

Software Engineering Biography

Wrapped in myth and mystic Jeffery Dean legendary google programmer and senior vice president of Google AI. Throughout his career he has been awarded various honors and worked on projects such as TensorFlow, an open source machine-learning library, and many of the production design for google translate. In fact his impact on the company is so great that he is one of the two engineers to be a Level 11 engineer along with Sanjay Ghemawat. Known for his productivity many point to Dean as proof that 10x programmers exist. This is back by his incredible resume. No doubt his success has been filled by many best practices allowing him to get work done at an extraordinary rate.

Born in 1968 Dean began his career obtaining a Ph.D in computer science from the University of Washington researching whole-program optimization techniques for object oriented programming languages. Additionally, he worked for the World Health organization program on AIDS developing software for forecasting the AIDS pandemic. Initially he worked at Compaq's western research library working on microprocessor architecture and information retrieval. It was at Compaq that he began his history of working closely with Sanjay Ghemawat. This partnership would follow him throughout his career.

Then in 1999 Dean would join google working his way up to head of Artificial Intelligence. At the company he would work on a wide variety of projects initially from the design and implementation of Google's advertising serving system, the lifeblood of the company, to the implementation of Google's large scale information retrieval systems. Additionally he was a major player in implementing Google's distributed computing infrastructure, including Google's MapReduce, BigTable, Spanner, and protocol buffers, the primary tool at google for all remote procedure calls. Eventually he co-founded and started working in Google's AI research center where he designed and built TensorFlow. TensorFlow is a free open-source library built for machine learning applications such as neural networks. It helps abstract away parts of neural networks letting the user focus on the overall logic of the system. Once released it quickly became the most referenced repository

on GitHub for the year. Internally TensorFlow is used on a variety of tools. Google is working to tackle a wide range of scientific and social problems. For example they have used neural networks to provide accurate information on the likelihood and scope of flooding in flood-prone regions. The information can be used for the regions to make decisions on how to protect themselves and their property. Additionally they have done a similar thing with earthquakes. Predicting aftershock location much more accurately than physics based models. TensorFlow has even found its way into many of Google's products including photo search, email auto-responder, and Google Translate. It is even used by Alphabet's DeepMind, the company that built the AI that solved the game Go.

One notable tool he has used throughout his career is pair programming. As noted above Dean is known to have spent a large amount of time pair programming with Sanjay Ghemawat. Pair programming is a software development technique in which two programmers work together on one machine. One programmer acts as the driver writing the code while the other, the observer, reviews the code as it is written. While the practice increases the amount of time needed to deliver code it yields fewer defects and higher quality code. Additionally together they can share their skill sets and knowledge. This is especially important as code is built on the programmers prior experiences. Having double the experiences allows programmers a lot more options in how to solve issues. The effect is especially useful when solving higher complexity issues. While mundane problems usually have well known solutions or implementations high complexity issues call for creativity. As the problems Dean is known to work on are all highly complex and challenging tasks using this technique allows him to design new and inventive solutions. He attributes much of his productivity to this approach noting that his strengths are complemented by Sanjay's strengths.

Another contributing tool to his productivity is Google's general software development process. They tend to follow a large amount of good practices. Google not only has a robust Code Review system integrated with their internal tools making it easy to not only request reviews but also submit comments and changes, but they also require any source code changes to be reviewed by at least one other engineer. This allows them to maintain their code quality and style consistently across their massive code base. Another big tool is their widespread testing. All code is expected to have unit tests and the tests are run on a consistent basis catching issues before they break services. Finally they have enforced style

guides for each language to make sure that all code in the repository is written with similar style promoting greater code readability such that python written in one part of their code base will look similar to python written in other areas. Additionally while not full agile they release frequently ranging from weekly to daily depending on the system. Using a system of canary servers that process a subset of the live data they can verify that all releases work as intended and will not break upon release.

Overall Jeff Dean has widely credited for the creation of multiple key technologies that are used to this day. While he is no doubt an exceptional programmer, he is widely known to benefit from pair programming and general good practices such as testing and constant code reviews. He no doubt epitomizes the 10x programmer mentality, achieving and building such a wide range of key products.

Sources:

Software Engineering at Google: <https://arxiv.org/ftp/arxiv/papers/1702/1702.01715.pdf>

Jeff Dean's work at google: <https://ai.google/research/people/jeff/>

Dean's Pair Programming:

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TensorFlow and AI at Google:

<https://ai.googleblog.com/2019/01/looking-back-at-googles-research.html>