

St. Louis Technology News

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Cracking the Code



Software forensic expert uses development experience and investigative techniques to detect theft and patent infringement.

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Software patents have been in the news lately, with a small Canadian company claiming Microsoft has violated its patent related to document formatting in XML. On August 12, 2009, a U.S. District Court for East Texas hit the software giant with almost \$300 million in fines and ordered it to stop selling Microsoft Word. Microsoft is, of course, fighting the ruling.

Whatever the outcome of that case, there's undoubtedly a good deal of detective work going on behind the scenes. Experts known as software forensics specialists pick apart the defendant's code and look for clues that it infringes upon the plaintiff's patent. Juan de Villiers, software forensics expert with Ispirian Computer Forensics, explains how the process works.

"First, it is important to understand that software forensics is not the same as the forensic examination of a hard drive or other digital media. Software forensics experts begin by working with attorneys to identify the portions of a patent that are in dispute. We then review the source code and look for any portions that behave in an infringing manner," he said. "Sometimes

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we'll have software that we can actually execute to see where it infringes in a real-time way. Sometimes we'll have documentation or screen shots that give us some clues as to what is going on. But a lot of times we don't — we have to dig through the source code and abstract it in our heads to find the places where the alleged infringement is happening."

Software Sleuths

It sounds fairly straightforward in theory, but it's actually quite complex. An application might have hundreds of functional modules, each with thousands of lines of code. Simply getting a mental grasp of it all can be mind-boggling.

"You have to work through the logic of the individual pieces — how one function calls another function which yet calls another function. And at the end of the day those pieces of code have to be linked to the suspected infringement," de Villiers said. "Sometimes you only get part of the system, so if you hit a point where a function call has been made that has bearing on the case, you have to request that additional piece of source code."

St. Louis-based Ispirian — the only professional forensic investigative agency in Missouri focused entirely on computer-related matters — is known for its thorough investigations and legally defensible reports. Part of the software forensics process is to produce documentation that shows, in the expert's opinion, the area or areas of potential infringement.

"We produce a summary report with conclusions that are presented in such a way as to tie pieces of the source code to the patent," de Villiers said. "Patents do not include source code — it is up to the software forensic expert to match the code to the concept that has been patented. We're trying to prove that the idea that the plaintiff has patented has been stolen or used, inadvertently or not, by the defendant. If we can show any likelihood of infringement, the plaintiff's complaint is strengthened."

Looking for Clues

In addition to patent disputes, the Ispirian team takes cases involving software "conversion" — the civil law equivalent of theft. Although the two types of cases involve some similar forensic techniques, the investigative approaches are very different.

"With software theft, we may not get source code. We may get executable, machine-readable software that has to be decompiled in order to compare it to the plaintiff's code. A line-by-line comparison is infeasible because of the sheer volume of code and because decompiled code isn't going to generate an exact match," said de Villiers.

"In addition, we're not looking for similar ideas but rather clues that the software has been copied. We compare

the underlying architecture — were both applications built using Java runtime or Microsoft .NET? Do both applications have the same modular structure? Have they both been built with class libraries and, if so, do those libraries contain the same basic classes? All of these things may provide a good indication that there's copying going on."

Other techniques include comparing screen shots and running the defendant's code against the plaintiff's system to see if function calls are successful. Ultimately, however, the software forensic specialist has to identify the unique, "signature" elements of the plaintiff's system and document the presence of similar elements found in the defendant's software.

Detective Work

How does one become a software sleuth? de Villiers has been a software developer for about 15 years, and has diverse experience in other IT specialties. He has dabbled in a wide range of software languages and database platforms, both professionally and out of personal curiosity.

"I think that kind of curiosity helps me in this work — I love to learn and have enjoyed analyzing the programming styles of dozens of developers and languages over the course of my career," he said. "Understanding the software language is certainly important for some aspects of these investigations, but it's sometimes important to be able to discern what may be unique about the author's stylistic nuances within that language's syntax. You have to enjoy picking things apart, seeing how they work and communicating your findings and conclusions in a way that everyone in the legal process can understand."

Software companies file patents to protect their ideas, and utilize licensing schemes to protect against theft of their code. If those companies suspect that another firm has violated those rules, software forensics experts like Juan de Villiers help unravel the mystery and crack the code.

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