

# Adam Kurkiewicz

## GITHUB PROJECTS

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### Predictive Collision

*A priori collision engine in Python*

Quick and accurate collision detection is a big algorithmic challenge the game industry faces every day. Most solutions use *a posteriori* approach, which requires a series of calculations to be performed every frame. In this project I have explored a different approach, which computes the exact position of the collision event using linear algebra. The advantage lies in calculations being performed only once every 10-100 frames, and the disadvantage in their higher computational cost.

### Vaida

*Humanizing public-key cryptography*

Vaida is a solution which redefines decentralized key distribution. With a simple user interface and secure protocol, Vaida lets the user create a video with personalized statement, which contains their key properties. Subsequently the statement is made public, e.g. on YouTube, and the user's peers can verify the user's identity and their new public key.

### Stock Exchange

*Scalable stock exchange in Java*

This is a team effort undertaken during Barclay's hackathon in Autumn 2013. Along with 3 other participants I have managed to create a scalable stock exchange, capable of executing 300,000 trades per second. The code shows a genuine 24-hour effort, and no post-hackathon development was carried out. I have plans to carry on with the project, depending on other commitments.

### Strongly Connected Divide and Conquer

*Parallel implementation*

Perhaps the finest of my programming achievements, this work in Java is an implementation of an algorithm introduced in an [IBM research report](#). The algorithm performs a decomposition of a graph into Strongly Connected Components – a very important graph operation, which is frequently the first step in analysis of large graphs. Prior to early 2000s, we had not known efficient algorithms to perform SCC decomposition in parallel, and although we do now, there is a shortage of their implementations. The following work is my attempt to bridge this gap.

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## EDUCATION

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- 2011 – 2015 UNIVERSITY OF GLASGOW  
**JH Maths & Computing**  
Glasgow, UK
- 2010 – 2011 JAGIELLONIAN UNIVERSITY  
**Studies in science**  
Krakow, Poland
- 2007 – 2010 MELCHIOR WANKOWICZ HS  
**International Baccalaureate**  
Katowice, Poland
- 2004 – 2007 FRENCH-POLISH BILINGUAL  
JH  
**Certificate in French**  
Katowice, Poland
- 1998 – 2004 MUSIC PRIMARY SCHOOL  
**Main instrument: Cello**  
Katowice, Poland

## SKILLSET

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### ORGANISER

In May 2013 I co-founded GUTS – [Glasgow University Tech Society](#). I served as the project officer in the society and a leader of its [scientific programming group](#). The society has proven to be a huge success, we organised 3 annual hackathons, starting with 50 participants in 2013 [hackathon](#), and growing to [260 participants](#) in 2015.

### TEAM PLAYER

I am a firm believer in pair programming. Both my coursework and non-academic projects regularly use this technique. In particular, when my partner is more experienced in a specific technology, I find pair programming is the quickest way I can catch up with them. As a part of the team I always try to serve the best of my knowledge, which usually means taking the responsibility for selecting correct algorithms and data structures, reasoning about the correctness of programs, writing critical sections of parallel programs and implementing secure parsers. The above area of expertise stems from my interest in mathematics, which is a part of my degree.

## CONFIDENT

Whenever posed with a technical challenge, I approach it with a can-do attitude. The first step I apply is trying to find an existing, possibly open-source technology, which would largely facilitate or even solve the problem. If writing the code is a necessity, I like to split up the work into small, manageable tasks.

## PRACTICAL

Although excited by new technologies, I always try to pick the best tool for the job without disregarding particular technologies because of current trends. For example, I would not push to rewrite legacy systems in the fashionable language of the day. At the end of the day, what matters most is good quality code, and good quality code is above all an attribute of the programmer.

am familiar with Libre Office and Google Docs. I have done simple scripting of Excel spreadsheets and am able to work with MS Office.

## TOOLSET

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### PYTHON

I like to use Python the way it likes to be used – exploiting its highly dynamic structure. Runtime method definition makes it easy to write powerful loggers, mixins help to keep implementation of separate features separate, and decorators are a nice way of introducing helpful functional paradigm features into OOP. I like to use python-flask for web development, matplotlib for automatic graph generation, python-gdata for scripting Google Forms and pygame for more advanced visualisations and games.

### JAVA

I like to use Java for computationally intensive tasks, for powerful parallelism and server-side programming. I am a fan of JVM languages family, currently learning Scala, which I believe is going to be a successor to Java.

### FUNCTIONAL LANGUAGES

Although I can't claim proficiency in any of those, I hope to put a much larger stress on the functional paradigm in my future development. Recently I have been exploring happstack – Haskell's web-server.

### PLATFORM

Linux is my OS of choice. I love package managers and the freedom of experimenting with different distros and window managers. I am an experienced git user, am familiar with bash scripting, and can set up a LAMP stack. I can trouble shoot both software and hardware problems. I use mostly  $\text{\LaTeX}$  for typesetting my documents, but I