Bytecode Translation: From The .NET CLR To Parrot

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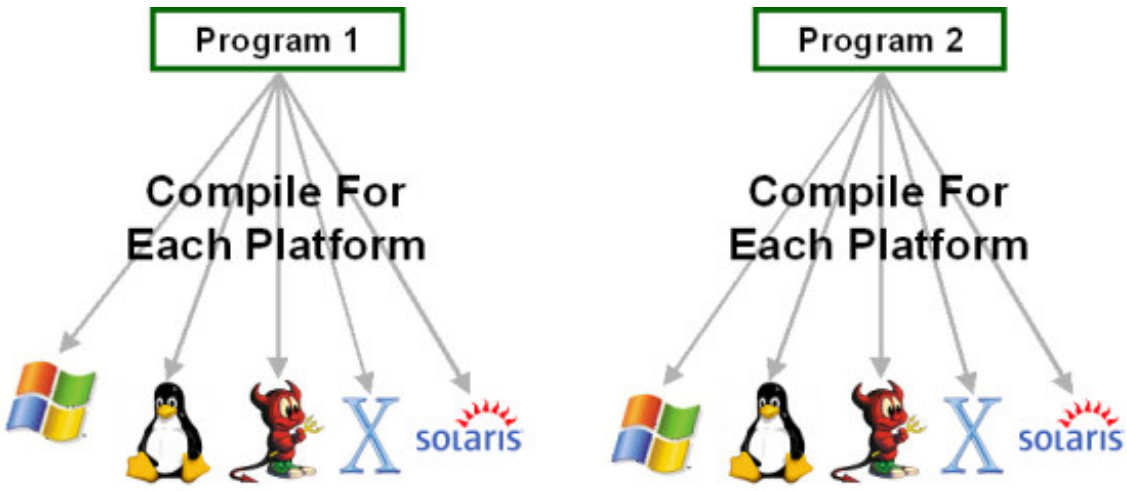
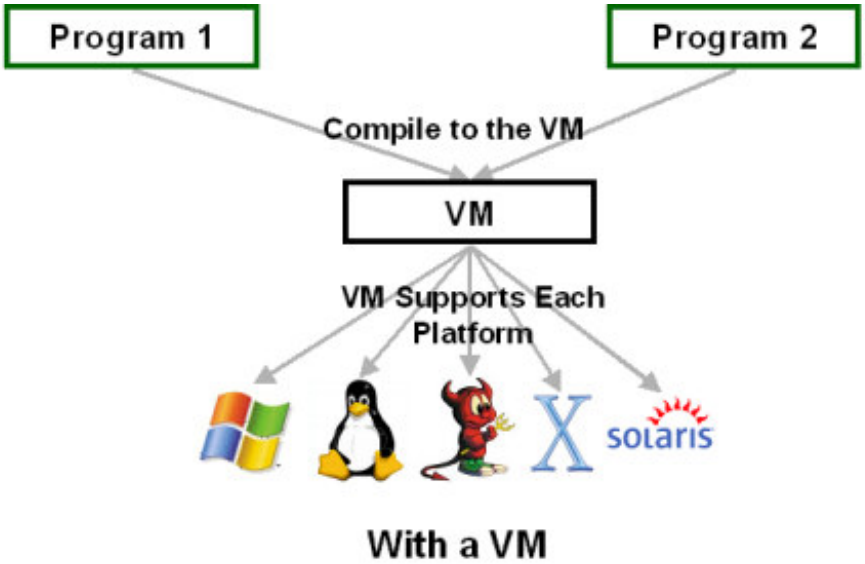
.NET To Parrot Translation

Virtual Machines Rock

Virtual machines for high level languages hide away the details of the underlying hardware and OS, making deployment simpler.



Without a VM



With a VM

.NET To Parrot Translation

Re-using code rocks too, but…

- We all use libraries rather than writing stuff from scratch.
- Libraries in native code just had to use a standard calling interface.
- In a world with multiple VMs, it is possible you'd want to use a library compiled to run on VM A from a program running on VM B.
- But VM A can't understand VM B's code. Argh! What to do?

Translation to the rescue!

- Translate code that runs on VM A to use VM Bs instruction set, etc.
- Wins support for all languages that compile to VM A.

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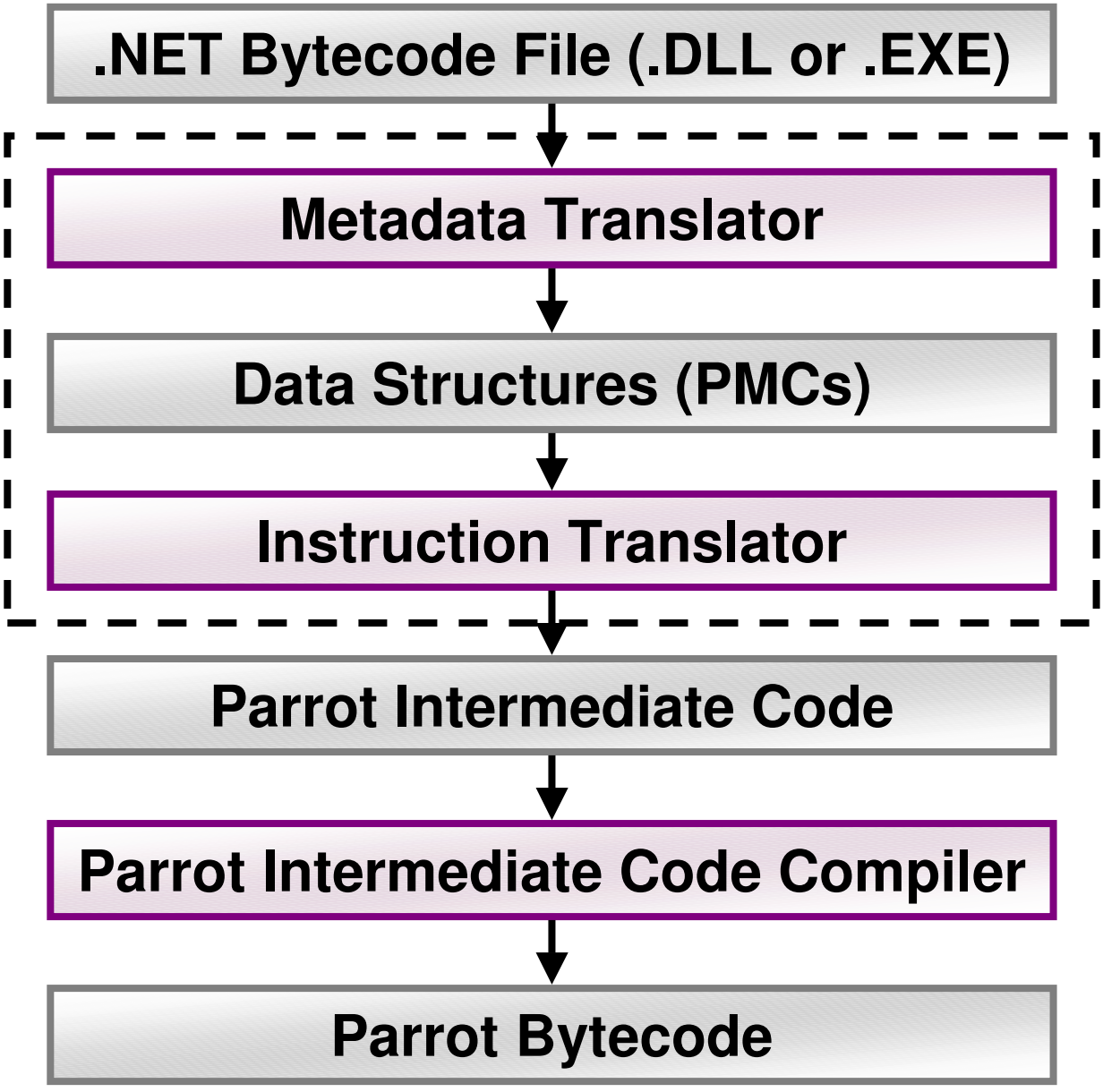
Designing the translator

The translator breaks down into a series of modules that execute one after the other, like a compiler.



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Writing repetitive code is boring

- Code for translating diffferent instructions has a lot in common.
- Write translation rules to describe how to translate instructions.

```
[add]
code = 58
class = op
pop = 2
push = 1
instruction = ${DEST0} = ${STACK0} + ${STACK1}
```

- Then use a script to build the instruction translator from them.

Stack to register mapping

- .NET is a stack based VM, Parrot is register based. Many ways to handle this, from easy to hard.
- Pluggable mapping modules allow multiple solutions to be explored.

.NET To Parrot Translation

What can be translated so far?

- Arithmetic, logical, branching and comparison ops
- Integer, floating point and managed pointer types
- Instance and static fields, methods and constructors
- Instantiation, method calling, inheritance and interfaces
- Array related instructions

Conclusions

- Bytecode translation still feels like a good idea.
- Regression testing is valuable.
- Generate repetitive code.