Application from	**Kubicek, Karel**
E-mail Address	karel.kubicek@mail.muni.cz
Job	Summer Students 2017 (Member State Students) / SUM-2017
Application date	03/01/2017 13:01

Personal Details

Title	Mr.
Family Name	Kubicek
First Name(s)	Karel
Maiden Name (if applicable)	
Gender	Male / Homme
Date of birth	09/06/1993
Nationality	Czech (CZ)
Second Nationality (if applicable)	
Country of Birth	CZECH REPUBLIC
Town of Birth	Brno
Home Address (line 1 - max 32 chars)	Pod kastany 11
Home Address (line 2 - max 32 chars)	
City	Brno
Country	CZECH REPUBLIC
Postal Code	61900
Landline Phone Number (with international prefix)	
Mobile Phone Number (with international prefix)	+420608930609
What is your mother tongue?	Czech
Please rate your level of English	B2
Please rate your level of French	I don't speak/understand French
Please select any other languages you may speak	German Norwegian

Education

Country	CZECH REPUBLIC
Level of Education	CZECH REPUBLIC - Magistr (Mgr)
Title of Diploma/Qualification **Note: Please give the full title in their original language (using Latin characters)**	Magistr - Master's degree
Attended From	09/2015
Attended To (planned end date for current studies)	06/2017
School/University Name	Masaryk University

Country	CZECH REPUBLIC
Level of Education	CZECH REPUBLIC - Bakalár (Bc)
Title of Diploma/Qualification **Note: Please give the full title in their original language (using Latin characters)**	Bakalar - Bachelor's degree
Attended From	09/2012
Attended To (planned end date for current studies)	06/2015
School/University Name	Masaryk University

Country	CZECH REPUBLIC
Level of Education	CZECH REPUBLIC - Maturita
Title of Diploma/Qualification **Note: Please give the full title in their original language (using Latin characters)**	Maturita - maturity diploma
Attended From	09/2004
Attended To (planned end date for current studies)	06/2012
School/University Name	Gymnazium Videnska 47

Specific Information (Summer Students)

Main Field of Study	Information Technologies / Informatique
Secondary Field of Study	
Tertiary Field of Study	
What is your motivation for applying for this position?	Short reason: a friend I trust told me, CERN Summer Student Programm was the best working experience he got. That alone can be sufficient motivation for me. Since childhood, I am interested in research. During my studies at grammar school, I preferred natural sciences, especially physics. In final years, I read many science popularisation articles regarding CERN, and this influenced me to write about Particle Physics for my last year's work. But when I thought about the university field, I decided to study Informatics, as it is less discovered major. My friend from university told me about CERN Summer Student Program, which remembered me my interest in this research organisation. Although I still like physics and I want to study it deeper, I currently focus on computer security/secure programming, advanced algorithm design and CPU/GPU optimisation. And as CERN is general research organisation (from CS area especially WWW and grid computing), my work will be valuable in CS field, which will teach me new skills. I am always open to new study opportunities, so I want to learn as much as I can from the new situation. I want to meet intelligent people as they can lead me to excellent knowledge. The smart collective also induces original ideas, which can change my point of view for my career. I also want to accomplish my dream to go to CERN, and the best opportunity how to get know it is to join the organisation. Last, but not least, I would like to get on this program together with my girlfriend Marta Krepelkova, so we can finally live together after a year of long distance relationship. Working for the same organisation would be a delightful experience, and for me very likely the best way of starting together life.

Within your studies, which are your preferred topics for gaining work experience?	My study area is computer security. I am involved in security laboratory of our faculty for three years. I work both as a programmer and researcher. Our tool is used for automatic analysis of cryptoprimitives. Therefore I am skilled in cryptanalysis, statistics and probability, more generally with C++ programming and Python scripting, experiment design and results analysis. I like various topics of my field: from crypto protocols and symmetric/asymmetric crypto to secure coding principles. I would be interested in analysis/design of protocols or code reviews (C/C++), as it would fit my skills. I understand that such positions are rare in CERN (especially the first, as I searched for it for many hours), but maybe there is also few applicants for these posts; therefore my knowledge in this area can be very welcomed. But I am always broadly focused student, so I also studied and taught theoretical CS, especially algorithm theory and automata theory. I know various algorithm design techniques, and I am also interested in machine learning. The project of our lab, I am working for, is using evolutionary algorithms (EA), and I used EA also in course projects. But now I would like to get experience with another ML model - AAN and gradient descent, decision trees... I also studied CPU and GPU optimisation during my projects. I understand memory and hardware models of CPU and GPU architectures, and I am experienced in the fundamental theory of parallelism. My Erasmus teacher of Compiler Construction proposed to me the idea to go work for CERN, as this area is both deep analysed and also valuable. In my research project, I am using grid computations, so I am an active user of TORQUE PBS. I manage scripts for grid computations.

Describe any relevant work or social experience obtained during your studies, training periods or visits abroad	I do research in security laboratory for three years. I work on automated cryptoprimiteves analysis, which is based on adaptive learning. My task was a comparison with other teams (resulting in publication http://crcs.cz/papers/infocomm2016), experiment design and my current work for a master thesis is an implementation of metaheuristics in our framework. Within this project, I arrange computations on the distributed grid; I manage scripts that automatize the experiment workflow. I like teaching and explaining, so I became a teacher of courses Algorithms (1,2) and Automata theory. In both areas, I have broad knowledge, and I like the topics very much. I took part in the preparation of study materials, and an exercise book for Algorithms became my bachelor thesis. During spring 2016, I studied at Norwegian University of Science and Technology. I chose courses: Bio-inspired AI methods (ANN, EA and others), Compiler Construction (low-level programming, optimisations) and a PhD course of cryptographic protocols, where I worked on a paper on anonymization networks. Selected courses from my studies: * cryptography - my major, therefore many courses - beginning with mathematics, following with protocols and ending with security policies * crypto project - programming secure Skype-like communicator, analysis of other teams work * secure coding - team project, code reviews of other teams projects and selected open source project * Parallel programming, GPU programming, optimisations - algorithms and low-level programming * Linux binary programming - assembly, ELF, kernel * C, C++, advanced C++, Java, Enterprise Java, Haskell 1,2,3 Other: * big data analysis - Splunk, elastic search on a conference and later apply Splunk on log analysis for assignments and research
Have you ever worked at CERN before?	No
If yes, for how long (in months)?	
How many years of full time study at university level will you have completed by the summer of your stay at CERN?	5
Applied physics	
Describe the projects where you used the selected applied physics topics and/or any others that are not listed	
Architecture	
Describe the projects where you used the selected architecture topics and/or any others that are not listed	
Surveying	
Describe the projects where you used the selected surveying topics and/or any others that are not listed	
Chemistry	
Describe the projects where you used the selected chemistry topics and/or any others that are not listed	
Civil engineering	
Describe the projects where you used the selected civil engineering topics and/or any others that are not listed	

Programming Languages	C C++ Java Python Shell Script
Describe the projects where you used the selected programming languages and/or any others that are not listed	C - 2 courses on C (basic and advanced C) and many using C (OS, crypto, Linux programming, parallel computations, compiler construction) with assignments around 10k of lines together. I also taught Algorithms in C (and Python). C++ - 2 courses on C++, many others using C++ (secure coding - code reviews, crypto, AI), of whose many were team projects. Our research project is written in C++14 (templates, modern programming). C++ is my choice for assignments, as I know it well and it is fast. Java - 2 courses (basics and enterprise Java). Sometimes some assignments of cryptography courses were in Java. But I have to admit I quite forget it - when I attended AI competition, and I was forced to write in Java instead of C++, I had to search often. Python - no courses, but I had to teach myself, as Algorithms course is taught in Python and I have to be able to help my students. I also use Python for scripting in my projects, and I use Python for prototyping and competitions. Shell script - Unix courses. I am Linux user and I use terminal often. But I write only a few scripts per year. More often I edit someone's else scripts - for example for grid computations for our project.
Databases	Oracle MySQL
Describe the projects where you used the selected databases and/or any others that are not listed	I have absolved SQL course. I also used Oracle databases in Enterprise Java course. During my high-school studies, I programmed websites, where I used MySQL, but all my SQL knowledge are rather old and unused. I know better databases from the security point of view - SQL injection and defence mechanisms.
Information Technologies	Developing distributed computing systems (e.g. clusters, batch systems) Using software development tools (e.g. Git, Jira, Trac)
Describe the projects where you used the selected information technologies and/or any others that are not listed	Distributed computing systems: parallelism courses, where we programmed Open MPI application (rather introductory). From a user perspective, I use PBS TORQUE for grid computations. I have an opportunity to maintain our laboratory computers in the grid infrastructure, but I have not done anything in this area yet. Before grid computations, we used BOINC. Software development tools: I use Git for all project I contribute. They are hosted either on GitHub (bender250 username) or faculty Gitlab. I understand the workflow, I use branches, pull requests... Our project is also automatically checked by Travis and Coverity.
Theory of electrical engineering	
Describe the projects where you used the selected theory of electrical engineering topics and/or any others that are not listed	
Networks and systems	
Describe the projects where you used the selected networks and systems and/or any others that are not listed	
Low and high frequency engineering	

Describe the projects where you used the selected low and high frequency engineering topics and/or any others that are not listed	
Experimental Physics	
Describe the projects where you used the selected experimental physics topics and/or any others that are not listed	
Materials and experimental techniques	
Describe the projects where you used the selected materials and experimental techniques and/or any others that are not listed	
Mathematics	
Describe the projects where you used the selected mathematics knowledge and/or any others that are not listed	
Mechanical engineering	
Describe the projects where you used the selected mechanical engineering topics and/or any others that are not listed	
Safety	
Describe the projects where you used the selected safety topics and/or any others that are not listed	
Choose a date	13 weeks from 26-Jun-2017 to 22-Sep-2017*
Y	