



PLoP[®] 2021 Conference Proceedings
28th CONFERENCE ON PATTERN LANGUAGES OF PROGRAMS

October 5–7, 2021, Virtual Online

Proceedings

Editors and Program Chair: Ademar Aguiar

Supporting Editors: Joseph Yoder and Daniel Pinho



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Welcome to PLoP 2021

The Pattern Languages of Programs (PLoP™) conference is the premier event for pattern authors and enthusiasts to gather, discuss, and learn more about patterns, programming, software development, and more!

This year was another year impacted by COVID-19 restrictions; therefore, we have made the decision to run **PLoP 2021** online again. In addition to the conference, we also organized this year a **PLoPourri**, a combination of events and activities that happened up to the conference days, covering different phases of the lifecycle of patterns and pattern languages, aimed to be held face-to-face, virtually, or in a hybrid way, depending on the event, time and location constraints.

Writers' Workshops are the primary focus of our time at PLoP. They allow authors to discuss and review each other's papers in a very fruitful way. We had three groups of five to six papers each, selected from an initial set of submissions after a considerable period of shepherding. Three other papers were selected for a writing group and had the opportunity to evolve during PLoP with the mentoring of an experienced pattern writer.

In addition to the Writers' Workshops, we had two invited talks, one workshop, and games:

- Invited talk - "Myths and Mythconceptions: What does it mean to be a programming language, anyhow?" by Mary Shaw, from Carnegie Mellon University.
- Invited talk - "How can we learn from Programming Systems? (They, too, deserve a theory.)" by Joel Jakubovic, Jonathan Edwards, and Thomas Petricek, from the University of Kent, UK.
- Workshop - "Flaws of the Cool City" by Joseph Corneli, Alex Murphy, Raymond S. Puzio, Leo Vivier, Noorah Alhasan, Charles J. Danoff, Vitor Bruno, and Charlotte Pierce.
- Games - in the opening and closing sessions, a well-established activity at PLoP, was guided this year by Christian Kohls, to help bring ice-breaking, exercise our bodies and minds, collaborate better, and reinforce our community of trust, remotely.

The PLoPourri events were held throughout the year. Topics included Pattern Mining which taught attendees how to extract patterns from proven experiences, Making Agile Happen, Cloud Adoption, Fearless Change, and a workshop about Methodological, Philosophical, and Educational Study on Pattern Languages.

After the conference, the authors were strongly encouraged to further evolve their papers to accommodate suggestions for improvement gathered during the discussions at the conference. The final versions of these evolved papers are published in the ACM Digital Library as PLoP 2021 Proceedings.

We would like to thank all authors, shepherds, reviewers, members of the Program Committee, and all conference organizers for their time and collaboration. Thank you all for making PLoP 2021 possible!

Ademar Aguiar and Joseph Yoder, PLoP 2021 Chairs

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PLoP 2021 Conference Description

Pattern Languages of Programs (PLoP) conference is a venue for pattern authors to have their pattern languages reviewed by fellow authors. The purpose of PLoP is to promote the development of pattern languages, primarily about aspects of software: design and programming, testing, software architecture, user interface design, domain modelling, education, human relations, and software processes. Patterns and pattern languages for domains outside software are also welcome.

PLoP 2021 was held online from October 5-7, 2021.

We invited contributions from practitioners and researchers on the following:

- Patterns and pattern languages
- Critiques of patterns and pattern languages
- Research on patterns and pattern languages
- Case studies of the use of patterns and pattern languages

PLoP is different from other conferences. It is run as a "writers' workshop," as described in Richard Gabriel's book, *Writers' Workshops and the Work of Making Things*. Before the conference, authors interact with a *shepherd* who helps them improve their paper to prepare it for PLoP. After shepherding, the program committee reviews the papers for final acceptance. The writers' workshops provide more feedback, and authors revise their papers again after PLoP. The papers here are these final, revised versions, not the ones reviewed at PLoP.

Invited Talks

PLoP 2021 conference had two invited speakers spoke on topics pertinent to pattern writing and developing trends in the software community. Following are listed the talks, including speaker information and a short synopsis.

"Myths and Mythconceptions: What does it mean to be a programming language, anyhow?" by Mary Shaw, Carnegie Mellon University

Modern software is embedded in sociotechnical and physical systems. It relies on computational support from interdependent subsystems as well as non-code resources such as data, communications, sensors, and interactions with humans. General-purpose programming languages and mainstream programming language research both focus on symbolic notations with well-defined semantics that are used by professionals to create correct solutions to precisely specified problems. However, these address only a modest portion of this modern software.

Persistent myths reinforce this focus. These myths provide a lens for examining modern software: Highly-trained professionals are outnumbered by vernacular developers; writing new code is dominated by the composition of ill-specified software and non-software components; general-purpose languages and functional correctness are often less appropriate than domain-specific languages and fitness for task; and reasoning about software is challenged by uncertainty and non-determinism in the execution environment, especially with the advent of systems that rely on machine learning. The lens of our persistent myths illuminates emerging opportunities and challenges for programming language research.

"How can we learn from Programming Systems? (They, too, deserve a theory.)" by Joel Jakobovic, Jonathan Edwards, and Thomas Petricek, University of Kent, UK

This talk is about the paradigm shifts from Programming Systems to Programming Languages and back. The speakers will discuss historical, philosophical, and methodological issues, and how patterns can provide a template for thinking about incommensurable world views.

Writers' Workshops

Writers' workshops help the pattern community to improve their patterns and pattern languages. These workshops are the primary focus at PLoP, and in them, we discuss accepted papers. Below is the list of papers that were workshopped at PLoP 2021 and are included in these proceedings.

Burgundy, led by Ademar Aguiar

- **Natural & Creative Living Patterns, Part2- Patterns for Natural Living**
by Sora Hatori, Takashi Iba
- **From Classroom to Online Education – An Educators Insights**
by Mary Tedeschi
- **Start-up Patterns: A Pattern Language for Developing Enterprise to Create the Future**
by Yuki Kawabe, Takashi Iba, Yuya Ota, Kotaro Chiba
- **Pattern Language Online: Qualitative-Data-Based Pattern Language Creation System**
by Yuki Kawabe, Takashi Iba
- **Patterns of Patterns: A Methodological Reflection on the Future of Design Pattern Methods**
by Joseph Corneli, Alex Murphy, Raymond S. Puzio, Leo Vivier, Noorah Alhasan, Vitor Bruno, Charlotte Pierce, Charles J. Danoff
- **Online Education Patterns, Part 2: Patterns for Creating a New Form of Learning**
by Sae Adachi, Sawami Shibata, Erika Inoue, Kiyoka Hayashi, Takashi Iba

Napa, led by Richard Gabriel

- **Patterns for the creation and interpretation of topic models**
by Michael Weiss
- **More Software Analytics Patterns: Broad-Spectrum Diagnostic and Embedded Improvements**
by Duarte Oliveira, João Fidalgo, Joelma Choma, Eduardo Guerra, Filipe Correia
- **Mining Good Practices of Low-Code Software Development from Model-Driven Approaches**
by Daniel Pinho, Ademar Aguiar, Vasco Amaral
- **Lazy Clone - A Pattern to Improve Performance and Maintainability of Object Cloning**
by Bruno Cartaxo, Eduardo Guerra, Victor Osório, Sérgio Soares, Paulo Borba

Douro, led by Rebecca Wirfs-Brock

- **Software Engineering Patterns for Machine Learning Applications (SEP4MLA) - Part 3 - Data Processing Architectures**
by Jomphon Runpakprakun, Sien Reeve Ordonez Peralta, Hironori Washizaki, Foutse Khomh, Yann-Gaël Guéhéneuc, Nobukazu Yoshioka , Yoshiaki Fukazawa
- **Secure Development Decomposition– An Argument Pattern for Structured Assurance Case Models**
by Jason Jaskolka, Brahim Hamid, Alvi Jawad, Joe Samuel
- **Patterns on Designing API Endpoint Operations**
by Apitchaka Singjai, Uwe Zdun, Olaf Zimmermann, Mirko Stocker, Cesare Pautasso
- **Patterns for Documenting Open Source Frameworks**
by João Santos, Filipe Figueiredo Correia

Other Workshops

“Flaws of the Cool City”

by Joseph Corneli, Alex Murphy, Raymond S. Puzio, Leo Vivier, Noorah Alhasan, Charles J. Danoff, Vitor Bruno, Charlotte Pierce

This workshop explores the interaction between Design Pattern Languages and Causal Layered Analysis (CLA) in the context of a cooperative game. It also introduces attendees to these methods, assuming no previous background. The theme of the workshop is the amelioration of and adaptation to climate change in an urban setting. Since cities account for more than 70% of global CO2 emissions, the workshop will help participants engage with a crucial challenge of our time.

“A Methodological, Philosophical, and Educational Study on Pattern Languages”

by Takashi Iba, led by Richard Gabriel and Joseph Yoder

Takashi Iba is writing an academic book (in Japanese) on pattern languages. Over 2021, the Iba lab has revised their method to create pattern languages and is sharing knowledge about their studies and experiences with it, on Methodological, Philosophical, and Educational studies on Pattern Languages.

- **A Practical Guide on Pattern Writing for Pattern Languages of Practices**
by Takashi Iba
- **Systematization of Patterns: How to Craft a Pattern Language as a Whole**
by Takashi Iba
- **Contrast within a Pattern: Capturing a Gap between Problematic and Good Consequences**
by Takashi Iba

Committees

The PLoP Conference would not be a success without the volunteer help of the shepherds and program committee members. The shepherds devote hours of their time to helping authors improve their papers before the conference. The program committee members help organize the conference, handle requests, and communicate with attendees.

We would like to thank all those who helped make PLoP 2021 a complete success!

Conference Organization Committee

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