F# in Education Workshop

F# in Academia

Going cross-platform with F# for MonoDevelop

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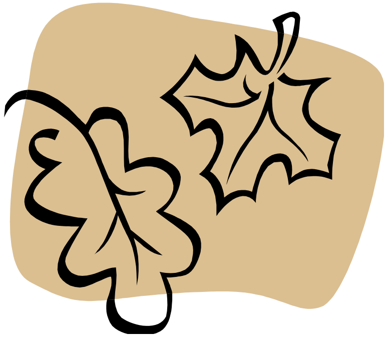

Cambridge, MA
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F# **doesn’t work**

on Mac & Linux

F# doesn’t work **well**

on Mac & Linux

F# **developer tools** don’t work on Mac & Linux

F# **has great developer tools** on Mac & Linux

Introducing F# add-in for MonoDevelop

F# in Academia

- Good cross-platform developer tools for F#
  - Using cross-platform MonoDevelop IDE for Mono
  - F# add-in provides IntelliSense and F# interactive
  - Not aimed at large-scale business applications
- Demonstration – how can universities use F#?
  - Teaching (functional) programming
  - For statistics and data analysis
  - Functional programming research

Teaching (functional) programming with F#

F# for Teaching

- F# is a great language for teaching
  - Practical functional programming
  - Programming language concepts and principles
  - Introducing computer programming
- Introduction to (functional) programming
  - Solid and useful mathematical foundations
  - Gives students practical experience
  - Intriguing examples are a great motivation

Demonstration

Composing 3D objects in a functional way

Processing scientific data with F#

F# for Data Processing

- What makes F# great for working with data?
  - Productive and efficient language
  - F# Interactive environment
  - Useful features such as units of measure
- Many scientists use F# already
  - Genome sequencing, Machine learning
  - Can be used on multiple platforms now…

Demonstration

Downloading and analyzing stock data

Programming language research with F#

F# for Language Research

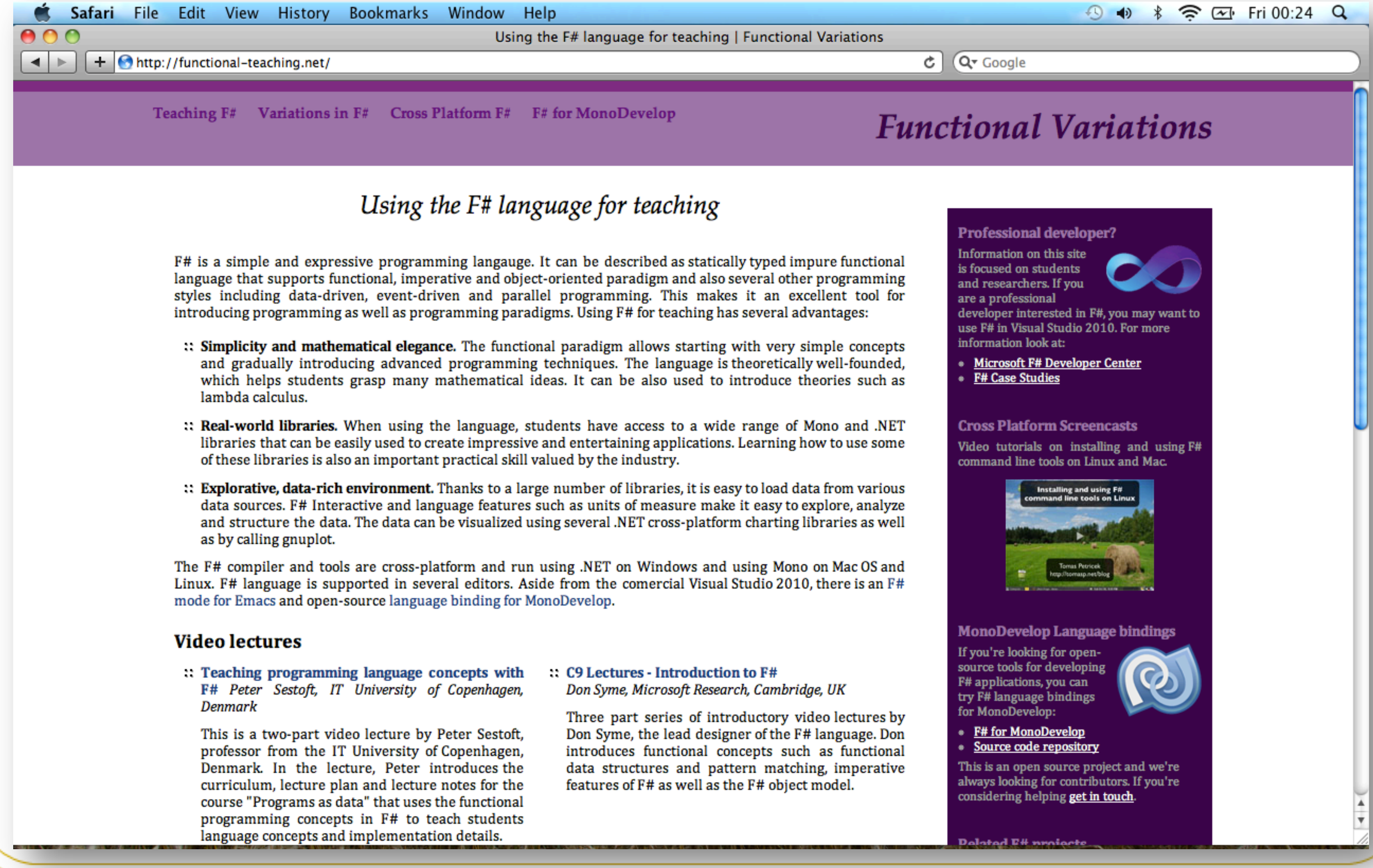
- Building the open-source version of F#
  - Release contains command line tools
  - Integrates into MonoDevelop with no effort
  - Auto-completion & tool-tips “just work”

- Examples of existing F# extensions
  - **Joinads:** Language extension for reactive, concurrent and parallel programming
  - **F7:** Refinement Types for F#

Demonstration

Adding “joinads” to F# in MonoDevelop

Functional Variations & Teaching


Safari File Edit View History Bookmarks Window Help
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Using the F# language for teaching | Functional Variations
http://functional-teaching.net/
Google
Installing and using F# command line tools on Linux
Tomas Petricek http://tomasp.net/blog

Teaching F# Variations in F# Cross Platform F# F# for MonoDevelop

Functional Variations

Using the F# language for teaching

F# is a simple and expressive programming langauge. It can be described as statically typed impure functional language that supports functional, imperative and object-oriented paradigm and also several other programming styles including data-driven, event-driven and parallel programming. This makes it an excellent tool for introducing programming as well as programming paradigms. Using F# for teaching has several advantages:

:: **Simplicity and mathematical elegance.** The functional paradigm allows starting with very simple concepts and gradually introducing advanced programming techniques. The language is theoretically well-founded, which helps students grasp many mathematical ideas. It can be also used to introduce theories such as lambda calculus.

:: **Real-world libraries.** When using the language, students have access to a wide range of Mono and .NET libraries that can be easily used to create impressive and entertaining applications. Learning how to use some of these libraries is also an important practical skill valued by the industry.

:: **Explorative, data-rich environment.** Thanks to a large number of libraries, it is easy to load data from various data sources. F# Interactive and language features such as units of measure make it easy to explore, analyze and structure the data. The data can be visualized using several .NET cross-platform charting libraries as well as by calling gnuplot.

The F# compiler and tools are cross-platform and run using .NET on Windows and using Mono on Mac OS and Linux. F# language is supported in several editors. Aside from the comercial Visual Studio 2010, there is an F# mode for Emacs and open-source language binding for MonoDevelop.

Video lectures

:: **Teaching programming language concepts with F#** *Peter Sestoft, IT University of Copenhagen, Denmark*

This is a two-part video lecture by Peter Sestoft, professor from the IT University of Copenhagen, Denmark. In the lecture, Peter introduces the curriculum, lecture plan and lecture notes for the course "Programs as data" that uses the functional programming concepts in F# to teach students language concepts and implementation details.

:: **C9 Lectures - Introduction to F#**
Don Syme, Microsoft Research, Cambridge, UK

Three part series of introductory video lectures by Don Syme, the lead designer of the F# language. Don introduces functional concepts such as functional data structures and pattern matching, imperative features of F# as well as the F# object model.

Professional developer?

Information on this site is focused on students and researchers. If you are a professional developer interested in F#, you may want to use F# in Visual Studio 2010. For more information look at:

- Microsoft F# Developer Center
- F# Case Studies

Cross Platform Screencasts

Video tutorials on installing and using F# command line tools on Linux and Mac.

MonoDevelop Language bindings

If you're looking for open-source tools for developing F# applications, you can try F# language bindings for MonoDevelop:

- F# for MonoDevelop
- Source code repository

This is an open source project and we're always looking for contributors. If you're considering helping get in touch.

Related F# projects

Summary

- F# is a great language for Academia
  - Consistent cross-platform feel with MonoDevelop
  - Lightweight, but with all modern features
- Uses of F# in Academia
  - Teaching (functional) programming
  - Data analysis and statistics
  - Programming language research

Links

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Get involved!

http://functional-variations.net

http://functional-teaching.net