. He contributes to several Twitter open source projects including: Pelikan, Rezolus, and rpc-perf. Brian is passionate about high performance software, systems tuning, monitoring, benchmarking, and Rust. When not hacking on code, Brian volunteers in his local search and rescue unit and is training his dog to find people who get lost in the wilderness.

Keeping Your Open Source Project Accessible to All

0/01 11:40 am-12:20 pm, Grand ABC

Most Open Source communities do their best to welcome new contributors to their projects on every technical level, but small things like overly technical descriptions of projects, incomplete documentation, & wordy write-ups can unintentionally intimidate potential contributors without a lot of experience &/or traditional tech education.

As a pretengineer myself now in charge of building an open source community, it is important to me to remove as many boundaries as possible for others coming from non-tech backgrounds, but who are passionate about Open Source software. Being careful to not construct unintended boundaries in the projects I maintain, in addition to spreading awareness with other projects has become something of a mission. In this talk I will share what obstacles I've observed over the course of my journey in the Open Source world, as well as my game plan for dismantling said obstacles as a community manager.

Treva Williams @OGtrilliams - gh:OGtrilliams - Replicated

Treva Nichole Williams is a Red Hat certified Linux, OpenStack, & OpenShift sysadmin, instructor, & dedicated Open Source evangelist. Before venturing into the field of online learning, Treva spent 5 years managing Rackspace's multi-region, multi-tenant public cloud
infrastructure as a Cloud Virtualization administrator. Treva is an OpenStack Active Technical Contributor & Active User Contributor, and is active in several OpenStack, RDO, OpenShift and Ceph communities and groups. When not OpenStacking, OpenShifting, or Cephing, Treva enjoys doggos, candy, cartoons, and playing "So You Think You're a Marine Biologist" on Google.

Speaking of doggos, Treva frequently travels with her companion pup, Sir Hairold B. Gogginton III, & he loves making new friends. Feel free to come up & say hello. :D

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**Functional distributed systems beyond request/response**

0/01 11:40 am-12:20 pm, Grand DE

Our software today runs on highly-distributed cloud infrastructure, but our default model for distributed applications (request/response) is still based on an imperative mental model of computing inherited from 1970s sequential programs running on a single computer.

In order to make remote calls reasonably reliable in an unstable environment, we've built impressive but complex solutions: e.g. dynamic service discovery, automatic retry protocols, caching, and redundant replicas.

If we shift our intuition about application development away from request/response and toward event-driven patterns, we can develop distributed systems that are composable, scalable, and resilient by design - and avoid much of this complexity.

More fundamentally, building our application programming model on composable streams gives us powerful decoupling and flexibility by letting us decompose our business logic into linear operations, allowing us to add machine learning and other rich functionality without exploring the complexity of our system.

This talk will cover: lessons learned using event-driven patterns to simplify real-world systems, unifying event-driven and request/response patterns with shared evolvable schemas, and how using truly cloud-native patterns can make our systems more adaptable, reliable and scalable.

*Melinda Lu @skewleft - gh:melindalu - eggy*

Melinda is an engineer at eggy, where she's working on cloud-native systems to support people in building the next phase of computing. Previously, she was the director of foundation engineering at VSCO, where she helped the company migrate its PHP monolith to a cloud-native distributed system running on Go, gRPC, Kafka, and Kubernetes, serving 100M users in their pursuit of artistic exploration, outside the incentive structure of online advertising. Before that, she worked in synthetic biology, computational neuroscience, the aerospace industry, and piano.

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**Incremental, zero-config Code Nav using stack graphs**

0/01 11:40 am-12:20 pm, Grand F

Exploring a large or unfamiliar codebase can be tricky. Code Navigation features like "jump to definition" and "find all references" let you discover how different pieces of code relate to each other. To power these features, we need to extract lists of symbols from the code, and describe the language-specific rules for how those symbols relate to each other.

It's difficult to add Code Nav to a large hosted service like GitHub, where we must support hundreds of programming languages, hundreds of millions of repositories, and petabytes of history. At this scale, we have a different set of design constraints than a local IDE. We need our data extraction to be incremental, so that we can reuse previous results for files that haven't changed in a newly pushed commit, saving both compute and storage costs. And to support cross-repo lookups, it should require zero configuration - repo owners should not have to set up anything manually to activate the feature.

In this talk I'll describe stack graphs, which use a graphical notation to define the name binding rules for a programming language. They work equally well for dynamic languages like Python and JavaScript, and for static languages like Go and Java. Our solution is fast - processing most commits within seconds of us receiving your push. It does not require setting up a CI job, or tapping into a project-specific build process. And it is open-source, building on the tree-sitter project's existing ecosystem of language tools.

*Doug Creager @dcreager - gh:dcreager - GitHub*

Doug Creager is a staff engineering manager at GitHub. He manages the Semantic Code team, which applies academic programming language theory to analyze all of the code hosted on GitHub. Our goal is to make it easier for developers and maintainers to understand what their code does, and how other developers use it.

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**Nim Nuggets: Systems Programming & Metaprogramming Magic**

0/01 11:40 am-12:20 pm, Regency AB

On the surface Nim (https://nim-lang.org/) is familiar, a fast statically typed highly productive language that looks like Python, but just
below the surface are cutting edge features that put it at the forefront of systems programming, interop, metaprogramming, and static introspection.

This fast paced talk will target experienced programmers new to Nim. We will look at diverse and real world bite size examples that would be difficult if not impossible in most programming languages:

- Type safe web routes (with static overlap detection!)
- Compile time memory and resource management similar to languages like Rust
- Smooth interop with real world template heavy C++
- Flexible and type safe APIs with static introspection
- Metaprogramming with types for highly customizable compile time errors and warnings
- and possibly more if time allows!

Aditya Siram @deech - gh:deech - LeapYear

I am a Haskell developer at LeapYear (https://leapyear.io/) and work on Nim by candlelight. I am interested in the intersection of programming language user experience, explorability, abstractions and performance.

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Friday Lunch

0/01 12:20 pm-1:40 pm, Midway

Lunch is provided in the Union Station Midway.

- Chef's Soup du Jour (Vegan)
- Romaine Caesar Salad with Garlic Crostini
- Bean Salad with Crisp Vegetables & White Balsamic Vinaigrette (vegan)
- Potato Salad tossed with Chipotle Mustard Dressing
- The Butcher's Fare, Tuna Salad, Garlic Seared Roast Beef
- Honey Glazed Smoked Ham, Roasted Turkey Breast
- Grilled Vegetables and Tofu
- Swiss, Cheddar, Provolone & Regional Bread Presentation
- GF bread option on the buffet and labeled
- Individual bags of Ms. Vickie's Potato Chips
- Assorted Brownies, Bars, & New York Cheesecake

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Injecting Security at the Cloud Edge

0/01 1:40 pm-2:20 pm, Grand ABC

With the increase in public/private hybrid cloud deployments, there is an increased need to ensure and enforce security policies between clouds. A "Secure Edge" proxy layer is a good place to inject and enforce privacy and authentication security protocols. In this talk, I will present how Yahoo uses three open source solutions: Apache Traffic Server, Athenz and Waflz, to implement such a Secure Edge to enable a secure and dynamic hybrid cloud strategy.

Specifically, I will present multiple options for Secure Edge integration that range from basic routing with low edge visibility to more explicit delegation allowing for the Secure Edge to perform policy enforcement. I will also discuss lessons we learned along the way and how those issues are being addressed in the standards world. From this talk, participants will gain an understanding of the options available to secure applications deployed across multiple cloud locations, so they can make informed and secure deployment decisions.

Susan Hinrichs - gh:shinrich - Aviatrix

Susan Hinrichs is a computer engineer, specializing in networking, security, and system development. She is a committer on the Apache Traffic Server project and a member of the Apache Software Foundation. Susan has recently moved to Aviatrix as a Principal Architect for their multi-cloud platform. The work in this talk is from Susan’s work with the A Edge team at Yahoo/Verizon Media supporting web proxying and various networking solutions. Susan had previously worked in a variety of positions including teaching computer security at the University of Illinois and freelancing work in networking and security. Susan participated in the tech bubble by working with a network security company that got acquired by Cisco. Susan earned a PhD in Computer Science at Carnegie Mellon University and a BS in Computer Science from the University of Illinois at Urbana-Champaign.

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Impacting Global Policy by Understanding Litter Data

0/01 1:40 pm-2:20 pm, Grand DE
Each year, 11 billion dollars is spent cleaning up litter. And that's just in the US. Almost all of this money is spent without knowing where the litter is located, nor its composition. What are the objects, materials, and brands we see thrown on the ground? All around the world, cities and corporations are increasingly being called to help solve the global issue of litter in the environment.

8 years ago, Litterati began as an Instagram picture of trash and has now grown into one of the world's largest open litter data sources in the world encompassing over 10 million images and locations of trash from 185 countries.

We use computer vision and machine learning to recognize and label each image with its object type, material and brand. We're also learning information like the weight and volume of the trash, and how long it's been decomposing on the ground. We're also scaling our data collection to include new sources of data like street cameras and drone footage to further our data footprint.

Our solution centers on serverless technology and step functions allowing for customization of our recognition capabilities to support different models for different scenarios and environments. We're using the data to not only inform those in power about where trash is, but also using world-class scientific methodology to leverage our data to inform policy, influence packaging, and inspire personal responsibility.

Sean Doherty @seanbdoherty - gh:seanbdoherty - Litterati

Sean Doherty is the CTO at Litterati, a company focused on bringing data-driven change to the world's litter problem through collection and analysis of pictures of trash from all over the world. He is passionate about mentorship and bringing equity to software through training, advocacy and support. All of his free time is enjoyed with his family and five children who are all the hobby he'll ever need.

Prevent phishing and impersonation with trust loops

0/01 1:40 pm-2:20 pm, Grand F

Phishing and impersonation attacks are the most harmful side-effects of digitizing our identities, our work, and our relationships. It is the inevitable consequence of a central name list where anyone can present any name and picture to everyone. How can we build systems that are resistant to these attacks? How (and in what context) is this system best integrated into collaboration software? How can we best balance simplicity, security, and usability?

In this talk, we offer an alternative data model for structuring identities and relationships that is resistant to phishing, impersonation, and machine-in-the-middle attacks - without sacrificing usability. Instead of "I authenticate, therefore I am," we posit that "We collaborate, therefore we are." In other words, users exist in a collaborative application only in the context of a relationship with another user. We encode these "trust loops" into a distributed data storage layer that is synchronized between devices.

We will a prototype called Backchannel which is a local-first address book that puts these new distributed systems primitives into practice. We used an iterative human-centered design process to improve the security of the system without sacrificing usability. Backchannel users can offer strong proof that their collaborators are who they say they are, even over long periods of time and across multiple devices.

Karissa McKelvey @okdistribute - gh:okdistribute - Ink & Switch

Karissa is an expert in open source software development, security, and Internet architecture. She researches technical architecture design and its impact on usability, safety, and resilience. Her contributions are depended upon by at-risk users including human & environmental rights defenders, journalists, and civil society activists. Her background is in political sociology and data science, and she loves making weird musical art that touches funny bones. She is a maintainer of Decentralization Off The Shelf.

Outperforming Imperative with Pure Functional Languages

0/01 1:40 pm-2:20 pm, Regency AB

Richard Feldman @rfieldman - gh:rfieldman - NoRedInk

Richard Feldman is a software engineer at NoRedInk and a well-known member of the Elm community.

Morel, a functional query language

0/01 2:30 pm-3:10 pm, Grand DE

Is it easier to add functional programming features to a query language, or to add query capabilities to a functional language? In Morel, we have done the latter.

Functional and query languages have much in common, and yet much to learn from each other. Functional languages have a rich type system that includes polymorphism and functions-as-values and Turing-complete expressiveness; query languages have optimization techniques that can make programs several orders of magnitude faster, and runtimes that can use thousands of nodes to execute queries...
over terabytes of data.

Morel is an implementation of Standard ML on the JVM, with language extensions to allow relational expressions. Its compiler can translate programs to relational algebra and, via Apache Calcite's query optimizer, run those programs on relational backends.

In this talk, we describe the principles that drove Morel's design, the problems that we had to solve in order to implement a hybrid functional/relational language, and how Morel can be applied to implement data-intensive systems.

**Julian Hyde @julianhyde - gh:julianhyde - Google**

Julian Hyde is a software engineer at Google, working on Looker and BigQuery, and is an expert in query optimization, database internals, and streaming. He is the original developer of Apache Calcite, an open source query planning framework that powers many database and streaming SQL engines, including Apache Beam, Flink and Hive. He was the original developer of the Mondrian OLAP engine, and was formerly at Hortonworks and SQLstream.

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**Dancing With Myself**

0/01 2:30 pm-3:10 pm, Grand F

In a year marked by physical distance, my only dance partner was a past version of myself. Using motion capture of my own movements as training data, I have worked with teams of collaborators to develop custom machine learning tools, including a Variational Autoencoder (VAE) and Graph Neural Network (GNN), to generate choreography that feels like my own. In this talk, I'll discuss not only these models and their generative capabilities (and pitfalls), but also the creative motivations and tensions that guided me while shaping this research trajectory. This is a story about engaging with AI as a creative collaborator to understand to what extent algorithms can reflect the most cherished parts of our identities.

**Mariel Pettee @mariel.pettee - gh:mariel-pettee - Lawrence Berkeley National Lab**

Mariel Pettee recently defended her PhD in Physics at Yale University and is now a Chamberlain Postdoctoral Fellow at Lawrence Berkeley National Lab. Her research encompasses the development of custom machine learning techniques for high-energy particle physics, with a particular emphasis on creating generic techniques that have broad applicability across other areas of fundamental science and art. As a choreographer, director, and performer, she also uses theater and dance work to research audience activation, duration, power, self-documentation, authenticity, fear, and playfulness. Since 2017, she has led independent teams of researchers across academia, industry, and the arts using machine learning to generate choreography based on 3D motion capture of her own movements. Prior to her PhD, she earned her Bachelors in Physics & Mathematics from Harvard University and her Masters in Physics at the University of Cambridge (Trinity College) as a Harvard-Cambridge Scholar.

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**Training an Autonomous Pentester with Deep RL**

0/01 2:30 pm-3:10 pm, Regency AB

Deep reinforcement learning has proven useful in training agents that learn useful tasks through trial and error. Can we use these techniques in the infoscope space to create an autonomous pentesting agent? Previously successful agents have been built mostly in the context of games like Go or DOTA that can be sped up to make the techniques practical with the massive training data size requirements that come with deep RL, and can be naturally broken down into state and action spaces. Penetration testing does not have an obvious discrete state or action space and resetting an environment built out of virtual machines for every training episode would be too slow to be practical.

To solve these problems, we use the popular Metasploit penetration testing framework to break out a space of possible actions and state. Then, we simulate vulnerable networks using partially observed Markov decision processes to allow the agent to rapidly acquire training data. Finally, we remove the agent from the simulation in order to test that the behaviors learned in simulation can be used to pilot Metasploit to compromise a real-life vulnerable host.

**Shane Caldwell @shncldwll - gh:SJCaldwell**

Shane is a St. Louis based machine learning engineer who used to be a penetration tester and is primarily interested in the intersection of machine learning and information security. Currently Shane is the Director of Artificial Intelligence at UniGroup, where he uses deep learning to create computer vision solutions for the moving industry. He has potentially read too many William Gibson novels.

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**Friday Snack**

0/01 3:10 pm-3:40 pm, Midway

Ice cream bars, whole fruit
Streaming video analysis in Rust using Pravega

0/01 3:40 pm-4:20 pm, Grand ABC

How does Rust hold up when developing complex real world applications?

This talk is a case study based on building a scalable real time video analysis pipeline in Rust using:

- GStreamer - a real time video processing framework
- Pravega - a streaming data storage system

This talk covers:

- The challenges involved in creating a scalable video processing pipeline
- How and why Pravega, GStreamer, and Rust fit together
- How to take advantage of the language features of Rust to manage complexity
- Patterns we learned during development

Tom Kaitchuck - gh:tkaitchuck - Dell

Tom Kaitchuck is one of the original developers who started the Pravega project and is currently a core contributor. Tom has been using Rust since 2015 and is the author of the popular allFlash crate. He holds a degree in Computer Science from Valparaiso University. Currently working at Dell, Tom previously held software engineering positions at Google and Amazon. His interests include: Concurrency models, Consistency algorithms, Distributed system design, and Effects of language design.

Crowd dynamics, RL and Unity: A Journey

0/01 3:40 pm-4:20 pm, Grand DE

Modeling crowd dynamics is hard. From attempting to model emotion to treating people as fluids, no one method captures all the nonlinearity of this problem.

This talk is about taking a different approach. An approach that requires less prodding at the underlying physical equations and more about allowing the computer to compute. We'll walk through the current work being done in the field and step through the process of how reinforcement learning might provide a more robust solution to handle a larger variety of environments and scenarios.

We'll dive deeply into extended Kalman filters, how to utilize PPO in Unity-ML, and what validation of the results mean. Crowd behavior can be everything between the unexpected and dull. It is this interaction which provides a rich domain to modeling and simulation.

Tomás Díaz - @tomas_writes - gh:tfdiaz - Karagozian and Case (KCSE)

After a brief stint on Wall St., Tomás Díaz replaced Excel for Vim. A successful graduate of 42 Silicon Valley, Tomás Díaz is now a lead member of KCSE's software group, providing innovative solutions to challenging problems in extreme environments. His work predominately focuses on graphics, machine learning and virtual reality. When he's not coding, he's pursuing sound design with his modular synthesizer and studying film. His past writings can be found over at tomasdiaz.dev

Software for Court Appointed Special Advocates

0/01 3:40 pm-4:20 pm, Grand F

Sustainably developing open source software is famously impossible and I'm not sure that this is it but we're faking it very well. Born in 2019 through the collaboration of Ruby for Good and CASA Prince George County, rubyforgood/casa has now expanded to serve hundreds of Court Appointed Special Advocate volunteers for multiple CASA organizations (there are 938 in the USA, as every county court is slightly different). rubyforgood/casa supports CASA volunteers and supervisors with data recording and reminders as they help youth in the foster system access services. Alternatives include salesforce(complicated) and Optima(expensive). We get rave reviews (along with minor bug reports) from the heads of CASA organizations during our weekly stakeholder checkins. Linda has been one of the leads for the project since the beginning and there are currently four active leads including one PM.

Linda Goldstein @goldlindastein - gh:compwron

Linda (she/her) is a software developer working currently in healthtech, previously in airlines, QSR, and other industries. She writes code for Ruby for Good for free and good, and Parachute Health for money and good. When she isn't coding, she enjoys riding bicycles for distances between zero and 50 miles, and reading and writing science fiction and fantasy. She can frequently be found somewhere near an airport and is currently based in San Francisco.
**Equitable Experiential Access: Audio Description**

0/01 3:40 pm-4:20 pm, Regency AB

Accessibility is often viewed as a service, tackled on after the fact, and evaluated by a minimum standard rather than by equity of experience. Instead: centering our users, let's embrace the multiplicity of ways in which we can offer content experiences in an equitable fashion.

This session dives specifically into auditory accessibility for artists, content creators, and presenters. We'll look at recent and ongoing research with nonvisual audiences and a few ways to put that knowledge into action, including the open source Audimance platform.

Laurel Lawson @llcycore - CyCore Systems

Laurel Lawson (she/they) is a product designer and CTO of CyCore Systems, a small R&D consultancy specializing in novel multisystem solutions. She is also a choreographer & trans-disciplinary artist-engineer and an expert instructor in user-centered design & interfaces, leadership, disability access and equity, and creativity, and is the creator of the Access ALLways method. Laurel is interested in solving problems, whether the correct method is a story, software, a dance, hardware, or process organization.

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**The Future of Conferences**

0/01 4:40 pm-5:30 pm, Grand DE

For the past 50 years, academic and technology communities have embraced a professional culture that relies heavily on physical meetings of people from around the world: we present our most important work in conferences, we meet our peers in conferences, we even make life-long friends in conferences. While all professional communities have their conferences, Computer Science academics and, to a large extent, software technologists have embraced the conference culture as integral part of their professional identities and career advancement.

Conferences are great! However, in some respects, they are not great. As more, and more diverse, people join the profession, many problems that did not exist in small, mostly homogeneous, mostly elitist groups started to emerge. Among them: large carbon footprints due to long-distance air travel, predatory sexual behavior, exclusion of those who cannot afford the costs of travel, and of those with care-taking responsibilities.

As these problems started to come into focus, COVID-19 happened, and all physical conferences were cancelled! 😱

In this talk, I start by visiting the long history of conferences, their elitist origins, rituals, and role in community formation. I then zoom in on the Computer Science and Technology conferences of the past 50 years, and on the problems that recently became visible. The second part of my talk is about the future of conferences. I explore alternatives to physical conferences, in part informed by what online communities have been doing for a long time, and in part informed by the online conference experiences of the past 18 months.

It is unclear what the post-pandemic world will look like. It is my hope, however, that we all embrace the lessons learned, and steer our professional conference culture in a more sustainable and equitable direction.

Cristina (Crista) Lopes @cristalopes - gh:crista - University of California, Irvine

Crista is a professor in the Bren School of Information and Computer Sciences at UC Irvine, with research interests in Programming Languages, Software Engineering, Distributed Virtual Environments, and just about anything else that relates to the art of programming. She is an IEEE Fellow, an ACM Distinguished Scientist, and Editor-in-Chief of The Art, Science, and Engineering of Programming. Her book Exercises in Programming Style has gained rave reviews, including being chosen as "Notable Book" by the ACM Best of Computing reviews. She is the recipient of the 2016 Pizzigati Prize for Software in the Public Interest for her work in the Open Simulator virtual world platform. She's also a founder and advisor of Clowdr CIC, a UK-based company providing virtual conferencing services.

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**Board Game Night**

0/01 8:00 pm-10:00 pm, Midway

Join us for a night of board games in the Midway/Pegram area at Union Station!

Board game night is sponsored by New Relic.
Poems in an accidental language

0/02 9:40 am-10:30 am, Grand DE

Kate Compton wrote the text expansion language Tracery as a class assignment in 2013. It got a 110%, and subsequently got picked up by a few thousand users who used it to build bots that suggest cocktails, create poetry, meditate on loneliness, or scream. This accidental language and its poetic programs opened a new interest in other very small languages, especially those that grow in unexpected places. Let's go on a walk through the strangest languages developed by mystics, poets, botanists, and choreographers, and discover the way that language design can be a meditative practice of seeing the world in new ways.

Kate Compton @galaxykate - gh:galaxykate - Northwestern University

Kate Compton is an inventor, artist, zine-maker, accidental programming language maker, and now also a Professor of Instruction at Northwestern University's Computer Science department. Her mission is to bring AI to people that AI doesn't deserve by making accessible and open tools for unusual groups of users. Her biggest programming language contribution was creating Tracery, a text-generation language that has since become a favorite of Twitterbot-makers and novice programmers, as well as a great range of poets, musicians, kids, and weirdos looking to play with creative computing. She made the first version of Tracery in a week, and has spent the last seven years figuring out how to make a sequel.

Waterpark: Distributed Actors vs the Pandemic

0/02 10:50 am-11:30 am, Grand ABC

At HCA Healthcare we own and operate 185 hospitals, and around 2,000 surgery centers, freestanding emergency rooms, and clinics. Our scale breaks many vendor products. In 2018 we began building "Waterpark", which would become the company's next-gen integration platform (one-part streaming system, one-part distributed database). We chose the ErlangVM and Elixir for fault-tolerance and productivity. When COVID-19 arrived, an interesting tech story became something more serious; more essential.

In this talk we will discuss

- how the actor model maps so well onto healthcare
- the virtues of wheel reinvention
- how a big, Fortune 100 company can be more fun and innovative than a startup
- how we transitioned from proof-of-concept mode to continuously available (no planned or unplanned downtime) in three weeks
- how we use Erlang's hot code loading (for real) in a production cluster spread across four data centers
- how the wisdom of "Papers We Love" is indistinguishable from magic,
- how my hero and friend Joe Armstrong (from beyond the grave) helped make American nursing home residents safer during COVID-19

Specifically, we will discuss process pairs, long-lived digital twins, no-masters, bloom filters, rendezvous hashing, our recipes for continuous availability, location transparency, open sourcing our HL7 libraries, and using the bit-syntax for clinical data.

Bryan Hunter @bryan_hunter - gh:bryanhunter - HCA Healthcare

Bryan Hunter is an Enterprise Fellow at HCA Healthcare. He has two decades of consulting experience in complex business domains. In 2012 he founded Nashville Functional Programmers (@NashFP). Bryan enjoys supporting FP communities around the world and has shared his experience in Lean and functional programming at conferences and universities in London, Manila, Oslo, Bangalore, and throughout the United States.

Branchstack: branching infra for better development

0/02 10:50 am-11:30 am, Grand DE

Impedance doesn't just exist between objects and relational data.

12 factor apps, GitOps, and yes, even monads, can be seen as attempts to bridge across a more general form of the same impedance mismatch: between the logic of a system and its stateful infrastructure. But these and most other such practices bridge the gap between logic and state in one direction: they adapt codebases to the shape of "pet" environments.

In branchstack development, we go in the other direction, asking how we can make environments, state, and even external services as flexible as code. Our central primitive for this work, branching, is inspired by one of the most successful orchestrations of logic and state so far in our industry, git (a record of the successive states of your application logic).

Branchstack tools and practices complement cloud architectures, work well with the pull request previews of tools such as Netlify and Vercel, are in production at more than a dozen companies, and are under evaluation in the Fortune 100. In this talk, we show how making everything outside of your code easily branchable pays off in ways that matter to your team and your business: speed of
developer onboarding, fidelity during development to production resourcing and instrumentation, easy multitenancy at a number of different isolation levels, realistic testing against stateful third party services, and instant full-stack previews for dev and business users.

**Patrick Flor** @senorflor - gh:senorflor - Platter, Flexbase, CVKey

I spend my time building and supporting strong and diverse engineering teams, helping students grow their skills and careers, and working on tools to give us all more technical leverage. Currently I am CEO/co-founder at Platter.dev and CTO at Flexbase.app, spending additional time as Development Lead at cvkeyproject.org, where we help communities operate and reopen safely while maintaining data privacy in the time of Covid. In the past I've worked on infrastructure and interfaces at Google, machine learning for human learning at Volley, demand prediction at Groupon, and a little of everything at Wagon (the cult favorite Electron + Haskell cloud-connected SQL editor). I am a former band/chess club director, and an almost-everything enthusiast. Find me during the conf and share something that gets you excited!

**Alex Pearson** @NAlexPearson - gh:NAlexPear - Platter

Alex is dreaming up and building better tools for developers as CTO at Platter. He has taught and mentored hundreds of developers, mostly from non-traditional backgrounds, through his work as co-founder and instructor at SavvyCoders. He knows arcane things he would rather forget about learning management systems and markdown storage/rendering engines from past stints in publishing and education technology. Before his career in software, he founded and ran a CrossFit gym in Nashville and was president of a non-profit in music education. He recommends the Porchetta at Dressel's in Central West End if they are open again by October 2021, and since he let Patrick write his bio, please find him during the conf and share your most groan-inducing jokes and puns with him.

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**Practical Quantum Computing Today**

0/02 10:50 am-11:30 am, Grand F

Until recently, quantum computing was largely restricted to researchers and scientists who had access to physical computer systems. Today, cloud access - like D-Wave's Leap quantum application environment - and improvements in quantum computing hardware, software, and developer tools are empowering programmers around the world to code on live quantum computers in real-time via their browsers - quantum mechanical knowledge not required.

Users and companies have already built over 250 early applications on D-Wave's computers in industries ranging from automotive to machine learning, aerospace, finance, and more. The quantum application era is here, and the growing quantum developer community is making it a reality.

In this session, Alex Condello, Manager of Applications Development Technology and Tools at D-Wave, will talk about the growing quantum application development ecosystem and how developers can start learning to code on a quantum computer today. Alex will also explore some of the early applications that developers and companies have built to-date using D-Wave's system.

**Alex Condello** - D-Wave Systems Inc.

Alex Condello is D-Wave's Manager of Applications Development Technology and Tools. He is one of the creators of Ocean software, D-Wave's suite of quantum tools. Condello attended Queens University, Canada, where he earned a Bachelor of Applied Science in Mathematics and Engineering (Computing and Communication), as well as a Masters of Applied Science in Mathematics.

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**Asami: Turn your JSON into a Graph in 2 Lines**

0/02 10:50 am-11:30 am, Regency AB

Asami is an open source graph database that provides the same functional and time-travel operations as Datomic, but with some additional unique features. Operating in the JVM or in a web browser, it incorporates the schema-less approach of RDF with a more generalized data framework. This gives us much more flexible data structures that can be loaded and indexed trivially, while still using a familiar API for querying. Storage can be in memory, on disk, or can be extended to external storage such as other databases or key/value stores.

This talk will discuss how Asami achieves all of this, how the architecture is used to do novel graph analysis operations, and how it can be used to provide an SQLite experience for graph databases. Give us a JSON file and in 2 lines of Clojure we can load it as a graph, ready for querying!

**Paula Gearon** @quoll - gh:quoll - Cisco Systems

An avid Clojure development, Paula likes to work in the most technical parts of a system building the infrastructure that lets other developers do their jobs. She has been the technical lead on several commercial and open source projects, with a focus on data storage and processing, and was a lead editor for the SPARQL standard for accessing RDF databases. When not coding, she does triathlons, cooks, helps her children with homework, and mentors and supports young members of Women Who Code. Originally from Australia, she currently lives with her family in Virginia, in the USA.
Janus: Easy Complex UI with Declarative FRP

02/02 11:40 am-12:20 pm, Grand ABC

It has been gratifying to watch JS web development embrace functional paradigms and data flows in the past half decade or so. In adopting FRP-like semantics, React, Vue, and others have moved the needle on development and maintenance, clarifying data handling and embracing functional means for defining a user interface. However, while their particular blend of old and new paradigms and balance of familiarity to mainstream developers serve many purposes, there exist other approaches that go even further.

Janus (janusjs.org) is a plain-JS framework started in 2013 that makes complex user interfaces safe and easy to realize. Modular but opinionated, Janus is built on a strong formal base but provides familiar building blocks. Its emphasis on time-independence push it in almost more of a declarative than functional direction.

Janus provides data primitives (Varying, List, Map, and many others) with common and familiar interfaces, but which work declaratively: x is always this mapping of y, not x is right now this mapping of y. On top of this Janus builds powerful tools for context-free programming, a flexible and extensible declarative View and Template framework based on composition, established means to render interfaces on both client and server with the same code, and much more.

Through all this, Janus stays true to its core ideals. It is a tiny toolkit of independent customizable parts which work brilliantly together to create a simple, humanist development experience.

Issa Tseng - gh:issa-tseng

Issa lives in Seattle, WA, where they work on music, words, video, technology for the developing world, and silly things like this.

Tech When the Sky is Falling: Tools for Crisis Response

02/02 11:40 am-12:20 pm, Grand DE

In a crisis situation where time is of the essence, what technologies will move your real-world mission forward the fastest? How do you make smart trade-offs when a situation is rapidly changing around you, and time is your most precious resource?

Early in the COVID-19 pandemic in the United States, PPE shortages for healthcare workers posed an enormous public health danger. To get masks to healthcare workers as fast as possible, we cofounded MaskMatch, a peer-to-peer mask donation organization. We got MaskMatch up and running in about 48 hours in March 2020, and led it for five months. Running on almost-free technologies and volunteer time, the project delivered nearly a million masks to frontline healthcare workers.

In this talk, we'll walk through the technologies and tech decision-making that allowed us to scale a successful, pragmatic crisis response. We'll describe:

- What technologies we picked & how we picked them
- The tech investments we made
- Tradeoff decisions you'll face
- How to manage chaos, volunteers, and unexpected rate-limiting
- How to know when to shut your project down

COVID isn't the last crisis we'll see, and when the next one comes, you're going to wish you could jump in and help. This talk will give you a starting point for doing just that.

Emma Ferguson - gh:emmaonthursday - Samsara

Emma is a software engineer at Samsara, a connected operations company, where she has worked on reporting infrastructure, real-time alerting, and performance, among other things. Previously she worked at Eventbrite. She is enthusiastic about Golang, Python, messy data problems, baseball, speculative fiction, the zoo, baking, and backpacking.

Colin Schimmelfing @schimmy_changa - gh:schimmy - UCSB Bren School of Environmental Science and Management

Colin is working towards a Masters of Environmental Science and Management at UC Santa Barbara. Before graduate school, he worked for ten years in engineering and engineering management at tech companies in San Francisco and New York. He hopes to use his technology skills to fight climate change, and is in grad school to figure out exactly how to do that.

Pictures Of You, Pictures Of Me, Crypto Steganography

02/02 11:40 am-12:20 pm, Grand F
I was puzzled when a friend sent me a Buffy the Vampire Slayer picture out of the blue, but knowing my friend is an oddball, thought nothing of it. Days later, again without warning, a Babylon 5 picture arrived in my inbox! A few days after that a picture from Firefly. Then they started resending the same three pictures over and over again. A cryptic comment turned out to be a clue, that led me to understand that there was more to the pictures than met the eye. Join me to learn the history, applications, and math behind Crypto Steganography, and learn how unravelling the mystery of the three pictures culminated in the resolution of a 15 year rivalry, when the US Olympic Men's Curling team won the gold in 2018.

Sean Marcia @seanmarcia - gh:rubyforgood

Sean Marcia, pronouns he, him, his, founded Ruby for Good in 2013 to fill the gap created by inaccessible and uneconomical technology solutions for nonprofits. He built an inclusive community of gooders-technologists determined to make the world a better place-who build open source, technology solutions for individuals and nonprofits serving vital missions. Sean is a passionate zymurgist, avid coffee roaster, enthusiastic writer of screenplays, and connoisseur of practical jokes.

Help to Equitably Close the CS Education Gap

0/02 11:40 am-12:20 pm, Regency AB

Computer Science is taught in less than half the schools in the U.S. Technology Education and Literacy in Schools (TEALS) is a Microsoft Philanthropies program that builds sustainable computer science programs in high schools with a focus on serving students excluded from learning CS because of race, gender, and geography. Learn how to help increase inclusive CS education in the U.S. and BC, Canada.

Jeffery Phipps @TEALSJeffery - Microsoft Philanthropies TEALS Program

Jeffery is a graduate of Southern Illinois University at Edwardsville with a BS in Math Studies with a minor in Computer Science. He is a former Airman, Newscaster, Housekeeper and teacher. Jeffery taught geometry for 13 years and taught computer science for four years. He was an AP Computer Science Principles Table Leader. He is currently the Regional Manager for TEALS in the St. Louis area.

Saturday Lunch

0/02 12:20 pm-1:40 pm, Midway

Lunch is provided in the Union Station Midway.

- Tortilla Chips with Tomato Salsa and Hot Sauces
- Tortilla Soup
- Braised Chicken Tacos
- Chili Lime Fajita
- Roasted Red Potato with Chorizo
- Braised Black Beans
- Roasted Corn
- Mango Smoothies, Cinnamon Churros

Carbon Footprint Aware Software Development

0/02 1:40 pm-2:20 pm, Grand ABC

Liking someone's status on Facebook or quickly searching Yelp for breakfast options nearby are some of the things we start our days with. Did you know that performing a simple Google Search generates 0.2g of carbon dioxide if you consider the carbon footprint of all the components in the software stack, which includes, browser, backend servers, networking calls, etc. In this talk, I would like to initiate a thought of Carbon footprint aware software development. Software development includes writing massive amounts of code that can run in parallel, and that scales to millions of devices and handles petabytes to exabytes of data. With blockchain technologies such as Bitcoin gaining notoriety for increased usage of electricity, and therefore increased carbon footprint, it has generated interest in the software community to revisit non-blockchain code and check its impact on the environment. In this talk, I would like to also cover some of the techniques that can be leveraged by Software developers to write code with less impact on the environment. Furthermore, just like we write unit tests to check functionality and catch regressions, I propose having environment regression analysis as a part of the CI/CD pipelines for each code check-in. We'll explore the tools available to do so. Code uses energy, bad code uses more energy. I just want to put a thought out there for software developers to be aware of what they write and check its impact beyond their project alone.

Tejas Chopra - Netflix, Inc.

Tejas Chopra is a Senior Software Engineer, working in the Data Storage Platform team at Netflix, where he is responsible for
architecting storage solutions to support Netflix Studios and Netflix Streaming Platform. Prior to Netflix, Tejas was working on designing and implementing the storage infrastructure at Box, Inc. to support a cloud content management platform that scales to petabytes of storage & millions of users. Tejas has worked on distributed file systems & backend architectures, both in on-premise and cloud environments as part of several startups in his career. Tejas is an International Keynote Speaker and periodically conducts seminars on Software Development & Cloud Computing and has a Masters Degree in Electrical & Computer Engineering from Carnegie Mellon University, with a specialization in Computer Systems.

How Tracing Uncovers Half-truths in Slackâ€™s CI Infrastructure

0/02 1:40 pm-2:20 pm, Grand DE

Traditional monitoring tools like logs and metrics were necessary but not sufficient to debug how and where systems failed in CI, which relies on multiple, interconnected critical systems (e.g. GHE, Checkpoint, Cypress). In this talk, Frank Chen shares how traces gave us a critical and compounding capability to better understand where, when, how, and why faults occur for our customers in CI. We share how shared tooling for high-dimensionality event traces (using SlackTrace and SpanEvents) could significantly increase our velocity to diagnose code in flight and to debug complex system interactions. We go from stories with early incidents that motivated further investment throughout Slack's internal tooling teams to stories about gains in performance and resiliency throughout our infrastructure.

Frank Chen @frankc - gh:fxchen - Slack

Frank is a maker. At Slack, he focuses on making engineers’ lives simpler, more pleasant, and more productive, in the Developer Productivity group. Frank builds tools to be force multipliers for performance and resiliency projects, and guides internal teams adopt observability culture + tooling. Frank helps people make better decisions by designing technologies that connect people to what they want to do. He informs software development with a background in behavior design, engineering leadership, site reliability engineering, and resiliency research. Frank recently moved back to the bay area and can frequently be found hiking, running, or woodworking.

Type-Driven API Design in Rust

0/02 1:40 pm-2:20 pm, Grand F

Rust is a unique programming language that blends imperative and functional concepts to make low-level systems safer. However, compared to other modern languages, designing APIs in Rust requires a fundamentally different mindset -- for example, designing without classes or inheritance. In this talk, I will live-code the design of a simple Rust API. Through the evolution of the API, I will demonstrate how Rust's typeA system (especially traits) can be used to design interfaces that cleanly compose with existing code, and that help API clients catch mistakes at compile-time.

Will Crichton @wcrichton - gh:willcrichton - Stanford University

Will Crichton is a 6th year CS Ph.D. student at Stanford University advised by Profs. Pat Hanrahan and Maneesh Agrawala. His research is about applying cognitive psychology and programming language theory to understand programmers and to design better programming tools.

Client Side Deep Learning Optimization with PyTorch

0/02 1:40 pm-2:20 pm, Regency AB

Deep learning has the capacity to take in rich, high dimensional data and produce insights that can create totally new mobile experiences for developers. However, the constraints of network availability and latency limit what kinds of work can be done in the mobile application space and vastly increase the cost to developers. We have recently developed a customer facing mobile application that leverages real-time computer vision models and will share our experiences of moving multiple deep learning models from the server onto the client. In this presentation, we dive into technical solutions for porting custom architectures for various vision tasks and how to serialize them from Python to binary assets, while avoiding common issues such as unsupported hardware instructions. We also discuss the theory and practice of quantizing models, model fusion, and storing tensors in last memory format for optimization. We conclude by demonstrating how to benchmark the performance of client-side models for various devices and operating systems.

Tyler Kirby @tylerkirby9388 - gh:TylerKirby - UniGroup

Tyler Kirby is the Principal Data Scientist at UniGroup where he focuses on dynamic pricing and computer vision. He has degrees in classics and computer science, and is an active contributor to research in digital philology. Tyler is also the proud father of two miniature dachshunds.

Shane Caldwell @shncldwll - gh:SCaldwell - UniGroup

Shane is a St. Louis based machine learning engineer who used to be a penetration tester and is primarily interested in the intersection
of machine learning and information security. Currently Shane works at UniGroup as their Director of Artificial Intelligence, using deep learning to create computer vision solutions for the moving industry. He has potentially read too many William Gibson novels.

Remote Workstations for Discerning Artists

0/02 2:30 pm-3:10 pm, Grand ABC

Netflix is poised to become the world's most prolific producer of visual effects and original animated content. To meet that demand, we need to attract the world's best artistic talent. Artists like to work at places where they can create groundbreaking entertainment instead of worrying about getting access to the software or source files they need. Our solution is Netflix Workstations. They are remote workstations tailored to artists' needs that make it easy to just start working, whether in an office in Mumbai or at their house in Vancouver.

The technical needs of fast-paced productions can vary wildly and change rapidly. We needed to not only make it easy for artists to have a one-click experience; but for developers to be able to control and customize that experience. This project was all about the new. I was new to Netflix. A new studio. A new team. How do you look at the vast array of technology options and say this is what I am going to bet my year on? We'll provide a peek into the future of Netflix Workstations and how it evolves from a single picture to an expanded universe of use cases.

Michelle Brenner @michellelynneb - Netflix

Michelle (she/her) is a Senior Software Engineer, with 10 years of experience in tech, from engineering support to manager. She runs an interview format tech podcast called From the Source that examines what tech jobs are really like. A Philadelphia native that now calls Los Angeles home, she is an art school graduate and a self-taught engineer. She enjoys making it easier for others to create great things, from artists to entrepreneurs. Michelle works to promote diversity and inclusion in tech through conference speaking and organizing, mentoring, board membership, and making sure everyone knows they belong here.

How we used serverless to speed up our servers

0/02 2:30 pm-3:10 pm, Grand DE

At Honeycomb, customers send us lots of data and then compose complex, ad-hoc queries. Most are simple, some are not. Some are REALLY not; this load is both complex, spontaneous, and urgent. It would be prohibitively expensive to size a server cluster to handle these big queries quickly, so we took a different approach: farm the work out to Lambda, Amazon's serverless offering.

In this model, Lambda becomes an on-demand accelerator for our always-on servers. The benefits are immense, improving response times by an order of magnitude. But the challenges are numerous and often unexpected. In this talk, I'll review the benefits and constraints of serverless-as-accelerator, and give practical advice based on our own hard-won experience.

Jessica Kerr @jessitrion - gh:jessitrion - honeycomb.io

Jessica Kerr has 20 years in software and nine of conferences, where she talks about languages from Scala to Elm, Ruby to Clojure; movements from DevOps to symmathesy; and now AWS Lambda in a database. She works at Honeycomb.io, bringing developers into familiarity with production.

Ian Wilkes - gh:ianwilkes - honeycomb.io

After riding the first.com boom, I began a long stretch at Linden Lab (makers of Second Life), including several years as Director of Operations. From there I moved on to a 4-year run as a senior engineer at Facebook, and then joined Honeycomb where I am the principle author of the custom distributed data store.

Game Development in Eight Bits

0/02 2:30 pm-3:10 pm, Grand F

The "8-Bit" era of the late '80s brought video games into the home with systems like the Nintendo Entertainment System (NES). Game developers of the time produced iconic games and introduced genres that are still with us to this day, while working with hardware that had serious limitations. This talk will explore how NES developers created more with less, looking at techniques used in professionally-developed NES games to handle physics, collision detection, randomness, data compression, and more.

Kevin Zurawel - gh:kzurawel - Candid

Kevin has been an NES fan since he first played "Super Mario Bros." in 1989. He learned to program out of a love of video games, and ended up with a career in web development. Kevin is currently an engineering manager at Candid and explores programming for old
How Flutter Can Change the Future of Urban Communities

0/02 2:30 pm-3:10 pm, Regency AB

Flutter has the ability to become a major part in urban development. Cross Platform Programing has become a hot topic in developer communities. Cross-platform app development helps developers to roll out new applications simultaneously easily: imagine one team of native developers for one platform being behind another team of native developers - a nightmare. With the right set of cross-platform tools in hand, they can have one team developing applications for all platforms. But the real payoff for serverless is greater code simplicity and developer efficiency. Each unique offering approaches functions differently, with varying methods for triggering, scaling, and event formatting. How is that efficient?

Edward Thornton @Streetgenius - Street Genius Innovations
Street Genius is a Software & Innovations firm founded in Missouri. We strive to bridge the gap between people and technology, by developing tools to make life easier. Our aim is to design and create the future

Saturday Snack

0/02 3:10 pm-3:40 pm, Midway
St. Louis gooey butter cake station, whole fruit

Authorship Environments: In search of the â€œpersonalâ€ in personal computing

0/02 3:40 pm-4:20 pm, Grand ABC

What if, instead of thinking of computing as technology for greater efficiency and convenience, we thought of it as a medium approaching that of conventional literacy? What might the environments be like, whom would they serve, and what can we imagine to be the artifacts of that interaction? By exploring big ideas from the last 70 years of computing and attempting to update them for the present, we will examine the implication of these questions in-depth, including potential approaches for thinking about them in the future. Along the way we will present an exploratory effort called Simpletalk, an authoring system built for today's ubiquitous computing environment: the web.

Eric Gade - gh:darth-cheney
Eric is a historian, writer, and programmer. Along with long-time collaborators Daniel Krasner and Thomas Nyberg, he created Simpletalk while working at the computing research lab at UnitedLex. Previously he served as the Project Manager for Columbia's Declassification Engine (now History Lab) project. His interests include malleable computing systems like Hypercard and Smalltalk.

Exploring deep space and deep ocean with AI guidance

0/02 3:40 pm-4:20 pm, Grand DE

There are many challenges associated with data and autonomous decision making in day-to-day life. These are amplified when we explore extreme environments such as the ocean floor, the surface of Mars, or other distant bodies. Scientists and engineers must balance the desire for science return and actionable insights with safety, latency, transmission volume, and environmental factors. Key questions include: What data should be collected? What data is useful for decision making? What data should be returned? What operations should be autonomous?

In some cases, the answer to these questions is simple. Large scale ocean floor exploration, for example, cannot be completed without autonomous/semi-autonomous underwater vehicles. Mars exploration also requires autonomy because the signal latency is between 3 and 22 minutes depending on the orbital positions. Martian rovers move slowly but waiting minutes for each command is not possible. Additional planned missions to distant bodies including Europa, a moon of Jupiter, require advances in instrument awareness and decision making.

In this talk I will discuss several data acquisition techniques including Raman spectroscopy and Laser Induced Breakdown Spectroscopy (LIBS), what we can learn from these techniques, and why they require ML/AI advancement. I will also discuss the role of remote sensing on autonomy for maximizing information return as well as remaining challenges in ML/AI related to extreme environment exploration.

Daniel Van Hoesen - Impossible Sensing
I am a data scientist at Impossible Sensing LLC which is headquartered on Cherokee street in St. Louis. My background is in condensed matter physics with an emphasis on phase transitions. At Impossible Sensing, I apply ML tools to space and other remote sensing data related to spectroscopy and autonomous decision making. Our focus is to understand extreme environments from micro to macro scales to aid scientific advancements including the search for life, resource identification, and to aid in environmental sustainability.
both editions of 'The Reasoned Schemer', and one of the creators of the miniKanren relational programming language. Will is also one of the creators of mediKanren, a system for bio-medical reasoning based on miniKanren, and funded under the NIH NCATS Biomedical Data Translator Project.