Mads Torgersen, Microsoft

BEHIND LINQ – AND BEYOND

LINQ

- **Language INtegrated Query**
  - An open multi-language query facility

- **Uses cool language stuff**
  - Points into the future

WHAT LANGUAGE STUFF?

* **Declarative**
  + More "what", less "how"
  + Higher order functions
  + Type inference
  + Comprehensions

* **Metaprogramming**
  + Expression trees

DEMO

EXPRESSION TREES

* Language neutral

* Expressions now
  + Statements soon
  + Declarations and programs later?

* Strongly tied to reflection now
  + Runtime independent later?

DYNAMIC LANGUAGE RUNTIME (DLR)

* API for efficient dynamic lookup

* No special CLR (it's the VM ☺) support

* Caching via ETs and runtime code generation

HOW THE DLR WORKS

- Call sites cache a delegate which does the dispatch
- Slow path is (caller) language specific. Typically
  1) Ask the receiver object if it wants to lookup
  2) If not, use language binding rules on runtime type
  3) Either way, return *rule* and *meaning* ETs
  4) Patch up dispatch ET with new case
  5) Compile ET and install in call site

THE FUTURE?

* Dynamic languages and features
  + IronPython, IronRuby
  + Dynamic lookup in other languages?

* Functional languages and features
  + F#
  + Mutability tracking? Pattern matching?

* Parallelism
  + Plinq, Parallel Extensions and beyond

* Metaprogramming
  + More compiler in APIs?
  + More API in compilers?