Internship report

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Software developer Internship from 22-11-2017 to 16-02-2018

supervised by Erez Saf.

CRiskCo Credit community

CENTRALE MARSEILLE

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Thanks

I would like to thank everybody at CRiskCo for this great internship and the ongoing employment. More specifically, I would like to thank Efi Bar for the very welcoming first contact with CRiskCo, Adam Harris and Iman Naslpak for the interesting discussions and insights you shared with me on AI, Dave Mc Adam and Rubia Kamal for the stimulating collaboration on my first assignment at CRiskCo, Guy Sand for your patience and mentoring, you have helped me become a better developer. And Finally, I would like to give a special thanks to Erez Saf for giving me the opportunity to work at CRiskCo, the high standards you set out and the supportive and relaxed environment you maintained.

Summary

I have completed a 3-month software developer internship at CRiskCo at the River City Labs coworking space. CRiskCo is a dynamic fintech start-up that helps small businesses asses their credit risk and get better access to loans and insurance.

As a software developper I was in charge of a number of projects including creating an online payment process for our new customers and getting new business intelligence information throuh a government web service and showing it to our users for a validation feedback. I am grateful for the freedom I was granted to execute every project fully -from solution architecture to implemetation and testing- while acting on feedback received from my colleagues.

This internship has been a great learning experience as I have discovered most of the tools and techniques I used during the internship. These range from web development and good practicies to database operations and code organization in a 3-tier architecture. I have also met a number of people who are passinate about innovation during community events and talks who have made this journey truly inspiring from a human as well as technological standpoint.

Résumé

J'ai effectué un stage de 3 mois chez CRiskCo en tant que développeur web, j'ai travaillé depuis l'accélérateur River City Labs. CRiskCo est une startup de la fintech qui a ide les PME à gérer leur risque de créance client et facilite l'accès à l'emprunt et à l'assurance.

En tant que développeur j'étais responsable de plusieurs projets, tels qu'un portail de payement en ligne pour les nouveaux clients ainsi que l'accès à un API du gouvernement australien pour afficher des informations supplémentaires à nos utilisateurs. J'ai apprécié la grande liberté qui m'a été laissée pour conduire chaque projet en intégralité (choix de la solution, implémentation et test logiciel) tout en incorporant les retours de mes collègues.

Ce stage m'a permis de découvrir beaucoup de nouvelles techniques et outils. Ceux-ci sont très divers : des bonnes pratiques du développement web jusqu'aux opérations sur les bases de données et l'organisation du code dans une architecture à trois niveaux. Lors d'évènements et conférences j'ai rencontré des gens formidables qui ont rendu ce stage extrêmement intéressant d'un point de vue humain et technologique.

25% of bankruptcies are triggered by customer debt collection issues

Company presentation

History

CRiskCo was co-founded in 2013 by Erez Saf and Amit Eisenthal on the finding that most businesses suffer from cash flow problems when their customers don't pay on time or go bankrupt. In fact, it is the leading cause of bankruptcy: 25% of bankruptcies are triggered by customer debt collection issues. CRiskCo has created a Credit Risk Community of businesses that shares information about their customers. Thus, the community becomes better informed as it grows. CRiskCo has developed a Machine

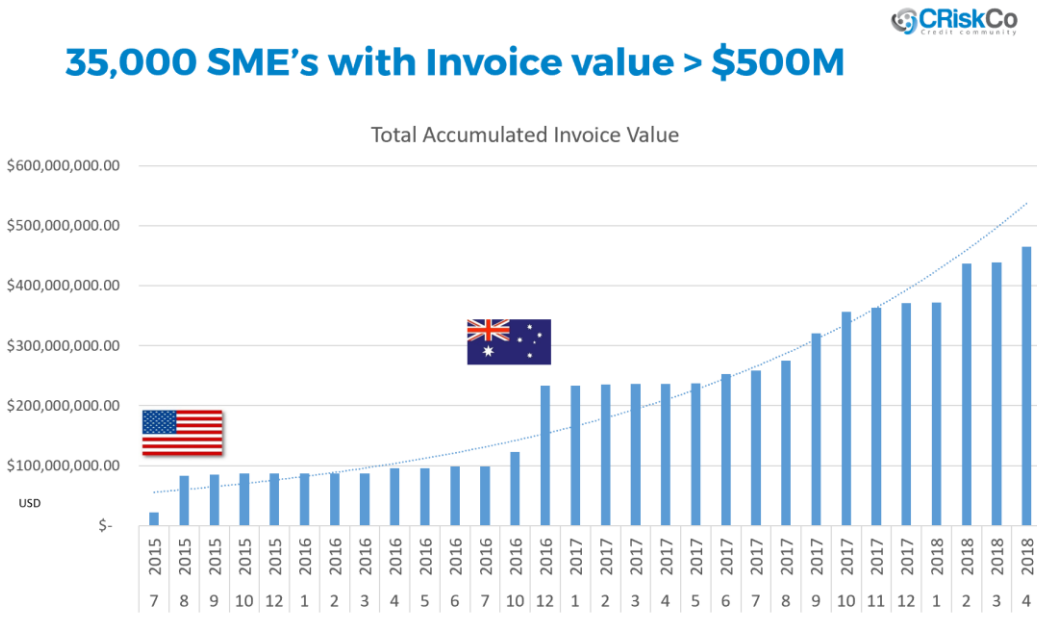

Figure 1: Evolution of the invoice database

Learning model trained on over $500M worth of invoices from 35 000 SME's to predict the likelihood that a given customer will pay on time, this finscore® ranges from 300 to 850. This score is shown to the user along with KPIs and graphs in an online dashboard, this intelligence helps our customers track unpaid invoices and assess their customers creditworthiness. All our information is updated daily directly though the accounting system API. CRiskCo's innovative approach to customer credit analysis and

The team is very multicultural, in fact all team members working from Australia grew up in different countries: Malaysia, Israel, England, France, Iran and Australia!

management has been rewarded by a first place in the BBVA Open competition innovation challenge. CRiskCo also reached the finals in two other China FinMaker Competition and Global Start-Up Challenge: FinTech 2017.

As many online platforms, CRiskCo operates on a SaaS (software as a service) business model.

Locations

CRiskCo was founded in 2013 in Los Angeles and quickly moved to San Francisco to benefit from its hub of innovation. The team has expanded to include developers, marketer and operations manager as well as a board of advisors with extensive experience in insurance and technology. CRiskCo has more recently moved to Australia as part of the government Hot DesQ initiative (a government funded initiative to attract start-ups to Australia by providing grants up to $100, 000 AUD) to follow business opportunities. The team is comprised of Erez Saf founder and CEO of CRiskCo, Guy Sand a talented full stack developer working from Israel, Efi Bar who handles Logistics, Accounting and Human Resources based in Palo Alto, California and Dave McAdam an experienced manager who has led major transformation initiatives at large Financial institutions, as well as 4 interns including myself. The team is very multicultural, in fact all team members working from Australia grew up in different countries: Malaysia, Israel, England, France, Iran and Australia!

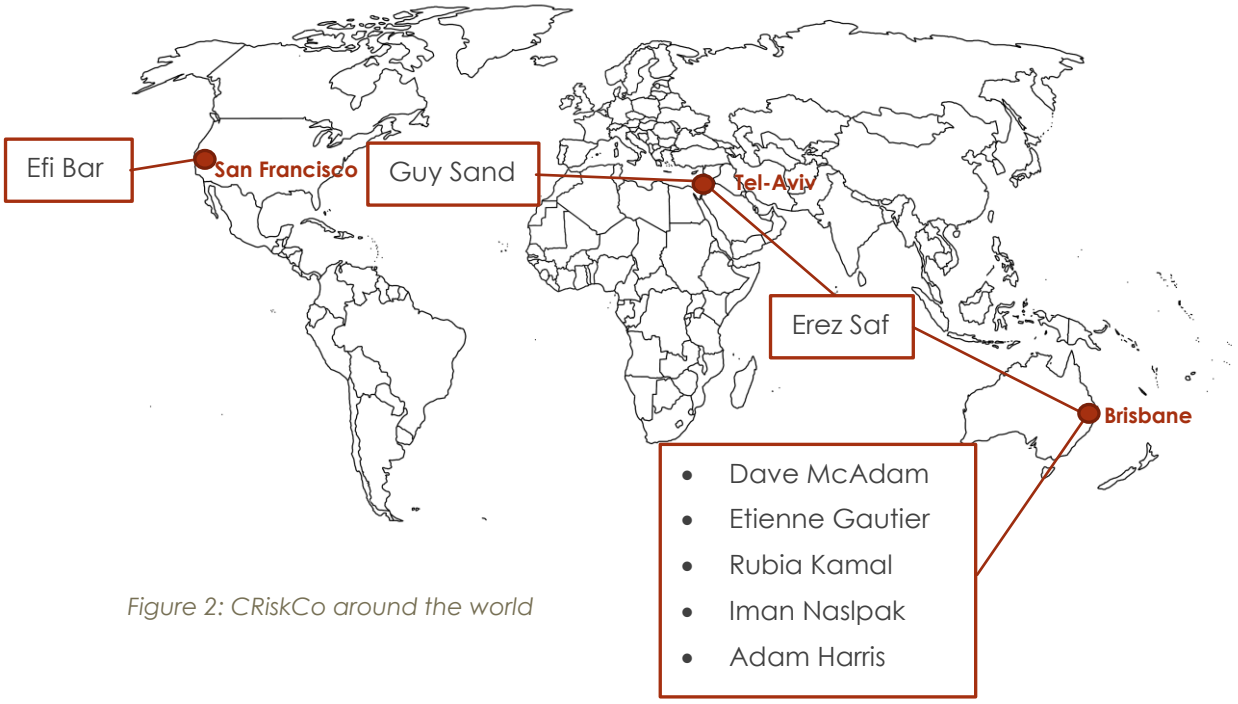

Figure 2: CRiskCo around the world

Financial Data

CRiskCo raised $500, 000 of funding in 2015 from investors include Plug & Play (the Silicon Valley based innovation hub) and angel investors. Other details are confidential.

Future Growth

CRiskCo is working to expand their operations with various government agencies in Australia, a pilot project has been completed with the Queensland government to review grant applicants. The pilot has recently been approved and more work is underway to extend the project. Different opportunities with local partners around the globe in lending and insurance are also explored.

The team is very multicultural, in fact all team members working from Australia grew up in different countries: Malaysia, Israel, England, France, Iran and Australia!

My Assignments

CRiskCo is using an Agile methododlogy for all software development and realeases features incrementally to match our clients needs. Our product backlog is defined mostly by Erez our CEO and Guy Sand our lead developer, those feature ideas come from weekly conference calls with the team and advisors, business opportunities and contracts. We regularly pick tasks from our product backlog that are broken down to represent roughly 2 weeks of work. We also work closelsy with the client-facing operations to toubelshoot issues and prepare demonstration websites before meetings. These smaller unplanned tasks never take more than 2 days.

I worked on a number of tasks during this internship ranging from a simple modification to a web page to the creation of complex processes involving serveral calls to our API, 3rd party APIs and database operations. Here are the four main tasks that I completed during the internship:

- As CRiskCo offered a new paying service to small businesses, a online payment system became a necessity. The payment steps were inserted in the registration process, this involved a lot of planning to work with 3rd party APIs (Stripe, Google invisible Captcha) and took me a full month to complete as I was still discovering our codebase.
- I worked on SEO (search engine optimisation) to maximise the ranking of our website covering both aspects of SEO: on-site (identify and use keywords popular in search, embed JSON-ld metadata) and off-site (monitor links to our site, contact website). This area was completely new to me and I was given the freedom to do some research and then implement the solution directly.
- All accounting systems use different norms to represent the country of a business. Before implementing country based features, we needed to standardize country names from a fuzzy input (US, USA, United states, United states of America all represent the same country). I managed to clean 99.7% of old database records, and analysis of the remaining inputs showed they were all erronous. My implementation was used to convert all previous data and all new inputs.

- As CRiskCo expanded in Australia, it became interesting to include additional information from the Australian Business Registar (which contains tax number, official name and the registration status) in our dashbord. I worked on all aspects of this project from the user interface to the automatic daily update of our database.

Methodology

The four main missions I worked on were different in many regards but I always started by a planning phase. When working with complex interactions between client-server and 3rd-party APIs the process was the following: I started by reading the documentation of the APIs and understand the interactions involved in the process and represent them step by step in a flowchart.

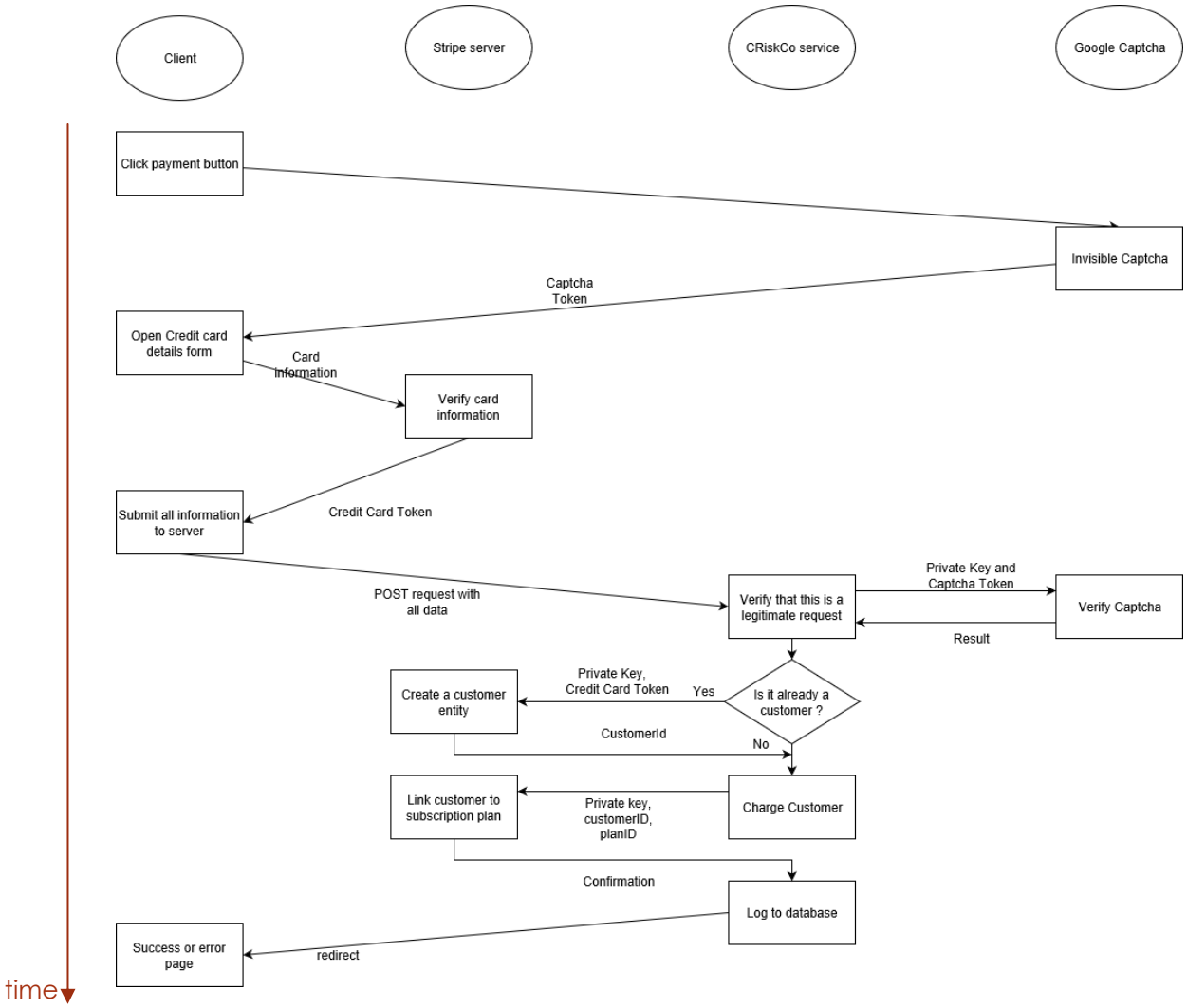

Figure 3: Flowchart of the Payment process

Then, I designed the solution from our side, thinking about database tables and code architecture. I discussed my findings with senior developers Guy Sand and Erez Saf whose input often made me rethink my model.

Then I went on with the code implementation. The code architecture was very different from what I had encountered before with a clear separation between the database operations, API calls, entities and the business logic (high level methods). This framework was disorienting at first but once I wrote code in each of these sections I quickly understood the advantages of such an architecture and managed to find my way between files more quickly.

Finally, I tested the software: first looking at individual methods and then testing the whole process. When I believed my code was ready to go to production, I went over it in a code review with fellow developer Guy Sand who challenged my implementation choices and showed me how to comply to the code architecture already in place.

At the beginning of this internship had very limited knowledge of HTML and CSS and reasonable bases in Object Oriented Programming with Java and SQL databases. I went much further in those areas, discovered many new tools (Visual Studio, My SQL Workbench, fiddler), programming languages (Perl, JavaScript, C#) as well as coding patterns (Singleton, lazy initialization, factory method).

This internship also illustrated the evolution of code over time when the company switched from Perl to .NET which provides much more tools for developers (rich IDE, advanced debugging features) and which scales much more easily. The code is more organised and indexed by the IDE, features such as "Go to definition" are especially useful when navigation such a large code base (more than 20 000 lines of code).

Work Environment

Workplace

I worked at the River City Labs co-working space, a large and brand-new start-up hub at the heart of Brisbane. Residents have access to the facilities (meeting rooms, board rooms etc.) and community events (talks, meetings). This is a vibrant community with an accelerator program that hosts 10 start-ups for a 6-month session.

Figure 4: A community event at my workplace

The cohort is very diverse ranging from b2b software, drones to a platform for private tutoring and educational game. The start-ups are also at different stages, some already have a product and customers, others released their beta version halfway through the program. More advanced start-ups such as Clip Champ (online video editing and compression) are leaders on their market with 3M users. Large corporations

have established an innovation lab on RCL premises such as Bank of Queensland and the Queensland Government eHealth department.

Of the many events I participated in I especially enjoyed:

- Practical workshops on a wide variety of subjects: crypto-currencies, drones and SEO, negotiation etc.
- Monthly pitching sessions where entrepreneurs present their ideas in an interactive format. The pitches are followed by a networking time. Having professional conversations in such a noisy room was quite challenging!
- A presentation given by Rod Drury the founder and CEO of Xero (since then, he has stepped down from that position), an Online accounting software valued over A$6 B that CRiskCo connects with. He shared the unusual path taken by the company: Xero was publicly traded before receiving any investment.

I worked closely with Guy Sand in Tel-Aviv, Israel whom I have never met in person

Human resources

Because of its size of only 4 full time employees, CRiskCo is naturally a human sized company. It emphasizes on a very open, encouraging and friendly approach to management. As an intern, I was given real responsibilities and mentoring to achieve my assignments. I felt encouraged and learned a lot throughout the internship. CRiskCo was also very flexible as to how the work was done: I had no fixed schedule and could also work remotely (although I preferred working from our office). The team

worked in a friendly atmosphere: we often had lunch together, we participated in social events and met outside of work.

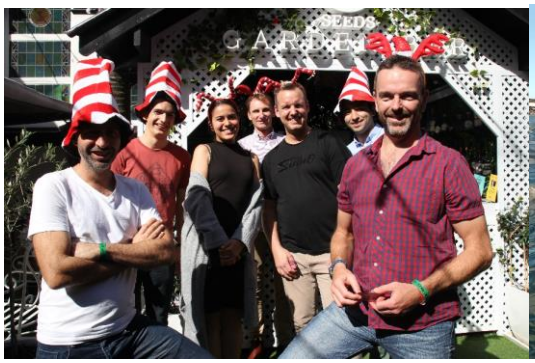

Figure 5: Christmas mini-golf with the Brisbane-based team.

Figure 6: Dive with Erez Saf

Communication

With a team that is so split geographically, it is important to keep a good professional communication. I worked closely with Guy Sand our lead developer based in Tel-Aviv, Israel whom I have never met in person. We used 3 communication channels: email for long messages and more formal communication, WhatsApp for short or urgent messages and finally Zoom, an audio and video calling service that enables screen sharing and remote control for "meetings". This was especially helpful to have a conversation over development tools at the beginning of the internship, we went over some processes together despite the 9h time difference and many thousand kilometres.

I found that given the communication tools available, distance wasn't a problem but time difference was challenging during the first couple of weeks as I had many technical questions during the day and I needed to wait until 5pm to make the call and get an answer. This became less of a problem as I gained more knowledge into how the codebase is organised and thus acquired more autonomy.

Finally, communicating in English wasn't a problem as I had spent 6 months in Australia prior to the start of the internship. Most Employees have also learnt English as a second language so everybody was very forgiving of occasional mistakes.

Conclusion

During this internship, I had the chance to work on many aspects of Software Engineering. I developed new technical knowledge and soft skills while working in English. I have also discovered a vibrant start-up ecosystem from the inside, this experience has shifted my career plans towards start-ups and reinforced my interest in expatriation.

I am extremely satisfied by this internship and I am glad to continue working part-time at CRiskCo alongside my studies. This job continues to carry new opportunities and technical challenges in a hands-on approach that is missing from my studies.

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Glossary

Economics

SME (small and medium-sized enterprises): a company that is below a given size threshold (turnover, employee count…). In Australia, it is defined as company with less than 200 employees.

Creditworthiness: Judgment of an entity's current and future ability, and inclination to honour debt obligations as agreed upon. It is usually based on the credit history, credit rating, and character of the entity.

CRiskCo finscore®: a credit score developed by CRiskCo, it rates a business creditworthiness by looking solely at its history of customer credit payment. This approach avoids biases related to a company's public image found in other credit scores.

KPI (Key Performance Indicator): a measure of the quality or efficiency of a process. Some common financial KPIs include ADD, CEI, DSO.

ADD (Average days delinquent): the average number of days that customers are late to pay their invoices (timespan between the due date and the payment date).

DSO (days sales outstanding): In accountancy, a calculation used by a company to estimate their average collection period. It is a financial ratio that illustrates how well a company's accounts receivables are being managed. $DSO = \frac{accounts\ receivable}{average\ sales\ per\ day}$

CEI (Collection efficiency index): The ratio of all payments (expected over a timespan) that are received.

Computer science

API (Application protocol interface): This acronym designates all the interactions that one program advertises for other programs to use. Some APIs are meant for local use (i.e. plugins for Microsoft Word) while other advertise their methods over Internet (i.e. an email provider with a mail client such as Outlook or Mozilla thunderbird).

3rd party API: An API between two separate entities. For instance, OAuth (the protocol between the "login with Google/Facebook" feature) defines a common protocol for authentication between any website and Google (or any other authentication provider).

RESTful API: A architectural style and approach to communications often used in web services development. RESTful APIs are stateless and available over the web.

3-tier architecture: a client-server architecture in which the functional process logic, data access, computer data storage and user interface are developed and maintained as independent modules on separate platforms.

SEO (search engine optimization): Techniques to maximize the ranking of a website on a search engine result page. They can be divided in two categories: on-site and off-site. On-site SEO is a set of modifications to the website that a search engine web crawler will consider beneficial to the user, unique content and a meaningful presentation will enhance a website ranking. Off-site SEO focuses on the online reputation of a website: the aim is to ensure that your website is referred to by many quality websites (blog, social media posts, etc.)

Other

Product backlog: In an Agile methodology, a list of features of a given product that each represent a small amount of work (around 2 weeks).

References

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- Hot DesQ grant to CRiskCo: https://medium.com/advance-queensland/a-not-so-risky-business-fca9ad431473
- Newsletter about start-up challenges results: https://mailchi.mp/3fba30e0cc75/criskco-is-reaching-milestones
- Content on SEO (Search engine optimization): https://moz.com/learn/seo
- Definition of a 3-tier architecture: https://www.izenda.com/blog/5-benefits-3-tier-architecture/