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Profile : I have had a significant and recent experience in Computer Security and Software Engineering. Indeed, I have had an essential experience in the following areas :

- Creating a positive learning environment that accommodate students' diverse cultural and educational backgrounds, experiences and individual learning styles.
- Effectively using educational technologies to support learning, manage and and deliver flipped and on-line courses.
- Working in industrial projects for more than five years as a Developer, a Research Scientist, and a Team Leader.
- Obtaining Grants from Canadian and international programs such as FQRNT and MITACS.
- Ensuring that course and program curriculum is up to date and relevant.
- Teaching topics in Computer Security and related technologies in university environment.
- Conducting research to advance knowledge in Academic and Industrial context.
- Supervising graduate students who are working toward Doctoral and Master degrees.
- Publishing original research and analysis in international conferences and academic journals.
- Serving on academic committees that review undergraduate and graduate students.
- Participating in the organization of Summer Schools and International Conferences.

I : Degrees and Current Job :

- From September 2016 : Adjunct Professor at Concordia University of Edmonton.
- From January 2015 : Research Scientist in Computer Security at Ubitrak Inc.
- From October 2015 to September 2016 : Postdoctoral position in Computer Sciences at Polytechnique Montreal under the supervision of Dr. Gabriela Nicolescu.
- From January 2014 to March 2015 : Postdoctoral position in Software Security at Queen's University under the supervision of Dr. Mohammad Zulkernine.
- December 2013 : Ph.D. degree in Computer Science from Montreal University, Canada.
- September 2009 : M.Sc. degree in Computer Science from University of Tunis, Tunisia.
- October 2007 : B.Sc. degree in Computer Science from University of Tunis, Tunisia.
- July 2003 : High school diploma in mathematics from Sadiky School, Tunis, Tunisia.

II : Research Interests : My research activities cover Data Analysis, Computer Security, Software Quality, and Cloud Computing.

- During the Master : Optimization of the Human Computer Interaction by the Management of Web Services : I proposed an approach to adapt composite Web services by

considering the internal logic of the business process and other information resources. This approach analyzes data from consumer textual requests with machine learning and data mining techniques in order to adapt and update Web Services. Experimental results show that our approach provides effective adaptation solutions by considering the Human/Computer Interaction.

- During the PH.D : Mining Software Repositories to Study the Quality of Software Systems : I proposed approaches to analyze the Quality of software systems. These approaches analyze historical data, mined from version control systems, and report change patterns, which hint at the causes, consequences, and actors of the changes to source code files. For example, I proposed Macocha approach, which mines software repositories and uses several algorithms and techniques, such as the KNN algorithm, the Hamming distance, and a bit vector model, to discover new co-change and change propagation scenarios not detected by previous work. Indeed, I introduced two novel change patterns : the Asynchrony change pattern, which models a set files that co-change within a large time interval (change periods), and the Dephase change pattern, which models co-changes that always happen with the same shifts in time. I conducted nine empirical studies to show that such new change patterns provide interesting information to developers that can help in explaining bugs, managing development teams, and performing traceability analysis.

- Researches on Computer Security and Cloud Computing : My research interests include also Computer Security, Cloud Computing, and Information Systems Security. Indeed, I am working on a research project to customize a methodology to increase the probability of discovering and fixing security defects according to their types. From the results of this research, it is possible to provide guidance in the defect detection, identification, and recovery techniques for secure software systems.

In addition, I proposed with a set of researchers from Queen's University, an approach to prevent click-fraud by implementing an anti-fraud service at the operating system level. In this way, we can protect users from becoming a part of an attack unknowingly. Since most modern operating systems already have anti-malware service, our proposed technique can be a part of it with a negligible overhead. Effective protection at the OS level can save billions of dollars of the advertisers. Simulations show that our approach is 99.5% accurate in detecting ad requests from all running processes and we get 100% success rate in finding the fraudulent processes.

Recently, we observed that several unchartered risks and challenges have been introduced due to the service delivery models of Cloud, deteriorating the effectiveness of traditional protection mechanisms. With a set of researchers from three different Canadian universities, I proposed a novel and effective approach which uses Cloud computing and IP address provider verification to prohibit this type of Slow Read connections attack.

I am working at Ubitrak Inc. in an Information Systems Security and Assurance project related to log management analysis. Indeed, I presented a methodology to specify the different log patterns which describe known anomalies and to discover unfamiliar log which could describe unknown anomalies in Information Systems.

III : Publications :

1- Refereed Articles in International Journals

1.1- Mohammad Shahrear Iqbal, **Fehmi Jaafar**, Mohammad Zulkernine, and Yuan Gu, *Protecting internet users from becoming victimized attackers of click-fraud*, Journal of Software : Evolution and Process, 20 pages, 2017.

1.2- Fehmi Jaafar, Angela Lozano, Kim Mens, and Yann-Gaël Guéhéneuc, *Analyzing Software Evolution and Quality by Extracting Asynchrony Change-patterns*, **Journal of Systems and Software**, 30 pages, 2017.

1.3- Fehmi Jaafar, Yann-Gaël Guéhéneuc, Sylvie Hamel, Foutse Khomh, and Mohammad Zulkernine. Evaluating the Impact of Design Pattern and Anti-pattern Dependencies on Faults and Changes. Journal of Empirical Software Engineering. 2016.
1.4- Fehmi Jaafar, Yann-Gaël Guéhéneuc, Giuliano Antoniol, and Sylvie Hamel. 2014. Detecting Asynchrony and Dephase Change Patterns by Mining Software Repositories. Journal of Software : Evolution and Process. Volume 26, Number 1 : 77-106.
1.5- Angela Lozano, **Fehmi Jaafar**, Kim Mens, and Yann-Gaël Guéhéneuc.2014. Clones and Macro co-changes. Journal of Electronic Communications of the European Association of Software Science and Technology. Volume 63 : 1-14.
1.6- Fehmi Jaafar, Yann-Gaël Guéhéneuc, Sylvie Hamel, and Foutse Khomh. 2013. Analysing Anti-patterns Static Relationships with Design Patterns. Journal of Electronic Communications of the European Association of Software Science and Technology. Volume 59 : 1-26.

2- Refereed Articles in International Conferences
2.1- Fehmi Jaafar, Gabriela Nicolescu, and Christian Richard, *A Systematic Approach For Privilege Escalation Prevention*, IEEE International Conference on Software Quality, Reliability and Security, Companion, 2016.
2.2- Md Shahrear Iqbal, **Fehmi Jaafar**, Mohammad Zulkernine, and Yuan Gu. FCFraud : Fighting Click-Fraud from User Side. IEEE High Assurance Systems Engineering Symposium. January 2016, Orlando, Florida, USA.
2.3- Darine Ameyed, **Fehmi Jaafar**, and Jaouhar Fattahi. A Slow Read attack Using Cloud. The International Conference on Electronics, Computers and Artificial Intelligence. June 2015, Bucharest, Romania.
2.4- Fehmi Jaafar, Foutse khomh, Yann-Gaël Guéhéneuc, and Mohammad Zulkernine. Anti-pattern Mutations and Fault-proneness. The 14th International Conference on Quality Software. October 2014, Dallas, USA.
2.5- Fehmi Jaafar, Yann-Gaël Guéhéneuc, Sylvie Hamel, and Foutse Khomh. Mining the Relationship Between Anti-patterns Dependencies and Fault-proneness. 20th edition of the Working Conference on Reverse Engineering. October 2013, Koblenz-Landau, Germany. Selected one of the best papers in WCRE 2013 and invited to special issue of Journal of Empirical Software Engineering.
2.6- Nasir Ali, **Fehmi Jaafar**, and Ahmed E. Hassan. Leveraging Historical Co-Change Information for Requirements Traceability. 20th edition of the Working Conference on Reverse Engineering. October 2013, Koblenz-Landau, Germany.
2.7- Fehmi Jaafar, Salima Hassaine, Yann-Gaël Guéhéneuc, Sylvie Hamel, and Bram Adams. On the Relationship Between Program Evolution and Fault-proneness : An Empirical Study. 17th European Conference on Software Maintenance and Reengineering. March 2013, Genova, Italy.
2.8- Fehmi Jaafar, Yann-Gaël Guéhéneuc, Giuliano Antoniol, and Sylvie Hamel. An Exploratory Study of Macro Co-changes. 18th Working Conference on Reverse Engineering (WCRE). October 2011, Ireland. Selected one of the best paper of WCRE 2011 and invited to the Journal of Software Maintenance and Evolution : Research and Practice.

3- Workshop Papers With Reviewing Committee
3.1- Angela Lozano, **Fehmi Jaafar**, Kim Mens, and Yann-Gaël Guéhéneuc. Clones and Macro co-changes. Eighth International Workshop on Software Clones (IWSC). February 2014. Antwerp, Belgium.
3.2- Fehmi Jaafar, Yann-Gaël Guéhéneuc, and Sylvie Hamel. Analysing Anti-patterns Static Relationships with Design Patterns. First Workshop on Patterns Promotion and Anti-patterns Prevention (PPAP). March 2013, Genova, Italy.
3.3- Fehmi Jaafar. On the analysis of evolution of software artefacts and programs. 34th International Conference on Software Engineering (ICSE Ph.D. symposium). June 2012, Swit-

zerland.
3.4- Fehmi Jaafar and Rim Faiez. L'utilisation de l'ingénierie ontologique pour l'adaptation des services web et des processus métiers. L'Association francophone pour le savoir (Acfas). May 2010, Canada.

4- Talks : I also gave keynotes or talks at the Université Catholique de Louvain in Belgium in 2012, at the University of Waterloo in Ontario in October 2013, at the Queen's Reliable Software Technology GROUP in Kingston in January 2014, and at the University of Montreal (4 times from 2011 to 2013). After these presentations, my research activities also attracted the attention of academic and industrial colleagues. Thus, I developed collaborations with several top researchers, among many : Bram Adams, Guiliano Antoniol, Massimiliano Di Penta, Daniel M. German, Andrian Marcus, Rocco Oliveto, Denys Poshyvanyk, Filippo Ricca, Paolo Tonella, etc., which led to publications in top venues.
4.1- Fehmi Jaafar. Software evolution and measurement. Queen's Reliable Software Technology GROUP. Queen's University, Kingston, Canada, January 2014.
4.2- Fehmi Jaafar. Software analysis and cloud. Ericsson Research and Development, Canada, November 2013.
4.3- Fehmi Jaafar. Change patterns and clones. Université catholique de Louvain, Belgium, December 2012.
4.4- Fehmi Jaafar. On the Analysis of Artifact Evolution : An Aggregate View and Lessons Learned. University of Waterloo in Ontario, Canada, October 2013.
4.5- Fehmi Jaafar. A Novel Approach for Analysing Software Evolution. Montreal University, September 2011.
4.6- Fehmi Jaafar. Detection and Analysing of Software Evolution. Polytechnique de Montreal, Canada, October 2010.

IV : Scholarship :

- Total value from 2008 to 2017 = 290000$:

* 2017-2018 The Cyber Security Cooperation Program grant from the Canadian Government. Value = 20000$.
* 2017-2018 The Canada-Alberta Job Grant from the Government of Canada and the Government of Alberta. Value = 10000$.
* 2016-2017 MITACS Elevate Canada Research Scholarship in Information Systems Security and Assurance. Value = 120000$.
* 2014-2015 MITACS Accelerate Canada Research Scholarship in Web and Mobile Computing. Value = 15000$.
* 2012-2013 Doctoral Scholarship in Computer Science from the University of Montreal, Quebec, Canada. Value = 12000$.
* 2012-2013 Research and development Grants Quebec-Wallonie in Computer Science. Value = 5000$.
* 2009-2013 Excellence Scholarship in Computer Science from the Ministry of Higher Education, Scientific Research and Technology, Tunisia. Value = 50000$.
* 2009-2013 Doctoral Foreign Scholarship in Computer Science from Montreal University. Value = 50000$.
* 2008-2009 Exchange Scholarship in Web and Mobile Computing from the Ministry of Higher Education, Scientific Research and Technology, Tunisia. Value = 5000$.
* 2008-2009 Research Internship Scholarship in Web and Mobile Computing from the University of Laval, Quebec, Canada. Value = 3000$.

V : Academic Service : I have been invited as reviewer for all major software engineering journals and conferences : Wiley JSME (2times), Springer EMSE (2 times), Software Quality Journal SQJO (4 times), Springer Journal of Automated Software Engineering, the International Conference on Software Security and Reliability SERE (3 times), the IEEE International Computers, Software, and Applications Conference COMPSAC (3 times), the IEEE CSMR (3 times), IEEE ICPC (2 times), IEEE ICSM (3 times), IEEE WCRE (one time), etc.

1- Reviewer

a)The Second International Workshop on Scalable Internet of Things : S-IoT'2017
b) IEEE International Software Quality Journal : SQJO'2015.
c) International Conference on Software Security and Reliability : SERE'2014.
d) IEEE International Computers, Software, and Applications Conference : COMPSAC'2014.
e) The International Workshop on Distributed Mobile Systems and Services : DMSS'2014.
f) International Conference on Program Comprehension - ERA Track : ICPC'2013.
g) Journal of Software : Evolution and Process : JSEP'2012.
h) International Conference on Software Maintenance : ICSM'2011.
i) International Conference on Program Comprehension : ICPC'2011.
j) Working Conference on Mining Software Repositories : MSR'2011.

2- Committee Responsibilities :

I have been invited to serve on the organization of the International Conference on Software Testing, Verification and Validation (ICST'2012). I participated also on the local arrangement of the Canadian Summer School on Practical Analysis of Software Engineering Data (PASED'2011), to which 65 students and professors participated and which featured keynotes by speakers from the academia and industry, including : Marc-André Decoste from Google Montréal ; Prem Devanbu from University of California Davis ; Gail C. Murphy from University of British Columbia ; Alain Picard from Benchmark Consulting ; and, Kal Murtaja from SAP Labs Montréal. In Queen's University, I was selected to be a member of the evaluation group for Best research in 2014 (we evaluated several projects for more than 20 candidates).

a) Project Application Review Committee, Graduate Studies, Queen's University (2014).
b) Volunteer : International Conference on Software Testing, Verification and Validation (ICST'2012).
c) Local Arrangement Co-Chair : Canadian Summer School on Practical Analysis of Software Engineering Data (PASED'2011).
d) Volunteer and Local organization : Mediterranean Conference on Information Systems (MCIS'2008).
e) Graduate Student Society representative on the Faculty of Computer Science (2008).

3- Supervision of Students :

During my doctoral thesis at the University of Montreal and my postdoc at Queen's University, I have supervise more than ten students. I currently supervising graduate students (masters students) on different research projects at Concordia University of Edmonton. My responsibilities for student supervision are :

a) Orienting the student to his or her role in our lab and the standards of behavior.
b) Training in Computational Intelligence and statistical skills and procedures necessary to perform scientific researches.

c) Keeping communication lines open, clear, and constructive.

VI : Description of Teaching Experience : I have had excellent opportunities to teach a variety of software engineering courses in both French and English in two universities : Montreal University and Polytechnique Montreal. I follow both a scientific and a practical approach to software engineering when teaching and tutoring students to prepare them for their future work.

1- Concordia University of Edmonton

1.1- Winter 2017, Lecturer for ISAM521 : Information Systems Audit I (graduate course).

Responsibilities : Provides a comprehensive discussion of the processes involved in conducting an information systems audit using a risk based approach. The purpose of this course is to present the set risks and best practices related to the systems development and change management process, understand data sources for audit, understand modern database environment, and develop practical skills of data extraction and information system auditing.

1.2- Fall 2016, Lecturer for ISSM551 : Disaster Recovery and Planning (graduate course).

Responsibilities : Teaching an indepth coverage of disaster recovery planning including, techniques to prevent, detect, and recover from loss of information availability. Students are instructed in ways to formulate a disaster and recovery plan, and test and implement the plan in a simulated lab environment. Note Open only to students in the Master or Diploma of Information Systems Assurance Management program and the Master or Diploma of Information Systems Security Management program.

2- Ubitrak Inc. in Montreal

2.1- Fall 2015, Lecturer for the training course Computer Security and Software Engineering (graduate course).

Responsibilities : Focusing on four critical software assurance areas, security requirements, software supply chain assurance, software vulnerabilities analysis, and security standards. This course exposes managers, engineers, and system administrators to concepts and standards for addressing software security assurance across the acquisition and development lifecycles. I provided participants with practical techniques for protecting the security of an organization's information assets and resources, beginning with concepts and proceeding on to technical implementations.

3- Polytechnique Montreal

3.1- Fall 2011, Lecturer for INF3410 : Requirements Specification and Systems Analysis (undergraduate course).

Responsibilities : Present to students how to (1) write well-formed, validated requirements and specifications, (2) analyze, verify and validate requirements into a user requirements document, (3) create project various plans, such as the review plans, configuration management plans, and risk plans, (4) manage Technical reviews to identify defects, conflicts, missing, or unnecessary requirements, (5) establish elicitation techniques to enable the discovery and understanding of the needed requirements, and (6) manage traceability of requirements to user needs and requirements, support documentation, and constraining policies.

3.2- Fall 2010 and Fall 2012, Teaching assistant for INF6306 : Patterns for Program Comprehension (graduate course).

Responsibilities : Helping graduates students to (1) identify fundamental and advanced concepts of design and architectural patterns, (2)learn and directly apply design patterns to development problems, (3) structure systems by applying architectural patterns, and (4) design flexible and maintainable systems and frameworks.

4- Montreal University

4.1- Winter 2012 and Summer 2013, Teaching assistant for LOG1015 : Introduction to programming (undergraduate course).
Responsibilities : Helping undergraduate students to understand program design and fundamental building blocks for programming in a high-level language. I provided student with practical skills to use and implement forms, properties, pseudo code, data types, arrays, operators, control structures, methods, classes, objects, and fundamental algorithms.
4.2- Winter 2011, Teaching assistant for LOG1931 : Data Base (undergraduate course).
Responsibilities : learning undergraduate students how to create new database by importing information from Excel spreadsheets into tables. Using action queries, undergraduate students add and update key fields that allow them to build relationships among the tables. Then undergraduate students master the steps for building complex yet easy-to-use forms to manage table data and techniques for optimizing database, including ways to build crosstab, summary queries, and reports using conditional formatting to highlight key data points.
4.3- Fall 2011, Teaching assistant for IFT1025 : Development of Object-oriented Programs (undergraduate course).
Responsibilities : Helping undergraduate students to appreciate and use the fundamental design principles of modularity and abstraction in a variety of contexts from computer science. I supervise student in the lab to enable them to develop programs that support experimentation, simulation and exploration in other parts of the Informatics curriculum (*e.g.*, the capacity to implement, test and observe a particular algorithm).
4.4- From Winter 2011 to Winter 2013, Teaching assistant for IFT1144 : Web Engineering (undergraduate course).
Responsibilities : Helping undergraduate students to understand the design and construction of web and e-commerce applications, and develop your understanding of current trends in this rapidly-evolving area. In the lab, undergraduate students acquire skills in using cutting-edge technologies including distributed computing, software design, object databases, XML, Web Services, JSP, ASP.NET, MVC frameworks and AJAX.
4.5- Fall 2011, Teaching assistant for IFT3902 : Organization and Maintenance of Systems (undergraduate course).
Responsibilities : Explaining the various organization structures that are needed for information systems with which those structures will need to be used, and the steps that will have to be taken in order to bring those structures and systems into being.

VII : Other Titles :

- Qualified proctor at The Linux Professional Institute since June 2008.
- Web master of several professional and academic Web sites.
- IEEE Member since June 2010.
- From October 2007 to September 2009, secondary school teacher at Zahrouni School, Tunis, Tunisia.
- Member of the Association for Computer Machinery (ACM) and the ACM Special Interest Group on Software Engineering (SIGSOFT)

VIII : Other Industry Experiences :

- From March 2015 : The specification of a methodology to detect anomalies and security vulnerabilities using message logs analysis. The first step was to analyze the different possible forms of a log message in order to understand the complete domain from which the messages must be interpreted. The next step was to specify the different log patterns in accordance with previous work and with known anomalies in log messages. Then, we used big data analytic to discover abnormal log occurrences which could identify anomalies not specified by log patterns.
- From October 2014 to February 2015 : The creation of a new nomenclature and teaching system that makes the process of learning, playing, and teaching music much easier and faster

using Big Data Analytic. This project is a part of a MITACS research internship program with industrial partners, OMP Music.
- The creation of the information system of chain stores Couffin Bio in Montreal (2010-2012).
- The management of the web site of the Canada Research Chair on Built Heritage, Université de Montréal since March 2010.
- The design and implementation of a system of documents and workflow management for Francophone Digital Campus in Tunis (2006-2007).
- The analysis and management of information system of chain stores Nahdi Tunisia (2007-2009).