# Five Reasons to Move from C# to F#

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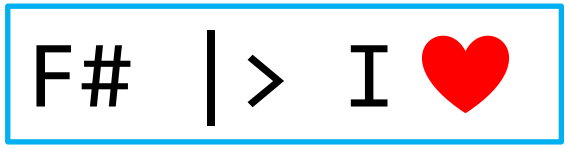
# Who am I?

Readify Lead Consultant - Sydney, Australia

F# Sydney User Group (fsharpsydney.com)

F# Workshop (fsharpworkshop.com)



# Why F#?

# Why F#?

.Net

Functional-First

Full Support in VS

Interoperable

Multi Platform

Open Source

Great Syntax

fsharp.org

# Reason #1: Powerful Functions

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```
int Add(int x, int y)
{
    return x + y;
}
```

```
Func<int,int,int>
```

In Out

```
let add x y = x + y
```

```
int -> int -> int
```

In Out

no parens and commas

no types

camel case

let instead of var

no semi colons

no return

let and equals

no curly braces

Partial Application

```
let addOne = add 1 //addOne: int -> int
let result = addOne 2 //result = 3
```

Pipelining

```
let result = customer
             |> promoteToVip
             |> increaseCredit
```

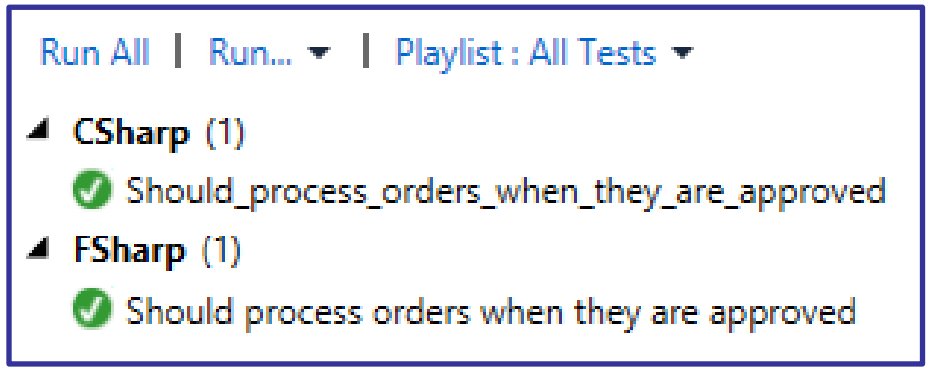
Composition

```
let addThree = addOne >> addTwo
let result = addThree 1 //result = 4
```

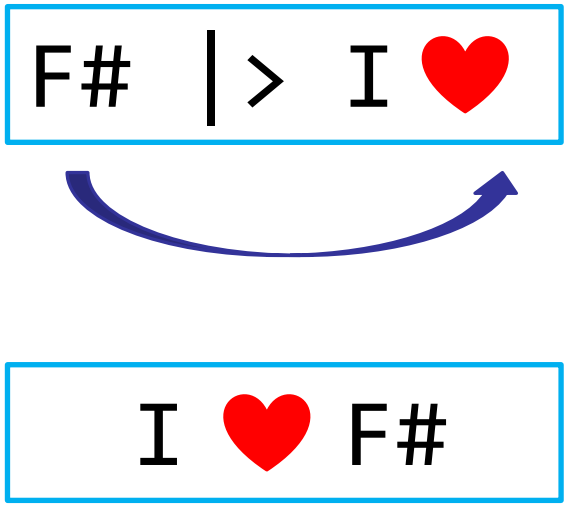
# Reason #1: Powerful Functions

```
[Fact]
void Should_process_orders_when_they_are_approved()
```

```
[<Fact>]
let ``Should process orders when they are approved`` () =
```



# Reason #1: Powerful Functions



# Reason #2: Great Types

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```
class Customer
{
    private readonly string name;

    public Customer(string name)
    {
        this.name = name;
    }

    public string Name
    {
        get { return name; }
    }
}
```

```
type Customer(name: string) =
    member this.Name = name

type Customer = { Name: string }
```

Immutability
Structural Equality
Type Inference

→ Class

→ Record

type instead of class

no curly braces

primary constructor

generated field

readonly property

# Reason #2: Great Types

Tuples

```
Tuple<string, int> myTuple = GetNameAndAge(3);
string name = myTuple.Item1;
int age = myTuple.Item2;
```

```
let name, age = getNameAndAge 3
let success, value = Int32.TryParse "42"
```

Options

```
int GetCustomerAgeById(int id)
Nullable<int> GetCustomerAgeById(int id)

Customer GetCustomerById(int id)
Nullable<Customer> GetCustomerById(int id)
```

```
getCustomerAgeById (id: int) : int
getCustomerAgeById (id: int) : Option<int>

getCustomerById (id: int) : Customer
getCustomerById (id: int) : Option<Customer>
```

# Reason #2: Great Types

Units of Measure

```
var meters = 200;
var kilometers = 30;

var total = meters + kilometers; // 230!
```

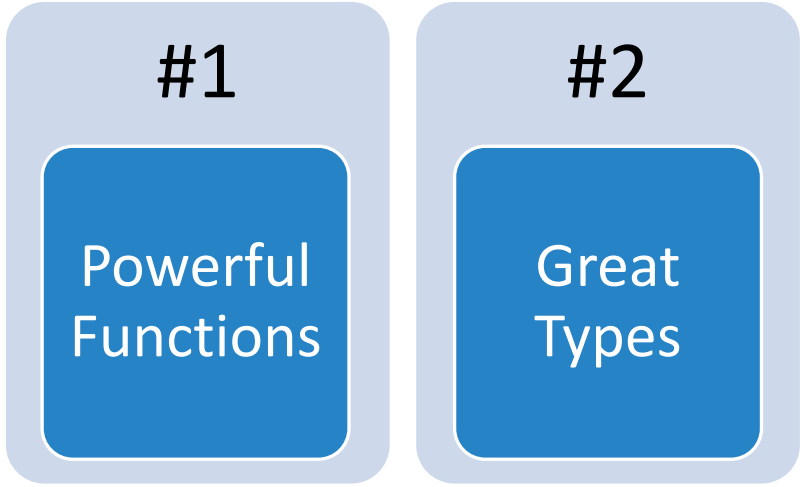
```
[<Measure>] type m
[<Measure>] type km

let meters = 200<m>
let kilometers = 30<km>

let total = meters + kilometers // Error!
```

Object Expressions

```
var product = new { Name = "Product1" };
return product; // ?
```

```
let product = { new IProduct with
                member this.Name = "Product1"
                member this.Show () =
                  printfn "%s" this.Name }
```

# Reasons



# Reason #3: Pattern Matching

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```
enum Result
{
    Success,
    Error
}

void Show(Result result)
{
    switch (result)
    {
        case Result.Success:
            Console.WriteLine(":)");
            break;
        case Result.Error:
            Console.WriteLine(":(");
            break;
    }
}
```

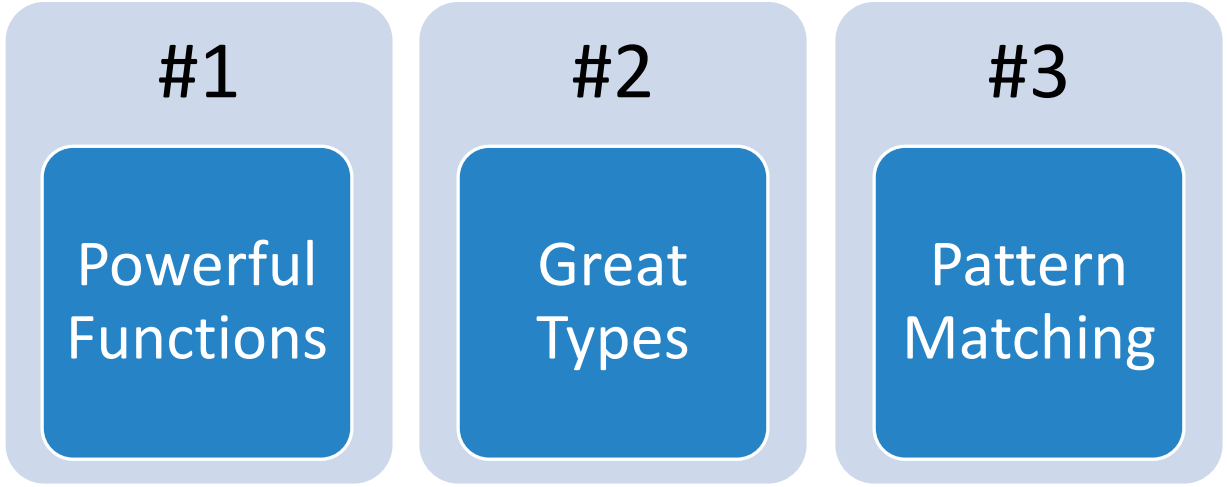
```
type Result =
  | Success of quotient: int * remainder: int
  | Error of Exception

let (|Pieces|_|) result =
  match result with
  | Success (q,0) when q > 1 -> Some q
  | _ -> None

let show result =
  match result with
  | Pieces q -> printfn "%i pieces" q
  | Success (q,r) -> printfn "%i %i" q r
  | Error e -> printfn "%s" e.Message
```

Discriminated Union

# Reasons



# Reason #4: Type Providers

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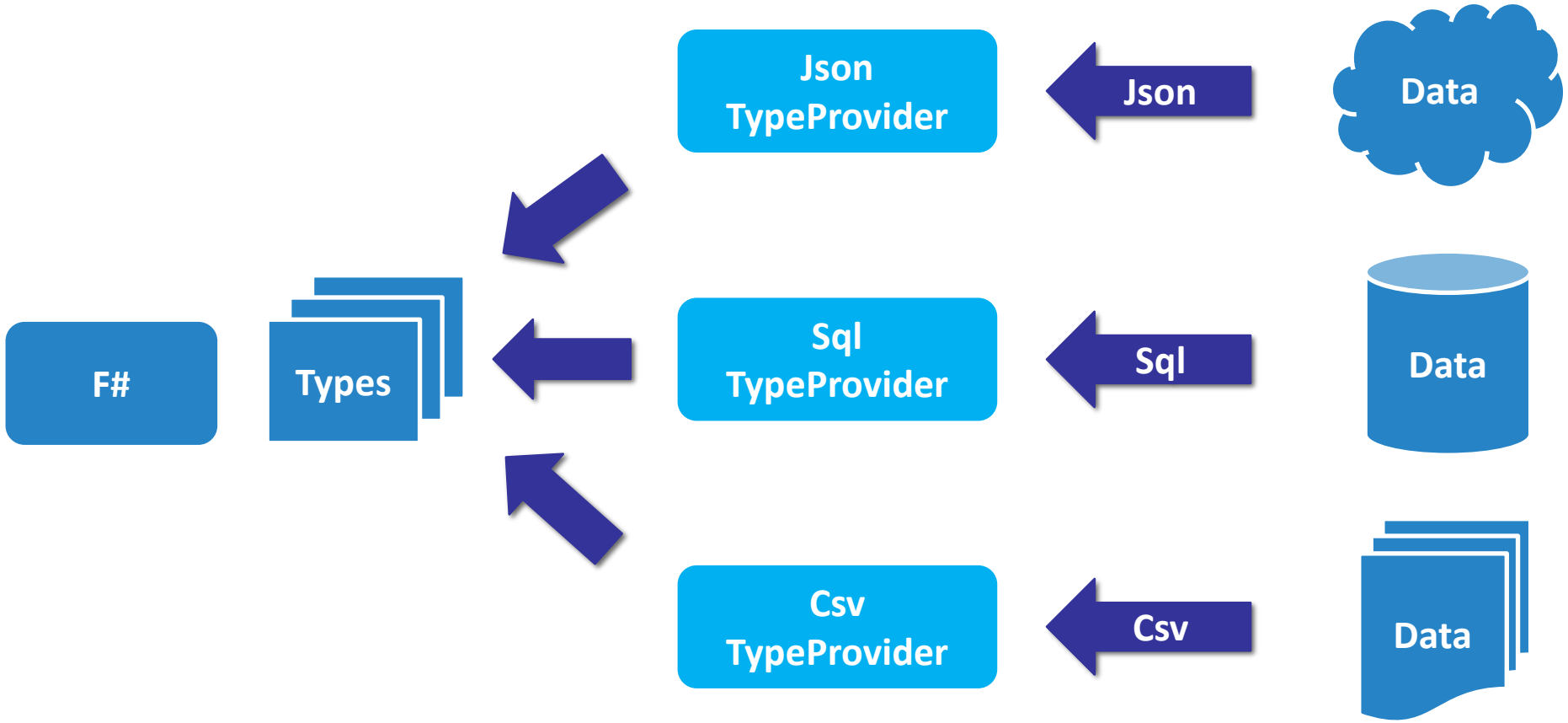


# Reason #4: Type Providers

```
type Customer = CsvProvider<"sample.csv">
let customers = Customer.Load "real.csv"

customers.Rows
|> Seq.iter (fun r -> printfn "%s: $%g" r.Name r.Credit)
```

```
Id,Name,IsVip,Credit
1,Customer1,false,0.0
```

```
Id,Name,IsVip,Credit
1,Customer1,false,0.0
2,Customer2,false,10.0
3,Customer3,false,30.0
4,Customer4,true,50.0
```

```
type EntityConnection = SqlEntityConnection <ConnectionString=cs, Pluralize=true>
let context = EntityConnection.GetDataContext ()
let customers = query { for customer in context.Customers do
                        select customer.Name }
```

# Reason #4: Type Providers

Csv

EF

Json

Azure Storage

Xml

Excel

OData

Linq2Sql

SQL

SQLClient

Reflection

World Bank

R

Freebase

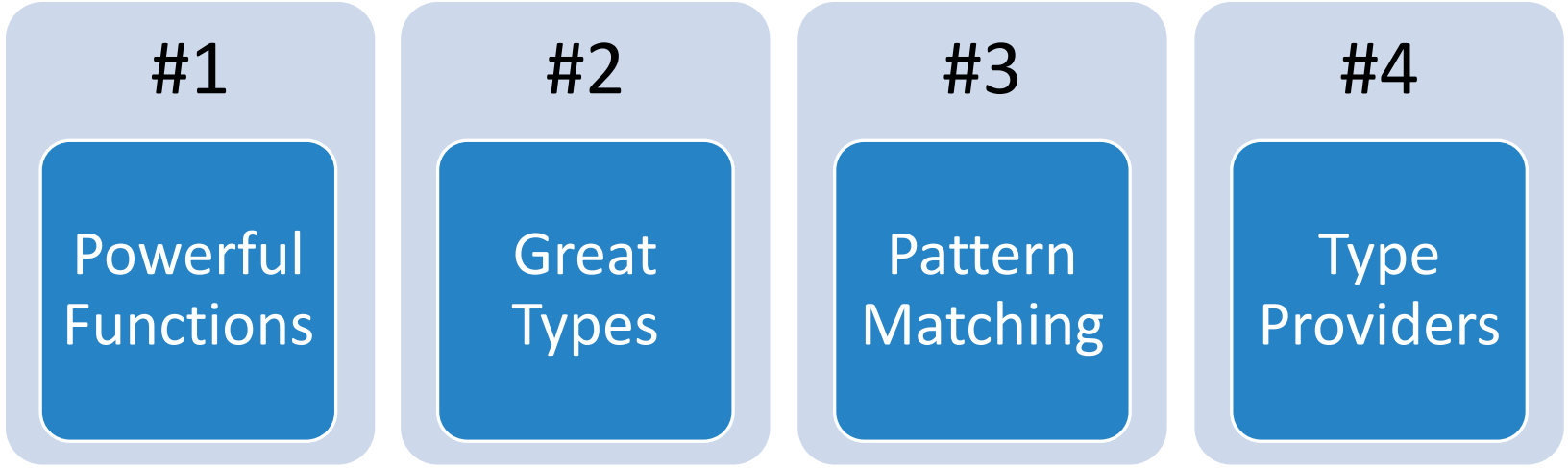
WMI

Hadoop

WSDL

and more…

# Reasons


#1
Powerful Functions
#2
Great Types
#3
Pattern Matching
#4
Type Providers

# Reason #5: Computation Expressions

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```
let x = isEven 1
let y = isEven 2
x && y
```

```
Value: false
Value: true
Result: false
```

```
log { let! x = isEven 1
      let! y = isEven 2
      return x && y }
```

```
Value: false
Value: true
Result: false
```

```
type LogBuilder() =
    member this.Bind (value, continuation) =
        printfn "Value: %b" value
        continuation value
    member this.Return value =
        printfn "Result: %b" value
        value

let log = LogBuilder()
```

# Reason #5: Computation Expressions

Async Expression

```
let readAsync (file: string) = async {
    use reader = new StreamReader(file)
    let! content = reader.AsyncReadToEnd ()
    content |> printfn "Content: %s" }
```

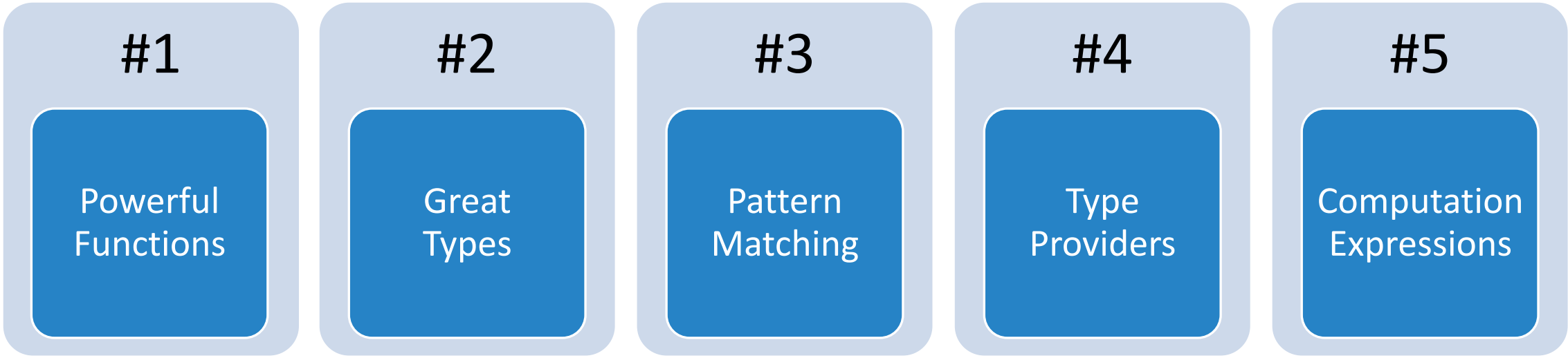
EF Type Provider Query Expression

```
let result = query {
    for student in db.Student do
    where (student.StudentID > 4)
    select student }
```

MBrace Cloud

```
let first = cloud { return 15 }
let second = cloud { return 27 }
cloud {
    let! x = first
    let! y = second
    return x + y }
```

# Reasons


#1
Powerful Functions
Partial Application
Pipelining
Composition
Spaces in Names
#2
Great Types
Classes
Records
Tuples
Options
Units of Measure
Object Expressions
#3
Pattern Matching
Discriminated Unions
Pattern Matching
Active Patterns
#4
Type Providers
CSV
EF
#5
Computation Expressions
Log
Async
Query
Cloud

# Thank you!

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github.com/jorgef/fivereasons

## Resources

fsharp.org


Real-World Functional Programming
By Tomas Petricek


Try F#: tryfsharp.org

Scott Wlaschin

fsharpforfunandprofit.com
fpbridge.co.uk/why-fsharp.html


Skills Matter: skillsmatter.com (tag: f#)


Community for F#: c4fsharp.net

F# Workshop: fsharpworkshop.com