# Giorgos Kritikakis

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## SUMMARY

Giorgos (or George) Kritikakis holds a Bachelor's degree in Computer Science from the University of Crete (2020) and a Master's degree in the same field from the University of Crete (2022). He completed his military service in the IT department of the Greek army in December 2022 and is currently employed at Tom Sawyer Software, a company specializing in data visualization and analysis. In his recent work titled "Analysis and Visualization of Hierarchical Graphs", he introduces new chain decomposition techniques, transitive closure solutions, fast (linear time) sparsification algorithms, a new general-purpose hierarchical graph drawing framework (The Path Based Framework), and more. The results of this research have led to several publications. From 2019 to 2020, he served as an associate researcher at the Institute of Computer Science (ICS) in the CARV Laboratory of the Foundation for Research and Technology Hellas (FORTH).

## PROFESSIONAL EXPERIENCE

**Associate Product Developer**
**Tom Sawyer Software**                                                    Mar 2023 - Present

Developing key features of Tom Sawyer Perspective, such as the Query Builders.

**IT support**
**Greek Army - SEAP Heraklion**                                            Mar 2022 - Dec 2022

Maintain all the systems, the servers, and the networks in the military camp.

**M.Sc. Student/Associate researcher**
**University of Crete - Graph and Information Visualization Laboratory**          2020 - 2022

The work "Analysis and Visualization of Hierarchical Graphs" offers solutions to vital open problems. You can find the document on my personal web page (doc) and the code is in my GitHub repository (repo). See the updated corresponding preprints in the publication section. This work includes:

– PBF (Path Based Framework).

  PBF is a new general-purpose hierarchical graph drawing framework. Early results of the Path-Based Framework were presented as a poster in gd2020. The first implementation was integrated into TSP (Tom Sawyer Perspective). In order to make a more advanced tool, with more automation, that creates thousands of drawing in a few milliseconds, I created it as a stand-alone java program. PBF was extensively evaluated, comparing it with the most recent state-of-the-art solution and running a user study. All work is described in the paper "Experiments and a User Study for Hierarchical Drawings of Graphs".

– Path/Chain decomposition graph techniques.

  Path/chain decomposition approach that is applicable, fast, and produces results very close to the optimum. This technique is the currently fastest way, theoretically and practically, to produce a chain decomposition. Extensive experiments have been conducted on these algorithms. Additionally, an optimization of the Fulkerson method for minimum chain decomposition using an indexing scheme (see next bullet) is included in my GitHub repository.

– Transitive closure, and reachability query solutions.

  Utilizing fast chain decomposition a new linear time sparsification technique is introduced that allows us to offer new bounds in transitive closure solutions. Furthermore, I have presented a methodology to build an indexing scheme. The experiments shed light on the behavior and expose the factors that affect transitive closure algorithms.

**Postgraduate Teaching Assistant**
**University of Crete** 2020 - 2022
– CS-484 Complex Network Dynamics [Spring 2021]
– CS-380 Algorithms and Complexity [Fall 2021, Fall 2020]
– CS-486 Principles of Distributed Computing [Spring 2020]

**Associate Researcher**
**Institute of Computer Science (ICS), CARV Laboratory** 2019 - 2020
Extension of the SCOOP compiler source-to-source C code transformations. SCOOP produces output for the PARTEE runtime system, a project developed at the Computer Architecture and VLSI Systems (CARV) Laboratory of the Institute of Computer Science (ICS) of the Foundation of Research and Technology Hellas (FORTH). PARTEE runtime uses annotations to specify tasks and their memory footprints. Scoop enables us to use pragma directives for the task annotation.

## EDUCATION

2022   M.Sc. (Computer Science) at **University of Crete**
       Thesis: Analysis and Visualization of Hierarchical Graphs.
       Advisor: Proffesor Ioannis G. Tollis.
       Area of Study: *a*) Algorithms and Systems Analysis, *b*) Parallel and Distributed Systems.
2020   B.Sc. (Computer Science) at **University of Crete**
       Thesis: Extension of the PARTEE runtime system with support for dynamic memory allocation.
       Advisor: Assistant Professor Polyvios Pratikakis.
       Area of Study: Software Systems and Applications..

## PUBLICATIONS

- Fast Reachability Using DAG Decomposition. Giorgos Kritikakis, and Ioannis G. Tollis. 21st International Symposium on Experimental Algorithms (SEA 2023).

- Experiments and a User Study for Hierarchical Drawings of Graphs. Panagiotis Lionakis, Giorgos Kritikakis, and Ioannis G. Tollis. IEEE Access. May 29, 2023

- Fast and Practical DAG Decomposition with Reachability Applications. Giorgos Kritikakis, and Ioannis G. Tollis (ArXiv Dec 2022).

- Experiments and a User Study for Hierarchical Drawings of Graphs. Panagiotis Lionakis, Giorgos Kritikakis, and Ioannis G. Tollis (ArXiv Sep 2022).

- Algorithms and Experiments using the Path-Based Hierarchical Drawing Framework. Panagiotis Lionakis, Giorgos Kritikakis, and Ioannis G. Tollis.
  This work has been presented as a poster at the 28th International Symposium on Graph Drawing and Network Visualization, GD 2020).

## ADDITIONAL INFO

Passionate and curious, he has attended more than 200 hours of training on online platforms and seminars in topics like IoT, wireless communication, Arduino Raspberry and esp boards, version control systems (git and GitHub), Linux inter-process communication, web development, and more. Living on the island of Crete, near the sea, he was attracted by the Mediterranean waters. He underwent lifeguard training and since 2015, he has been a professional lifeguard. In October 2023, he obtained the SSI Open Water Diver certification.

# Several Projects

- Top-down (2, 3, 4) tree with fine-grained synchronization.

- QBert 2D game.
  Allegro library and C++ were used. A project of 2.5K lines of code implemented with a specific architecture.

- 2D card game.
  Java, Model–view–controller architectural pattern was used.

- Liquid Democracy.
  Liquid Democracy is a more agile form of democracy. To materialize this system of voting, a web page was constructed based on Java CGI to sign up/login and vote for candidates. Moreover, you can create your own topics and let the community vote on them online. You can even elect a delegator if you trust someone else. (html, css, javascript, ajax requests, json, servlets, sessions, cokkies , apache server).

- Iperf imitation.
  Socket programming.

- Micro tcp protocol.
  A reliable protocol over UDP with key features of TCP, socket programming.

- Barnes-Hut algorithm, sudoku, game of life.
  Pthreads, java threads, OMP.

- Linux C shell (command interpreter).
  Processes manipulation, System Calls, interprocess communication (pipes), shell variables, redirection (dump2).

- Alpha programming language(compiler).
  Lexical analysis (lex), syntax analysis (yacc), intermediate code generation (quads), target code, and virtual machine.

- Remote control and monitoring system for devices and sensors.
  Raspberry Pi, arduino, full-stack development.