## Summer Internships 2014
### Graduate Students

See new projects from Intel, Microsoft Marvell and Yahoo!

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Check Point

**Malware IOC research**

**Company:** Check Point

**Job description:** Go over malware behaviors to locate interesting malware behavior and find different implementations for those behaviors in API call sequences. Implement a mechanism to locate those behaviors.

**Requirements:** Malware experience, good security understanding, scripting knowledge (python or any other language).

**Full/part time position:** Full

**Contact details:** Maayan Kurzweil maayank@checkpoint.com

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**Malware categorization using machine learning**

**Company:** Check Point

**Job description:** Build an algorithm to try and categorize malware by behaviors and other data. This includes extracting data from the samples, using ML algorithms to cleanse the data, reducing dimensionality, selecting the different interesting POIs, and creating a list of heuristics to differentiate between malicious and benign samples.

**Requirements:** Scripting knowledge (Matlab, R, Python or any equivalent language), ML algorithms (clustering, categorization, decision trees etc.), good understanding of basic algorithms (graph traversal, flows etc.), statistics, knowledge and understanding in OS concepts and security — advantage.
Full/part time position: Full

Contact details: Maayan Kurzweil maayank@checkpoint.com

Honeynet developments

Company: Check Point

Job description: Develop a honeynet/honeypot for attracting new malware samples in order to catch samples from the wild.

Requirements: Good security understanding, scripting knowledge (python or any other language).

Full/part time position: Full

Contact details: Maayan Kurzweil maayank@checkpoint.com

Network profiling project

Company: Check Point

Job description: End-to-end development of a system that profile user behavior in the network - This includes: build a rapport of each node in the network - network profiling, passive/active network feature extraction using various MiTM techniques, train anomaly detection machine learning algorithms to detect network abnormalities.

Requirements:
- Knowledge of one of the following programming languages: Python/C#/Java/PHP programming – must
- Network protocols – must
- Machine learning/Data mining basics - nice to have
- Security landscape knowledge - nice to have

Full/part time position: full

Contact details: Maayan Kurzweil maayank@checkpoint.com
Malware visualization project

Company: Check Point

Job description: End-to-end development of system that visualize malware families. This includes: Static and dynamic feature extraction from multiple file formats, train machine learning algorithms to classify malicious samples into families, visualize the results in an easy-to-use web portal.

Requirements:
- Knowledge of one of the following programming languages: Python/C#/Java/PHP programming – must.
- Machine Learning/Data Mining Basics - nice to have.
- Security landscape knowledge – nice to have.

Full/part time position: Full
Contact details: Maayan Kurzweil maayank@checkpoint.com

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Enterprise calendar or contacts
for Windows Phone 8 operating system

Company: Check Point

Job description: Develop a dedicated C#/WPF application, running on Windows 8 operating system accessing corporate, Exchange server using dedicated secure APIs and delivering corporate calendar (integrating with local Operating System calendar) securely to the Windows Phone user.

Requirements:
- Familiarity with C# - must.
- Familiarity with WPF framework and Windows Phone operating systems – advantage.

Full/part time position: Preference for full time, or highly available part-time
Contact details: Maayan Kurzweil maayank@checkpoint.com

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Enterprise secure browser application
for Windows 8 operating system

Company: Check Point
Job description: Develop a dedicated C#/WPF application, running on Windows 8 operating system accessing corporate Exchange Server using dedicated secure APIs and delivering corporate contacts (integrating with local operating system contacts) securely to the Windows Phone user.

Requirements:
- Familiarity with C# - must.
- Familiarity with WPF framework and Windows Phone operating systems – advantage

Full/part time position: Preference for full time, or highly available part-time

Contact details: Maayan Kurzweil maayank@checkpoint.com

Cyber intelligence and analysis

Company: Check Point

Job description: The area focuses on technical analysis of current threats, based on malware samples, exploit and attack tools, logs and statistics of threat activity, etc. Some of the tasks we face, where we can define short-time projects for talented developers/researchers, include: Malware behavioral analysis (with machine learning aspects), Data analytics (“big data”) for capturing attack campaigns and bot patterns, Automated analysis of exploits, Generation of applications signatures from traffic captures, Analysis of false-positive/false-negative errors in detection algorithms.

Requirements: Fluency in a high-level programing language (C/C++/Java), A scripting language like Python/Perl – an advantage, Familiarity with network protocols (e.g., HTTP) and network analysis tools (e.g., WireShark) is a plus, practical experience with machine learning algorithms, SQL databases and/or Windows internal APIs (for malware behavior analysis) – an advantage.

Full/part time position: Could be both.

Contact details: Maayan Kurzweil maayank@checkpoint.com

Security analysis of logs

Company: Check Point

Job description: Join advanced Check Point development project of analyzing high volume of logs indicating network traffic, application usages, user access, etc. using advanced techniques of correlations and learning and highlight items that indicate security threats.
**Security policy building and optimization**

**Company:** Check Point

**Job description:** Take part in one out of several research projects done by Check Point aimed to create new approaches for security policy definition/validation according to organization needs for access and segmentations.

**Requirements:** Programming abilities in Java / C++.

**Contact details:** Maayan Kurzweil maayank@checkpoint.com

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**Security cloud management**

**Company:** Check Point

**Job description:** Join a special project studying and implementing Cloud based solution for managing Check Point’s gateways via Cloud. Providing a scalable and ‘always-up’ solution managing large number of gateways and high volume of logs and configuration items

**Requirements:** Programming abilities in Java / C++.

**Contact details:** Maayan Kurzweil maayank@checkpoint.com
Outbrain

Recommendation technology R&D intern

Company: Outbrain (Netanya offices)

Job description: Outbrain Inc., the Web's leading content discovery platform, is seeking outstanding candidates for its 2014 summer internship program. The 3-month long position entails working in Outbrain's Recommendation Group, the algorithmic core of a global service that reaches hundreds of millions of unique users per month, serving them billions of content recommendations. Working out of Outbrain's offices in Netanya, you will engage in cutting-edge big data technology - and push it forward. You will discover actionable insights in user interaction data, and will leverage those insights to improve our service.

Requirements:
- Currently enrolled as a graduate student in Computer Science or a related discipline.
- Performing research in one of the following fields: machine learning, data mining, natural language processing and statistics.
- Strong coding capabilities in Java.
- Excellent communication and interpersonal skills.
- Industrial experience is an advantage.
- Publication record is an advantage.
- Familiarity with Big Data platforms (e.g. Hadoop, Hive, Pig) is an advantage.
- Experience in working with large and complex data sets, databases (MySQL) and statistics/analytics tools (R, MATLAB) is an advantage.

Full/part time position: full time for 3 months

Contact details: please send your CV to mazi@outbrian.com. Interviews will take place in late May or early June.
**HP**

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**Analytic methods and tools for big data**

**Company:** HP Labs

Job description: Big data is an industry trend unfolding today, which will fundamentally change our IT systems and tools. HP Lab, Israel is researching how this trend, and the expected change in computing infrastructure, will enable a new style of analytics. We emphasize analysis and decision making in data rich environments. We seek exceptionally talented and motivated interns who want to get acquainted with a leading research center and to contribute to our agenda. Intern in this program will participate in hands-on research and development projects, while working closely with a researcher at the lab.

Projects may involve some of all of these technologies
- Big data systems, such as Hadoop, Stream, Spark, HP Vertica, HP IDOL, NOSQL databases
- Advanced analytics tools such as R, Python, Matlab, Mahout, Giraph, GraphLab
- UI/UX and visualization tools, including d3, Tableau

You will work on well-defined software or integration projects, and successful projects will be incorporated in larger systems developed at the lab.

**Requirements:** Graduate students at the Computer Science departments with background in machine learning, statistics, algorithms data management, or distributed systems and programming experience should apply.

**Full/part time position:** Full time position during the summer months.

**Contact details:** naomi.chait@hp.com
**Biometric login for windows**

**Company:** Rafael

**For graduate students / undergraduate students:** graduate students or undergraduates in the final stages of their studies

**Job description:** Design and implementation of software components which adds biometric identification to the windows login.

Optional extensions:
- User data is saved in windows Active Directory or other databases
- Different biometric devices
- Different operating systems

**Requirements:** OOD, C# (.net framework 4.5)

**Full/part time position:** full time

**Contact details:** alexke@rafael.co.il 04-8794220, 052-4291014

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**Active directory based user management framework**

**Company:** Rafael

**Job description:** extending the windows Active Directory schema to support advanced and secure user management. Including: adding proprietary data fields to the schema and security mechanisms to protecting the data, importing and exporting users between two different domains.

Optional extensions: extending the basic design of the framework to create a "light weight" user management framework which is not dependent on windows Active Directory.
**Printer SDK**

**Company:** Rafael

**Job description:** Design and implementation of a generic interface to a printer. Including specific implementations for a number of specific printers (specific printer driver and documentation will be provided).

The printer interface will be used by different applications developed in the software department. For each application the relevant specific printer implementation will be used.

**Requirements:** OOD, C# (.net framework 4.5), some coding experience, undergraduates in the final stages of their studies

**Full/part time position:** full time

**Contact details:** alexke@rafael.co.il 04-8794220, 052-4291014

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**NIOS loader**

**Company:** Rafael

**Job description:** Development of an infrastructure software component running on NIOS architecture hardware responsible for loading software and firmware at boot time.

This component will also be responsible for remote management of embedded software and firmware (burning, deleting, version management, etc.) using standard communications (such as COM ports, Ethernet, USB) via a desktop application.

**Requirements:**
- Knowledge in C++ (must)
- Experience in developing embedded systems with emphasis on NIOS architecture (advantage)
**Full/part time position:** Full

**Contact details:** Koren Krupko korenk@rafael.co.il, 050-4039503

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**SMARC loader**

**Company:** Rafael

**Job description:** Development of an infrastructure software component running on SMARC architecture hardware (based on Freescale IMX6 Arm processor) responsible for loading software (Embedded Linux OS) and firmware (Altera VHDL).

This component will also be responsible for remote management of embedded software and firmware (burning, deleting, version management, etc.) using standard communications (such as COM ports, Ethernet, USB) via a desktop application.

**Requirements:**
- Knowledge in C++ (must)
- Experience in developing embedded systems with emphasis on ARM architecture (advantage)
- Experience in Linux programming (advantage)

**Full/part time position:** Full

**Contact details:** Koren Krupko korenk@rafael.co.il, 050-4039503
Amdocs

Predict version’s quality

Company: Amdocs (Team Name – Quality & Operational Excellence)

General Background: Amdocs is a global company, the market leader in customer experience systems innovation. Amdocs would like to develop Quality Prediction Models.

Job description: Our objective is to develop a Quality Prediction Model based on the past parameters and results of Amdocs’ versions quality.

The applicant is to become acquainted with the Measurements industry benchmarks, analyze the data, and identify variables that may affect it, analyze the results and draw conclusions.

Amdocs will supply: Vast database with relevant parameters’ measurements over time, professional consulting in business and software-development related aspects.

Requirements:
- Intensive applied mathematics background (Post graduate student or PhD)
- Data Scientist proficient in forming prediction models of small & medium data.

Full/Part time Position: Full/part time Position for about 3 month period.

Contact details: Yael Soffer Yael.soffer@amdocs.com, 09-7767807, 054-2555838

Data scientist

Company: Amdocs

General background: Amdocs is a leading software company for telecommunication providers around the globe. Amdocs testing team, of more than 2000 testers, is the testing telecommunication market leader.

Analytics of vast testing data may have large business impact. Test data analytics is a growing research domain with many opportunities.

Responsibilities: Our objective is to build predictive models of where defects are likely to be found, based on analysis of past Amdocs’ testing projects’ data.

Amdocs will supply:
- Vast testing data.
- Professional consulting of testing managers, business background and interviews
- Professional data scientists partners
Office, computer/laptop and analysis tools.

**Requirements:** Intensive applied mathematics background (Phd. preferred) in data science, machine learning or statistical analysis. Experience in R is preferred. Knowledge in testing is an advantage.

**Full/Part time position:** Either full time or part time, for 3 months at least. At least 2 days a week in Amdocs office in Raanana.

**Contact details:** Gilli Shama, Amdocs Testing R&D Director, gillis@amdocs.com 09-7786214
Verifying firmware correctness

Company: IBM Research Lab

Job description: Firmware is the lowest level code of the SW stack. It is present in all modern computer systems (e.g., smartphone, in-car-network, pc, server, large-super-computer). It is burned in the ROM and many times runs on auxiliary dedicated processors present in the system. The purpose of firmware is to allow a system to do its functional work, and its correctness is crucial to the system. Firmware is shipped as part of the hardware system and a bug in the firmware can be harmful to a company's reputation as much as a hardware one. Ensuring firmware correctness is a non-trivial tasks due to:
- its distributed nature
- its tight connection to the underlying (and complex) hardware - firmware runs on "bare metal"
- use of unique hardware interfaces
- unique characteristics that differentiate it from general software

In this internship we would like to address the challenge of ensuring correctness (and in general, analysis) of firmware. We shall explore the feasibility of various possible analysis goals and examine different techniques of how to achieve them. Where possible we will build on existing tools and experience, and enhance/modify them to cope with unique characteristics of firmware.

Requirements: We are looking for an MSc or PhD student whose research field is static/formal analysis of software and who has practical experience in this domain.

Contact details: Laurent Fournier LAURENT@il.ibm.com

Automatic identification of error checking structures in hardware designs

Company: IBM Research Lab

General background: Logic soft errors are transient errors affecting sequential elements (latches, flip-flops) and combinational logic of digital designs caused by cosmic radiation, package radioactivity and signal integrity issues. While enterprise computing has always had extremely stringent reliability requirements, new applications such as digital commerce and network computing expand the scope of computing systems and networks demanding high
resilience to errors. This put together with the continued integration of increasing numbers of transistors in VLSI circuits and systems results in logic soft errors becoming a serious issue in the design, verification, and validation of reliable systems. Vulnerability to soft errors quantified in FITs (Failures in Time). Chip designers can reduce the FIT by placing protections against soft errors.

One of the most challenging problems, if not the most challenging problem, one has to tackle when providing a solution to soft errors is to assess the FIT of a given chip. One aspect of FIT calculation is finding the derating factor of each sequential element – the probability that a flip in the sequential elements will actually impact the system. Another aspect is identifying which sequential elements are protected and by what means. This gives rise to the following problem: given a gate-level representation of a design, can we automatically identify those sequential elements which are protected against soft errors?

**Job description:** Develop a tool for automatic identification of error checking structures given a gate-level representation of a design. The idea is to first point at candidate circuits for being error checkers. This involves developing structural analysis algorithms for identifying known checking structures (e.g. parity checks using Xor trees). Dynamic functional analysis techniques will also be used for further identification and filtering of candidates.

One of this internship’s targets is to publish a paper with the project results in one of the relevant scientific/industrial conferences.

**Requirements:**
- Strong background in graph theory algorithms
- Familiarity with logic design and basic computer structure concepts
- Good C/C++ programming skills

**Full/Part time Position:** Full time summer internship.

**Contact details:** Shiri Moran shirim@il.ibm.com

**Architectural coverage for post-silicon exercisers**

**Company:** IBM Research Lab

General background: Validation in the post-silicon domain is predominantly carried out by executing random test instruction sequences directly on the hardware. The disadvantage of this randomness in test-case generators is that there is a loss of control relative to what is actually being tested. Coverage is the natural counterpart of randomness. It allows monitoring the test generation process and directing it toward uncovered areas, while avoiding too many repetitions of similar tests. Defining appropriate coverage metrics and understanding verification coverage are among the biggest unsolved challenges.
Bridging the gap between pre-silicon and post-silicon verification was one of the key factors that enabled reduction of the POWER7 development cycle. Running post-silicon validation tools, called exercisers, on the hardware accelerators is known as a exerciser-on-accelerator (EoA) activity. During EoA, implementation (RTL) level coverage is collected by the exerciser developers and used to prepare and target exercisers before bring-up. But, running exercisers during EoA also aims to find new and escaped bugs from the presilicon simulation. Thus, it is beneficial to have the exercisers tuned before EoA starts. Adjusting the exercisers during EoA involves the additional challenge of comprehending the implementation level coverage that consists of events defined by the design team.

Job description: The goal of the project is to research and develop novel coverage models and collection methodology that addresses both issues: tune an exerciser before EoA and comprehend RTL level coverage during EoA. The work will involve implementation of coverage collection framework over industrial Instruction Set Simulator (for example, FastModels or Mambo), gathering and analyzing coverage data from running an exerciser to fine-tune initial coverage model and exerciser. The results of this research may be submitted to a design automation conference.

Requirements:
- Computer Architecture
- Good programming skills
- Graduate student is preferred. Outstanding undergraduate can also apply

Full/Part time Position: Full time summer internship.

Contact details: Vitali Sokhin vitali@il.ibm.com

Static analysis for failure localization in hardware validation

Company: IBM Research Lab

General background: In post-silicon functional validation, one of the most complex and time-consuming processes is the localization of an instruction that exposes a bug detected at system level. The task is particularly difficult due to the silicon’s limited observability and the long time between a failure’s occurrence and its detection. Recent research [1] proposed a method for automatic architectural localization of post-silicon failures by leveraging the information derived from executing the test on an Instruction Set software Simulator (ISS). The proposed method [2] identifies a set of instructions that could lead to the faulty final state. The usage of simulator allows near-100% accuracy in failure localization. As this work is at exploratory stage, there is a variety of open research directions in this domain. Some of the directions include development of algorithms for analysis of new failure models, algorithms for static analysis that can be applied without dynamic simulation, etc.
Job description: In this project we will explore and implement new techniques for failure localization and debug. The techniques will allow extended analysis capabilities for various failure types. The intern will join an IBM research team which explores and develops novel verification and debug technologies used in variety of projects and companies in semiconductors industry. Successful results of this research may be submitted for publication.

Requirements:
- Good research and self-learning skills
- Good programming skills
- Graduate student is preferred. Outstanding undergraduate can also apply

Position: Full time summer internship

[1] Post-Silicon Validation research group, IBM Research - Haifa

Contact details: Arkadiy Morgenshtein arkadiym@il.ibm.com Wisam Kadry WISAMK@il.ibm.com

Method and tool for measuring test-templates quality

Company: IBM Research Lab

Job description: Random and constraint-based stimuli generation tools are widely used in the hardware verification process. Many of these stimuli generators are based on test-templates that describe the verification plan scenarios. These test-generators generate multiple test-cases that conform to the original test-template. Then these test-cases are executed on the design under test. This auto-generation saves the labor of manually writing test-cases and allows the verification engineer to specify the scenarios from the test plan using a user-friendly test-template language.

Simulation and silicon platforms are very expensive resources. We require the test-cases to be relatively unique, to avoid repetition and to ensure high utilization of these resources.

We propose to build a tool that measures the variability of the test-templates and indicates whether the generated test-cases are sufficiently unique to be executed over the different pre and post silicon platforms. The heart of the solution is to measure the variability of the generated test-cases per test-template and to give a "score" to its variability that defines how much the generated test-cases vary from each other.

Project deliverable / Publications: A proof of concept tool demonstrating the ability described above.
Requirements:
- A computer science/electrical engineering student
- Self-motivated, quick learner and good communicator
- Perl/C/C++ programming experience

Contact details: Wisam Kadry WISAMK@il.ibm.com

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Formal verification of SW

Company: IBM Research Lab (Researcher at the emerging quality technologies group)

Job description: Formal verification of software is an automatic method to either prove that a piece of code obeys certain properties, or to falsify that by finding a counter example. A tool for formal verification of C/C++ software developed at HRL achieves this goal by combining symbolic interpretation of the code with the SAT solving techniques. In this approach, control flow graph of the program is explicitly traversed, looking for feasible paths that can lead to software being at the bad state. The problem is very complex, since the number of possible program states is exponential by its nature. The problem becomes even more complex when the software under test is concurrent, because of a need to take in account every possible interleaving.

The candidate will join a team whose goal is to look for novel state-of-the-art and beyond techniques for dealing with inherent algorithmic problems in this approach such as path explosion (cases where a software under test contains an exponential number of feasible computational paths), or a team that develops solution for dealing with multi-threaded software.

We offer: An opportunity to work and conduct high-quality research in one of the leading research groups in IBM Haifa Research.

Requirements: Very strong C++ programming and OO design skills, ability to read and understand scientific literature, self-learning, team working..
Full/Part time Position: Summer internship

Contact details: Ronen Levi RONENL@il.ibm.com

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Data analytics

Company: IBM Research Lab (Researcher at the Emerging Quality Technologies Group)
**Job description:** Data generation is one of the key processes in enterprise test environments. The existence of smart high-quality data is crucial for testing data-intensive applications. Privacy regulations on the use of production data add another level of complexity to the data generation process.

The goal of the project is to explore and devise new methods for performing analytics under the above-mentioned restrictions. The focus of the work relates to relational databases with a variety of interconnections hailing from database-logic, business-logic, and testing-logic requirements. The work will include adding analytics capabilities that enable the technology to dive into existing data and generate user-guided insight which leads to higher quality test data.

The intern will join an IBM research team that is currently developing a state-of-the-art smart data generation technology.

**We offer:** An opportunity to work and conduct high-quality research in one of the leading research groups in IBM Haifa Research.

**Requirements:** Good research and self-learning skills, excellent programming skills with a passion for solving complex problems.

**Full/Part time Position:** Summer internship

**Contact details:** Ronen Levi RONENL@il.ibm.com

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**Constraint Satisfaction Problem (CSP) decomposition**

**Company:** IBM Research Lab

**Job description:** Data generation is one of the key processes in enterprise test environments. The existence of smart high-quality data is crucial for testing data-intensive applications. Privacy regulations on the use of production data add another level of complexity to the data generation process.

One of the possible methods for data generation is based on formulation of a Constraint Satisfaction Problem (CSP) [1], which models the data requirements. After the CSP is formulated it needs to be solved to produce the required data. A need to generate big amounts of data obeying complex data requirements (data rules and constraints) makes data generation even more complicated, resource intensive, and time consuming process.

The goal of the project is to devise new methods of formulation of complicated CSP-s that can be effectively solved with reasonable resources. The project entails exploratory research of existing methods and solutions of CSP construction and decomposition, as well as implementation of a proof-of-concept application.
The intern will join an IBM research team that is currently developing a state-of-the-art smart data generation technology.


We offer: An opportunity to work and conduct high-quality research in one of the leading research groups in the area of Verification and Quality Technologies on a topic that brings advanced analytics to the software verification process.

Requirements: Good research and self-learning skills, excellent programming skills with a passion for solving complex problems.

Full/Part time Position: Summer internship

Contact details: Tamer Salman TAMERS@il.ibm.com

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**Post-Analysis Failure Clustering for Hardware Validation**

**Company:** IBM Research Lab

General background: Failure clustering is the act of determining that several fails originate from the same problem. After a fail has been debugged, engineers define a "fail signature", that is, a definition of the observed important events that lead to a problem. With the fail signature in hand, engineers now need to go through many fails to determine which of these have the same signature and originate from the same problem. In reality, there are many fail signatures to look for, and hundreds of fails to sift through.

**Job description:** We wish to build a tool that would automate this process. The tool will allow its users to define multiple fail signatures. Based on the fail signatures, the tool will analyze new fails to determine whether or not they match a known bug signature.

The project includes multiple challenges, including the definition of the fail signature language (that can incorporate regular expressions, first order logic and temporal aspects), analyzing data to find patterns, and evaluating different matching criteria.

The intern will join an IBM research team which explores and develops novel verification and debug technologies used in variety of projects and companies in semiconductors industry. The results of this research will be documented in a paper which will be submitted to a top design automation conference and/or a relevant journal.

**Requirements:**
- Good research and self-learning skills
- Good programming skills
- Graduate student is preferred. Outstanding undergraduate can also apply
Full/Part time Position: Full time summer internship

Contact details: Arkadiy Morgenshtein arkadiym@il.ibm.com Wisam Kadry WISAMK@il.ibm.com

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**Security analysis for the cloud**

**Company:** IBM Research Lab (researcher in the area of cloud security)

**Job description:** OpenStack is a rapidly growing open-source project for Cloud Computing, developing software for the cloud infrastructure. Nevertheless, little attention has been given so far to the security qualities of OpenStack. The Openstack code is based on Python and automatic scripts, and there are no mechanisms today to reveal whether it has vulnerabilities or any malware affected flows.

The goal of the project is to examine Openstack security, revealing new weaknesses and vulnerabilities. It will involve running penetration tests, download and run known malware and monitoring its behavior, with the goal of generating new attacks. It will also involve workload generators to enable dynamic analysis of the OpenStack cloud.


We offer: An opportunity to work and conduct high-quality research in one of the world's leading research groups in the area of Systems Research on a topic that is in the bleeding edge of research and technology – Cloud Computing and Security.

**Requirements:** A good background in Operating systems, Linux and Systems skills. Passion for systems/storage/network research and systems security,
Full/Part time Position: Summer internship

**Contact details:** Dalit Naor DALIT@il.ibm.com

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**Anonymization**

**Company:** IBM Research Lab

**Job description:** Large data sets such as medical data sets have enormous value for society and the companies that collect them. The ability to extract, analyze and explore the data can advance science, provide insight and assist in decision making. Anonymization is the process of removing, generalizing and aggregating user information such that the privacy of individuals is not compromised (it is not possible to re-identify users). Anonymized data sets can then be shared with researchers to study and analyze the data or sold for profit.
Though many anonymization algorithms exist, most of them are not able to handle well large sets of data (data sets that do not fit in memory). This project will focus on the development of an anonymization algorithm able to handle efficiently very large data sets. The project will consider different approaches including streaming, partitioning and sampling, to overcome some of the difficulties associated with large data set and will consider learning, predicting and clustering methods to guide and optimize the algorithm.

We offer: An opportunity to work and conduct research with a team, working on the privacy domain on a topic that is on the frontier of the anonymization research.

**Requirements:** Good research and self-learning skills, excellent programming skills, knowledge of java is a plus.

**Full/Part time position:** Summer internship

**Contact details:** Micha Moffie  moffie@il.ibm.com

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**Mobile application monitoring**

**Company:** IBM Research Lab

**Job description:** In this project we will create a generic monitoring platform able to monitor the behavior and usage of android applications. Monitoring mobile apps can be used to understand application behavior and gain insight into user actions. Information gathered by the monitor can be used to enforce security policies, enhance user privacy and evaluate users’ trust.

The platform will provide monitoring API’s and automated processes to generate monitoring code for android apps. It will support the collection of events such as: GPS access, Clicks, Button pressed, network access, packet content, access to Contacts, data flow and more. The platform will support development of specialized monitoring for mobile apps by enabling the user to specify the events, the relevant information to collect, as well as code able to process the collected information.

We offer: An opportunity to research and develop state of the art mobile monitoring solutions.

**Requirements:** Good research and self-learning skills, excellent programming skills, knowledge of java, Android is a plus.

**Full/Part time position:** Summer internship

**Contact details:** Micha Moffie  moffie@il.ibm.com
**Offline application analysis**

**Company:** IBM Research Lab

**Job description:** This project deals with analyzing web-application logs to help create rules for a masking system (called MAGEN). The masking system uses a proxy to intercept HTTP messages between a client and server of a web-application, and performs masking of certain texts in the messages according to defined rules. The masking can be performed on either requests or responses, according to the use case. One of the use cases entails masking values in forms submitted by the user before they are saved to the database, in scenarios where the submitted data may be highly sensitive and cannot reside in the application’s DB, for example if it is a cloud-based application.

The masking system supplies many sophisticated masking methods to choose from, including format-preserving encryption and tokenization, that may be imperative in order to preserve the application’s original functionality. The main problem when masking values in a format-preserving manner is to recognize the values that have been masked in order to unmask them when the user views the data again.

The goal of this project is to analyze an application’s HTTP message logs (collected using a web-proxy, e.g., Fiddler) and discover in advance all of the locations in the application where data needs to be unmasked, to automatically create “unmask rules” for them. This analysis will run as part of an existing tool – an Offline Analysis tool for web-applications, implemented in C++. This project will be an extension of the existing tool, adding a new type of analysis to it.

**Links:**


http://en.wikipedia.org/wiki/Format-preserving_encryption

http://www.telerik.com/fiddler

We offer: An opportunity to conduct interesting research in the area of web privacy and security, for cloud environments using novel encryption techniques, as well as create an actual working prototype, that may later be integrated into an IBM product.

**Requirements:** Good research and self-learning skills, excellent programming skills (preferably experience in C++), basic knowledge of web protocols and languages (HTTP, HTML, etc.). Good people skills and teamwork.

**Contact details:** Micha Moffie moffie@il.ibm.com
Data encryption for web applications located in the cloud

Company: IBM Research Lab (researcher at the privacy and security area)

Job description: Today, businesses and governments can move their homegrown web applications to the cloud. However, many organizations are unable to make the move because of data security, privacy, and compliance concerns. We propose a system that smashes these barriers with encryption for any kind of web applications. In particular we provide an ability to encrypt sensitive data before it is transmitted from the enterprise to the cloud and decrypt it when it is transmitted from the cloud to the enterprise. The main challenge here is preserving the application functionality (e.g. search and sort encrypted data). To achieve this, we have to support Order Preserving Encryption (OPE) [1] in our system. With this being said, the goal of this project is to implement the encryption and decryption algorithms of a given integer-OPE scheme [2] (i.e., an OPE scheme for sets of consecutive numbers) and demonstrate how they can be used for encryption/decryption of general formats.


We offer: An opportunity to work and conduct high-quality research in the area of Encryption on a topic that extremely important for all Cloud customers – Privacy and Security.

Requirements: Good research, programming and self-learning skills, strong background in the area of Encryption

Full/Part time Position: Summer internship

Contact details: Tamar Domany TAMAR@il.ibm.com

Authorization for Hadoop-based systems

Company: IBM Research Lab (researcher at the Privacy and Security Area)

Job description: The Hadoop [1] framework is a popular way to store and process Big Data on the cloud. It is based on distributed processing of large data sets across clusters of computers using simple programming models like MapReduce [2]. As Big Data gains significant traction, it exposes multiple and complex security and privacy problems. To mitigate those problems, new cybersecurity techniques for Hadoop are required. In this project we focus on authorization for Hadoop-Based Systems.

The project goal is to validate and come up with guidance/best practices for leveraging Hbase [3] and Hive [4] for fine-grained access control [5]. The student would need to read the
literature, investigate, implement and produce a best practices paper with samples. Customers can use this best practice to leverage HBase and Hive for fine-grained access control.


We offer: An opportunity to work and conduct high-quality research in the area of Security for Hadoop-based systems. Outcomes of this project will make the research immediately applicable and practical to widely used distributed database systems.

**Requirements**: Good research, programming and self-learning skills, strong background in the area of Hadoop and Database Security

Full/Part time Position: Summer internship

**Contact details**: Tamar Domany TAMAR@il.ibm.com

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**Mining roles from DB log files demonstrating users' activity**

**Company**: IBM Research Lab (researcher at the privacy and security area)

**Job description**: Role mining [1] refers to the problem of discovering an optimal set of roles from existing user permissions. In most role mining algorithms, the full set of user permission assignments is given as input. However, in practice it is very challenging task to create precise assignments. The challenge we are facing in this proposal is mining roles from actual database usage information, information that is collected by monitoring the access of users to the database during a period of time.

With this being said, the project goal is identifying an optimal set of roles required for an application, given a DB log demonstrating users' activity.


We offer: An opportunity to work and conduct high-quality research in the area of database security.

**Requirements**: Good research, programming and self-learning skills, strong background in the area of Database Security
Full/Part time Position: Summer internship

Contact details: Tamar Domany TAMAR@il.ibm.com

Smart client platforms

Company: IBM Research Lab

Background: The Smart Client Platforms group specializes in the study and development of tools and platforms for developing, deploying, and managing enterprise applications using cutting edge Web 2.0, mobile and cloud technologies. The platforms we develop target skilled developers as well as knowledge workers and highlight operation simplicity, consumability, scalability, excellent user experience, while supporting high end security standards.

The group's activities are as follows:
- Rapid mobile application development - providing a consumable, high level, integrated set of capabilities to construct LOB mobile applications and solutions with an order of magnitude improvement in development costs, maintenance and administration.
- Enterprise mobile, cloud and system of records secure connectivity - providing an end-to-end security solution that protects the enterprise data on its way from/to the cloud. The solution incorporates a secure tunnel between the enterprise and the cloud, seamlessly integrates with the enterprise data sources, allows fine-grained control over the data items that leave the enterprise boundaries, and conducts in-enterprise processing of data.
- Mobile applications analysis - leveraging static and dynamic analysis to identify and collect semantic and syntactic anti-patterns and best practices for improving the application UX, performance, and reducing the energy consumption.
- Web legacy, mobile enablement – mobile enabling of JSP and legacy web applications, through native on-device container, analyzing the application, performing automatic application transformation while leveraging the mobile device’s native capabilities.

Contact details: Idan Ben-Harrush IDANB@il.ibm.com

Proactive location intelligence

Company: IBM Research Lab (Researcher and/or Software Engineer at the Smart Decision Solutions Group)

Job description: With the pervasive adoption of location aware technologies and other sensors in mobile devices, connected cars, environmental sensors, and other software and hardware
architecture, today's smarter systems need to be able to sense, analyze, monitor, predict, and response to space- and time- based situations. Our group aims to advance the state of the art in development of comprehensive set of technologies that facilitate building smart systems than can react, predict and take proactive actions to space-time situations. We apply our technologies for solving real-world client challenges across a wide range of industries such as Travel & Transportation, Logistics, Maritime, Insurance, Natural Resources and Retail. In addition we apply our technologies to address societal challenges in areas such as Smarter Cities, Urban Planning, Urban Mobility, Multi-modal Transportation, Environment, Open Data, and Citizen Engagement. We work in close partnership with other business units in IBM to deliver a standards based technological support for the IBM software platform, solution and services businesses.

References: [https://www.research.ibm.com/haifa/dept/services/sds.shtml](https://www.research.ibm.com/haifa/dept/services/sds.shtml)

We Offer: An opportunity to join R&D activities in the world's largest IT research organization.

**Requirements**: Good research and self-learning skills, programming skills (primarily in Java) and a passion for innovation that matters.

**Full/Part time position**: Summer Internship

**Contact details**: Jonathan Bnayahu [BNAYAHU@il.ibm.com](mailto:BNAYAHU@il.ibm.com)

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**Researcher at the medical imaging analytics group**

**Company**: IBM Research Lab

**Job description**: The Medical Imaging Analytics Group— part of the Multimedia Analytics department at IBM Research – specializes in advanced image processing technologies. The position involves generation of novel ideas in the field, invention and design of new computer vision methods to advance state-of-art in the fields of medical imaging.

We offer: An opportunity to work and conduct high-quality research with a leading research group in the area of image processing and machine learning, on a topic that is on the cutting edge of research and technology.

**Requirements**:
- Graduate student or (preferred) Masters/PhD Degree Computer Science, Electrical Engineering or related field of experience,
- Good research and self-learning skills.
- Background in computer vision or machine learning is important.
- Good programming skills in MATLAB/C - a must.

**Full/Part time Position**: Summer internship

**Contact details**: Tal Drory [TALD@il.ibm.com](mailto:TALD@il.ibm.com)
Computer vision

Company: IBM Research Lab (researcher at the video and GIS analytics group)

Job description: The Video and GIS Analytics group – part of the Multimedia Analytics department at IBM Research – specializes in advanced real-time video technologies. This unique group focuses on novel approaches for information overload and technologies in the areas of real-time rich-content streaming and management, video communication frameworks and geo-spatial situational awareness. The group develops a scalable framework for real-time connectivity, as well as a platform for off-line rich-media tagging search & retrieval of archived rich media assets.

In the area of video analytics, our group conducts research and develops novel computer vision algorithms (also using machine learning tools) for various problems such as object detection and tracking, visual recognition and scene understanding.

The goal of the project is to develop and implement novel algorithms for solving various computer vision problems related to video (such as the ones mentioned above), with a special emphasis on robustness and efficiency.

We offer: An opportunity to work and conduct high-quality research with a leading research group in the area of video analytics and computer vision, on a topic that is on the cutting edge of research and technology.

Requirements: Graduate student (preferable) with good research and self-learning skills, as well as with some background in image and video processing, and preferably also in computer vision and machine learning. Good programming skills in MATLAB and C++ are also required (prior acquaintance with OpenCV is a plus).

Full/Part time Position: Summer internship

Contact details: Tal Drory  TALD@il.ibm.com

Social stream analysis research

Company: IBM Research Lab (Researcher at the Web 2.0 and Social Media Technologies group)

General background: Social stream applications (activity streams), such as Twitter or the Facebook newsfeed, are becoming more and more dominant on the web. Through such streams, users share their activities, opinions, ideas, favorite links, photos, and videos, and in parallel get similar updates from their social environment. Similarly to their counterparts on the Web, social stream applications have also emerged inside organizations. Yammer, Chatter, and
IBM Connections are a few prominent examples. In this project, the goal is to develop a model for scoring of activities in the enterprise stream. The model may include personalized factors that reflect the user’s interests and global factors that characterize the activity as whole regardless of the user. Our goal would be to publish a scientific paper on the on the hand, and contribute to the IBM Connections product with advanced analytics functionality on the other.

**Requirements:** Graduate students with strong engineering skills and excellent research skills who can work as part of a team. Java programming knowledge is a must, due to the short term of the project. Web development skills are an advantage and so is existing publication experience.

**Full/Part time Position:** The project fits a 3-month internship on a full position basis.

**Contact details:** Ido Guy [IDO@il.ibm.com](mailto:IDO@il.ibm.com)

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**Data mining of neural network parameters**

**Company:** IBM Haifa Research Lab

General Background: Self-organizing maps (SOM) and their extensions are means of clustering and organizing multivariate data, in order to visualize, explore, and find patterns in the data.

SOMs are neural network models that involve sophisticated and highly nondeterministic algorithms. These algorithms are driven by certain configurable parameters, whose configuration is a nontrivial task that heavily relies on the characteristics of the input data.

**Job description:** Apply data mining and machine learning techniques in order to automatically configure the parameters of a novel extension of the SOM algorithm (based on the input of the algorithm). Design a setting for this task, in which sufficient supporting data is collected from benchmark runs of the algorithm. Support the possibility of later incorporating data obtained from actual runs of the algorithm.

We offer exploratory research project possibly leading to a scientific publication, in addition to participating in developing a novel solution with a clear productization roadmap.

**Requirements:**
- Strong background in data mining and machine learning
- Experience in data analysis is an advantage
- Background in neural networks and AI techniques is an advantage

**Full/Part time Position:** Full time student position for the summer period

**Contact details:** amirka@il.ibm.com
**Using mathematical optimization techniques for constructing visualizations**

**Company:** IBM Haifa Research Lab

General Background: Visualizing multivariate data on the plane (and lower-dimensional spaces in general) is a well-known problem with many uses in a variety of fields, for which a plethora of visualization techniques have been suggested. When certain limitations are imposed on the datasets, effective visualization techniques can be devised so as to allow exploring the dataset, find patterns in it, and get insights. Pareto frontiers are an important class of multivariate datasets: these are the result of the multi-objective optimization problem, and central to the all-encompassing problem of decision making in the face of several objectives with tradeoffs between them.

**Job description:** A novel and effective type of visualization of Pareto frontiers has been recently devised. Constructing this visualization is a nontrivial task, and currently uses sophisticated nondeterministic algorithms of neural networks. This project aims to devise and develop a different technique for constructing the same visualization, one that is more deterministic in nature. The project requires formalizing the problem of constructing the visualization as an attainable optimization problem, and solves it.

We offer: We offer exploratory research project possibly leading to a scientific publication, in addition to participating in developing a novel solution with a clear productization roadmap.

**Requirements**
- Strong analytical thinking
- Strong background in mathematics / mathematical sciences
- Background in optimization and mathematical modeling is an advantage

**Full/Part time Position:** Full time student position for the summer period

**Contact details:** amirka@il.ibm.com
Company: EMC / RSA
RSA is the security division of EMC. The Israeli R&D center is located at Herzeliya, and we develop fraud detection systems for online banking, eCommerce, and IT security. The intern position is in the research and innovation group, which includes ~10 researchers. We are developing the next generation of data science tools for RSA products.

Full/part time position: part-time

Job description: There are many optional projects to work on. Here are two examples.

a. Job description: IP ⇔ user ⇔ host mapping
Many behavioral analysis tools generate user profiles and detect anomalies. However, in most IT systems there is no straight forward match between the user identity and its IP address. This makes it difficult to generate long term profiles. The task is to match between a given internal IP address and a username and hostname. This includes extracting data from different data sources, synchronizing the data, generate logical flow that matches the different entities, and design and apply evaluation of the developed tool.

b. Job description: Automatic evaluation
There are many malicious sites on the internet. We apply advanced data-driven statistical tools to detect this domains and the development of these tools highly depends on a good automatic way to evaluate the system accuracy. The task is to develop an automatic tool that extract data over these domains from online analysis tools, aggregate this information to a unified score, and statistically evaluate the results.

Challenges: The cyber world is about to perform a major paradigm change. Every major company has been breached in the past years, including Google, FaceBook, Apple, and recently – eBay. The current defense of FireWalls, AntiViruses and static security rules is not sufficient. Not anymore.
This drives the cyber market into more sophisticated tools: data-driven, behavioral-based, machine learning systems that detect anomalies and find new attacks that have never been seen before (Stuxnet is one good example). The development of these tools is extremely challenging: There are BigData issues, the data is unlabeled and unsupervised methods need to be used, human and machine behaviors are diverse and difficult to predict and many more. However, this is the future of the IT security and cyber systems and RSA intends to play a major role in this adventure.
So, if you think you have what it takes, you’re creative, smart, and self-learner – we invite you to join the ride. At least for this summer.
Requirements:

- Programming skills:
  - Required: SQL, Python
  - Advantage: Java, R
- Knowledge in statistics
- Self-learner and independent

Contact details: eyal.kolman@rsa.com

Please apply here: http://emc.avature.net/careersisrael/JobDetailsIsraelCOE?jobId=24093
Yahoo!

Student optimization position

Company: Yahoo!

Job description: Yahoo! Tel Aviv the R&D center is working on the next generation of ad serving technology for PC, Tablets and Mobile. Join our team and work in a dynamic and friendly start up environment. You'll be challenged with front line projects, state of the art web technologies, and work on Big Data, Semantic search, Machine learning and Optimization for our 700 million daily visitors.

The Yahoo! Tel Aviv team is looking for excellent graduate students who are looking to work on real big data, see real-life results of their research work, and study from the Yahoo’s best developers and researchers. Be a part of the team working on Yahoo’s fastest-growing advertising product.

Requirements:

- Graduate student (towards MSc / PhD) in computer science (or related fields)
- Experience with programming languages such as Java, C++, C#
- Data mining / machine learning / statistical learning related research
- Familiarity with recommendation systems / probability processing / algorithms / online advertising - advantage
- Familiarity with big data, hadoop, pig – advantage
- Familiarity with UNIX scripting languages (e.g. Bash, Perl, Python) - advantage
- Ability to prioritize tasks and work independently, while interacting with product and engineering teams
- Excellent analytical and problem solving skills and desire to learn new skills
- An excellent team player
- Excellent communication skills

Full/Part time position: 40% Position

Contact details: please send CVs, along with the relevant job title to: israeljobs@yahoo-inc.com

Internship position

Company: Yahoo!
**Job description:** Yahoo! is pioneering the new sciences underlying the Web. As the center of scientific excellence for Yahoo!, Yahoo! Labs delivers both fundamental and applied scientific leadership through published research and new technologies powering the company’s products.

**Requirements:** Yahoo! Labs is looking for exceptional PhD / MSc students to work with us in our intern program for the summer of 2014. We currently have one position left, and seek world-class graduate students in pursuit of a PhD / MSc in Computer Science, Electrical Engineering, Mathematics, Statistics, or a related area. We are particularly interested in students with technical programming skills, working on Machine Learning, algorithms, search (systems or algorithms), collaborative filtering, Systems or analysis of large data. Ideal candidates will either be pursuing their PhD, or have finished at least a year of MSc graduate work.

Interns are expected to work with our scientists to perform original research, apply scientific thinking and techniques to improve the performance and effectiveness of our products, and solve problems by analyzing large amounts of data, gaining valuable experience in the field of applied data science. They will have the opportunity to publish their work and expand the horizons of web science.

**Contact details:** Candidates will need to submit a CV plus a letter of recommendation from their graduate advisor. Yahoo! Inc. is an equal opportunity employer.

For more information or to search all of our openings please visit [http://careers.yahoo.com](http://careers.yahoo.com).
Log and tracing features development for SW device driver

Company: Marvell

Job description: There is software driver for complex manageable semiconductor devices. These are ANSI C libraries those are set of API functions with plurality of parameters. The driver is part of complex systems those working in different data communication equipment like routers, switches, gateways e.t.c.

Need to develop new feature for the driver to log calls of API functions and parameters. The tracing of internal logic needs to be developed as well.

Development environment:
1. C language
2. Visual Studio 2010 for Windows 7
3. Linux related environment also.

Requirements/Courses:
- Courses:
  • C language
  • Software programming courses
- Experience and Knowledge: Must to know C programming language.

Full/Part time position: Full time position for 3 months

Location: Petach Tikva

Contact details: please send CVs israeljobs@marvell.com
**Microsoft**

**Machine Learning / Big Data analytics applied researcher**

**Company:** Microsoft. Location: Herzelia

**Job description:** The Cloud Machine Learning Applications Group at Microsoft’s Israel Development Center is a start-up spirited, fast paced research and engineering team focused on incubating new, innovative finished SaaS applications focused around data analytics & machine learning. The team’s charter is to create machine learning powered intelligent web services and end to end solutions for scenarios in diverse enterprise and consumer verticals. We are offering graduate students the opportunity to work as a team on cutting-edge, real-world applied research problems. The interns will participate in scoping the problems in the context of the product, business and user experience challenges at hand, giving them an opportunity to influence the next generation of Microsoft products. Overlaps with the intern’s academic research interests are welcome. Advisors are welcome to be involved.

**Responsibilities:** Contribute to ideation, scoping, and definition of research problems. Conduct independent and team research. Prototype algorithms and experiment on large amounts of real-world data. Collaborate with engineers on feature implementation.

**Requirements:**
- PhD/MSc student, researching a data-related topic.
- Strong programming skills (Java/C++/C#).
- Algorithm development skills.
- Background in Machine Learning or Data Mining areas - a strong advantage.
- Team player, communicative, highly motivated, innovation-oriented.

**Location:** Herzelia

**Job description:** Microsoft Israel R&D center is offering the opportunity to work as a team on cutting-edge, real-world applied research problems at Microsoft Cloud Machine Learning Applications Group. Start-up spirited group, with charter to create machine learning powered intelligent web services and end to end solutions for scenarios in diverse enterprise and consumer verticals.

If you want to participate in scoping the problems in the context of the product, learning and overcoming business and user experience challenges at hand, you can take a part giving an opportunity to influence the next generation of Microsoft products- apply now!

**Full/Part time position:** Part-time.

**For full job description and application click** [here](#)
**SPIR generator showcase**

**Company:** Intel

**Job description:** SPIR (Standard Portable Intermediate Representation, [http://www.khronos.org/spir](http://www.khronos.org/spir)) is a portable, non-source representation for devices programs. SPIR enables the consumption of code from third party compiler front-ends for alternative languages to C, such as C++. SPIR 1.2 supports OpenCL C as defined in the OpenCL 1.2 specification.

In this project, we would like to demonstrate how a cross platform Domain Specific Language \ Tool (not OpenCL “C” kernel language) should target SPIR and OpenCL runtime. The project is planned to be publicly available targeting developers who want to ramp and get educated on SPIR. It should be OS agnostic (Windows, Linux and Android) and focus on the high performance data parallel compiler technology for OpenCL devices (GPU, CPU, etc...).

This project will expose the student to the cutting edge LLVM compiler infrastructure and to the modern heterogeneous computing OpenCL and SPIR standards.

**Requirements:**
- C++ knowledge
- Ability to work independently
- Compiler Background
- LLVM Compiler infrastructure (www.llvm.org)
- OpenCL 1.2 Specifications ([https://www.khronos.org/registry/cl/specs/opencl-1.2.pdf](https://www.khronos.org/registry/cl/specs/opencl-1.2.pdf))
- SPIR 1.2 Specification ([https://www.khronos.org/registry/spir/specs/spir_spec-1.2.pdf](https://www.khronos.org/registry/spir/specs/spir_spec-1.2.pdf))

**Full/part time position:** Full

**Contact details:** boaz.ouriel@intel.com

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**Binary translation techniques for low-memory, low-speed Galileo/Arduino devices**

**Company:** Intel

**Job description:** Internet of things (IoT) is an exciting new area where new devices are emerging and new ways to develop these devices are formed. The Arduino interface is one of the known ways to prototype and implements devices for the IoT world.
Intel is shipping cards that support the Arduino interface called “Galileo”. As part of this work, the student will get familiarized with the Galileo card of Intel and will apply various binary translation techniques on the applications’ binaries at runtime.

Requirements: Basic knowledge on x86 architecture and assembly.

Full/part time position: Full position

Contact details: Gadi Haber  gadi.haber@intel.com