

VIRTUAL MACHINES

ABSTRACT

A virtual machine is a piece of software that goes between a program and the environment into which the program runs (operating system, hardware...). It is both an interpreter and a just-in-time compiler. It interprets an intermediate language obtained from the compilation of a higher-level programming language. It compiles the intermediate language just-in-time to call directly operating-system- or hardware-level instructions.

There exist several virtual machines, both from software vendors and from research groups. All these virtual machines possess specificities: Different intermediate languages, different garbage-collection mechanisms, different purposes (real-time, robustness...), and so on.

The aim of this Capita-Selecta is:

- To provide an exhaustive state of the art on the concepts behind virtual machines (Turing machine, register machine, stack machine, proof-carrying code...) and to demonstrate rigorously how science evolved from one concept to another.
 - To provide a state of the art on the existing virtual machines, their respective features, their intermediate languages... and the reasons of their existences (portability, ease of use...).
- (End of the 30 hours theory.)
- To provide an exhaustive synthesis on the features provided by virtual machines (garbage-collection, real-time...) and to demonstrate these features with relevant examples.
- (End of the 15 hours practice.)

REFERENCES

- Yann-Gaël Guéhéneuc ; *Virtual Machines* ; Lecture notes for the FI-4 and EMOOSE students, École des Mines de Nantes, 2001-2002.
- K. John Gough ; *Stacking them up: a Comparison of Virtual Machines* ; Proceedings of the Australian Computer Systems and Architecture Conference, February 2001.
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java.sun.com/docs/books/vmspec/2nd-edition/html/VMSpecTOC.doc.html
- *The UCSD p-System Museum* ; Available at: www.threedee.com/jcm/psystem/
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TYPE OF WORK

State of the art and synthesis

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