

Eiffel towering example of quick, clean software

By STAN BEER

DISASTERS such as airline crashes, rocket explosions and even online betting system failures have all been attributed to software flaws.

Could these disasters have been avoided if the software had been designed differently?

The answer is a resounding yes, according to Dr Bertrand Meyer, the architect of the Eiffel programming language and one of the world's authorities on object-oriented software development.

Dr Meyer was at the Tools 96 conference in Melbourne last week to deliver his message of the necessity of building reusability and reliability into object design.

Dr Meyer, who has probably written more books on object-oriented software construction than anyone else, believes that most high-profile, software-attributed, systems failures could have been avoided if a language like Eiffel had been used.

Dr Meyer said his software was so named because: "The Eiffel Tower, initially designed as a temporary structure for the Paris World Fair, was built to specifications with reusable components, delivered on time, within budget, without accidents and is still standing more than a hundred years later."

According to Dr Meyer, software failures happened because software component developers had not been forced into a rigorous adherence to specifications in the same way as hardware component designers.

Eiffel has been designed to correct this, with a built-in requirement to specify input and output limits to variables within its code.

The programming language has for the past 10 years been gaining steadily increasing support in developer circles.

"While it hasn't gained the profile of languages like C++ and Java, in terms of large, robust, mission-critical applications some of the world's biggest systems, in Europe and the US, have been built using Eiffel," Dr Meyer said.

"These include banking, trading, telecommunications and asset management systems.

"One thing that attracts the people who build these systems is that Eiffel is a very easy language to program in, without brackets, asterisks, ampersands and so on."



Dr Meyer ... 'reuse without specification is downright dangerous' — Picture: ROB LEESON

Dr Meyer said Eiffel could deliver applications more rapidly than both C++ and Java, but he believed its real difference was the built-in capabilities that produced higher quality software components.

"There is a division in the software development world between quick and dirty and slow and clean," he said.

"Our emphasis is on quick and clean."

Eiffel was just as adapted to rapid application development as Visual Basic or Delphi but did not achieve this at the expense of efficiency and long-term quality, he said.

"It's very exciting to see all this development of components in Java, ActiveX, OCX

and VBX but my contention is these are never going to yield the level of reuse that we are entitled to expect," he said.

The reason was that, unlike Eiffel, the languages did not have any mechanism to specify the components.

"The software community as a whole has not understood that you cannot have reuse without specification.

"If you want to have a catalogue of thousands of reusable components, you need to have precise descriptions of their input and output conditions."

Dr Meyer said the \$500 million Ariane 5 rocket failure, which occurred in Europe last June, happened because a reusable software module from the

Ariane 4 system did not have specifications built into its code.

An excessive value was fed to a variable related to horizontal velocity because of the much higher initial acceleration of the new-model rocket.

"If the system had been programmed in Eiffel, specifications for this variable would have been built into the code, rather than just recorded on an obscure document, and thus would have been checked," he said.

"Reuse without a precise built-in description of what objects assume from their environment and what they deliver in return is more than inadequate — it's downright dangerous."

More reports — Section 3, Page 5

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