*Software Engineer Biography – Odhran Mullan - 17331521*

The software engineer that I am doing this project on is Frances ‘Fran’ Elizabeth Allen. Allen was born in Peru, New York in the United States of America. Allen is known for her work on compilers, program optimization and parallelization. She was also the first woman to win the Turing award and the first woman to become an IBM fellow.  
She studied mathematics in the New York State College for Teachers and graduated with a B.Sc. in 1954. She then moved on to study mathematics at a master’s level graduating in 1957.

Allen wanted to work as a teacher and took a job in IBM so she could pay back her student loans and then go back to teaching. She ended up staying at IBM for the next 45 years.  
Her first task in IBM was teaching research scientists how to use the new programming language FORTRAN. While learning FORTRAN she reportedly read the source code which “set my interest in compiling, and it also set the way I thought about compilers, because it was organized in a way that has a direct heritage to modern compilers."

The rest of her career was largely spent designing highly optimised compilers for IBM research. She worked on compilers on IBM’s early supercomputers such as the ‘Stretch/Harvest’ computer. This computer was used by the US National Security for advanced codebreaking of secret messages during the cold war. For this project she worked on a single compiler that handled three dissimilar languages. This optimised the Stretch computer and allowed it to do what was needed. Going forward Allen served as the liaison between IBM and the NSA.

She then returned to IBM research and joined ‘Advanced Computing Systems project’. This involved cutting edge advances in the design of computer systems. This advancement was the design of the world’s first superscalar processor, this means the CPU can handle more than one instruction at once. Allen’s role in the project was equally cutting edge, designing compiler techniques that could automatically optimize programs for increased performance.

Allen spearheaded many of the most important improvements in compiler techniques in this era. An important new technique that she started was representing programs within the compiler not as a sequence of instructions but as a mathematical graph. This and many other complicated techniques discovered in IBM revolutionised compilers and the types of advanced programs that were now possible to run.

She then moved onto teaching graduate courses on compilers in New York University for a short period before returning to IBM. In her period at NYU she met her husband Jacob Schwartz.

Her next major project was the Experimental Compiler Systems project. This was designed to support multiple languages like some of the earlier projects she worked on.

The final project that Allen worked on at IBM was the Parallel Translator, this was a system for compiling FORTRAN programs. It was written for running programs on parallel computer architectures. This project birthed many new parallelisation algorithms and introduced the program dependence graph which is a concept vital to most modern compilers.

After this she retired and travelled to give lectures about compilers in universities across the globe.

In conclusion in Frances Allen’s 45 years at IBM she worked on some of the most cutting-edge projects and designed advanced compiler techniques to optimise these projects. Many of the techniques that she created are still vital to the running of modern-day compilers. She was a visionary in computer science and in my opinion one of the most influential software engineers of our time.

*References*

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