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Information for Paper #17

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Corresponding Author	Adam Megacz
Email	adam@megacz.com
Title	Complete Translation of Unsafe Native Code to Safe Bytecode
Authors	Brian Alliet and Adam Megacz

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Abstract

Most existing techniques for using code written in an unsafe language within a safe virtual machine involve transformations from one source code language (such as C) to another (such as Java) and then to virtual machine bytecodes. We present an alternative approach which uses a standard compiler to turn unsafe source code into unsafe MIPS binaries, which are then translated into safe virtual machine bytecodes. This approach offers four key advantages over existing techniques:

- Total coverage of all language features
- No post-translation human intervention
- No build process modifications
- Bug-for-bug compiler compatibility

We have implemented this technique in NestedVM, a binary-to-source and binary-to-binary translator targeting the Java Virtual Machine.

NestedVM-translated versions of the libfreetype, libjpeg, and libmspack libraries are currently in production use.

Performance measurements indicate a best case performance within 3x of native code and worst case typically within 10x, making it an attractive solution for code which is not performance-critical.

Keywords

Machine emulators

Binary translation frameworks

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