Microsoft STUDY4 Build School

.NET Conf

探索 .NET 新世界

Microsoft STUDY4 Build School

Universal Data / Service Platform

Poy Chang / Bruce

Poy Chang

任職於全美 100 大私人企業，負責企業內部 IT 解決方案設計與開發，專注於 Azure、.NET、Angular 等技術研究

- ✓ STUDY4 / Azure Taiwan / Angular Taiwan 社群核心成員
- ✓ Microsoft MVP 微軟最有價值專家 2018 ~ Present
- ✓ 資訊工業策進會 / 工業技術研究院 講師
- ✓ 2020 台北 .NET Conf 總召 / 講師
- ✓ 2019 台北 .NET Conf 總召
- ✓ 2019 廣州 Global Azure Bootcamp 講師
- ✓ 2019 台北 Insider Dev Tour 講師
- ✓ 2019 宜蘭 Angular TW Conf 講師
- ✓ 2018 台北 Azure Tech Day Party 講師

這一切都是為了團隊開發
而做的架構設計

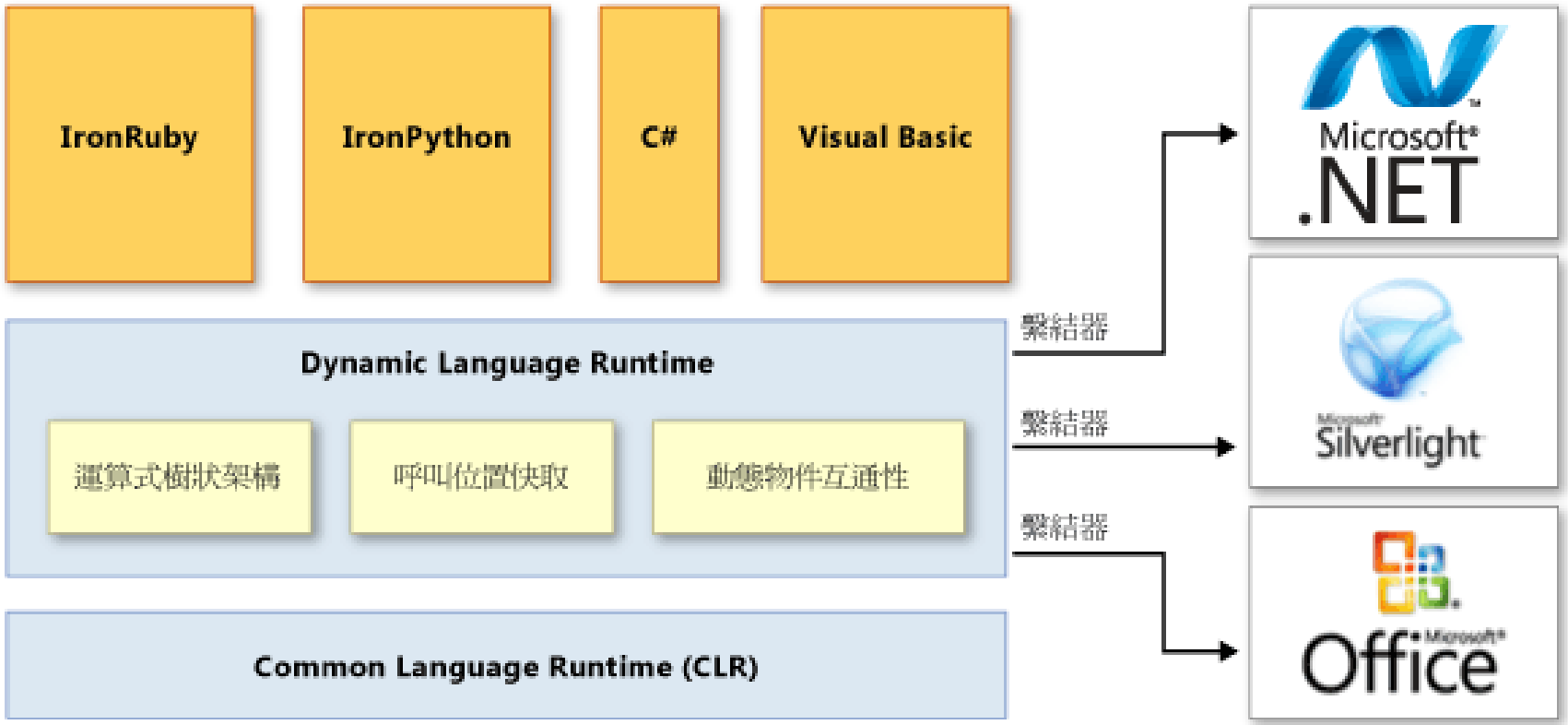
這一切都是為了快點開發
而做的速成設計

你有在用反射 / 動態嗎？

Reflection / Dynamic

Dynamic 動態型別

- C# 4.0 (.NET Framework 4.0) 開始提供
- 執行時期決議機制，只在執行期解析程式結構
  - dynamic 是靜態類型，但該物件會略過靜態類型檢查
  - 在基於 CLR 之上的 DLR 做執行時期繫結



https://docs.microsoft.com/zh-tw/dotnet/csharp/programming-guide/types/using-type-dynamic

COM Interop

```
// 過去只能用強制轉型來處理
((Excel.Range)excelApp.Cells[1, 1]).Value2 = "Name";
Excel.Range range2008 = (Excel.Range)excelApp.Cells[1, 1];
```

```
// 有了 dynamic 之後，轉型會交由執行時期的 COM 繫結器處理
excelApp.Cells[1, 1].Value = "Name";
Excel.Range range2010 = excelApp.Cells[1, 1];
```

C#'s Dynamic Type

- **Static type for dynamic dispatch**
  - Compiles away to System.Object
  - Instructs compiler to emit dynamic call sites

```
string  s = "Foo";
string  u = s.ToUpper();
```

- Strongly typed
- Statically typed

```
object  s = "Foo";
string  u = s.ToUpper();
```

- Weakly typed
- Statically typed

```
dynamic s = "Foo";
string  u = s.ToUpper();
```

- Weakly typed
- Dynamically typed

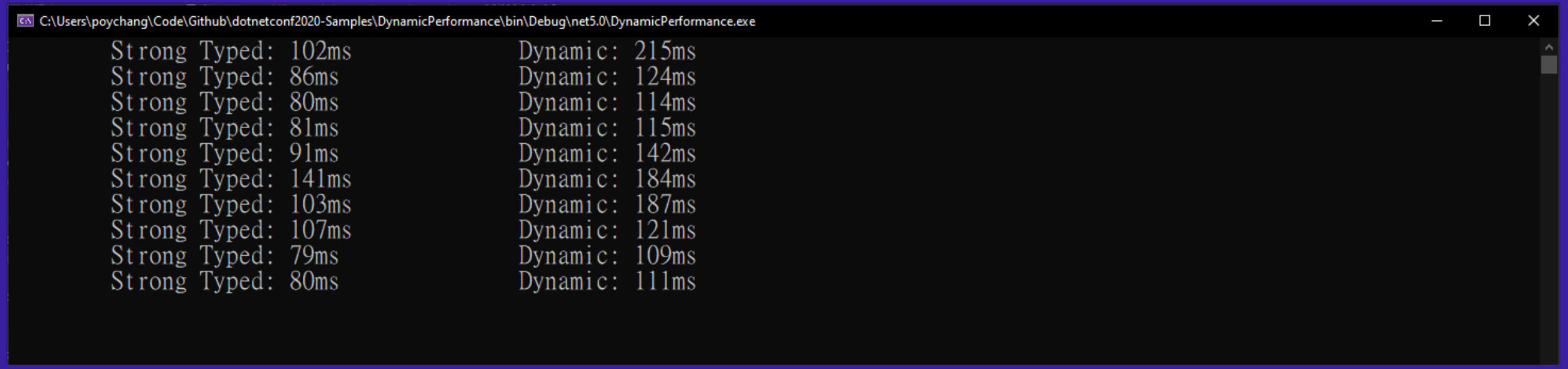
No IntelliSense here!

用在哪裡？

- 你知道它可能造成什麼問題的時候
- 開發時期未知資料型別時
  - Office Excel 儲存格資料
- 開發者一時的效率
  - 不需要編譯時期檢查的程式、資料時
  - 減少實驗專案的限制
- 處理原生是弱型別的資料時
  - XML
  - JSON

限制

- 動態物件無法使用擴充方法
- 動態型別無法取得靜態成員或建構式
- 無法直接指定成方法、匿名方法、Lambda，除非先轉型
- 效能是個軟肋



The Common Language Runtime

Deep Dive: Dynamic Languages in Microsoft .NET | pdc2008 | Channel 9 (msdn.com)

Reflection 反映

- .NET Framework 2.0 開始提供 System.Reflection 類別
- **組件**（Assembly）包含至少一個**模組**（Module）
- 模組包含**型別**（Type），型別包含**成員**（Property, Method）

https://docs.microsoft.com/zh-tw/dotnet/csharp/programming-guide/concepts/reflection

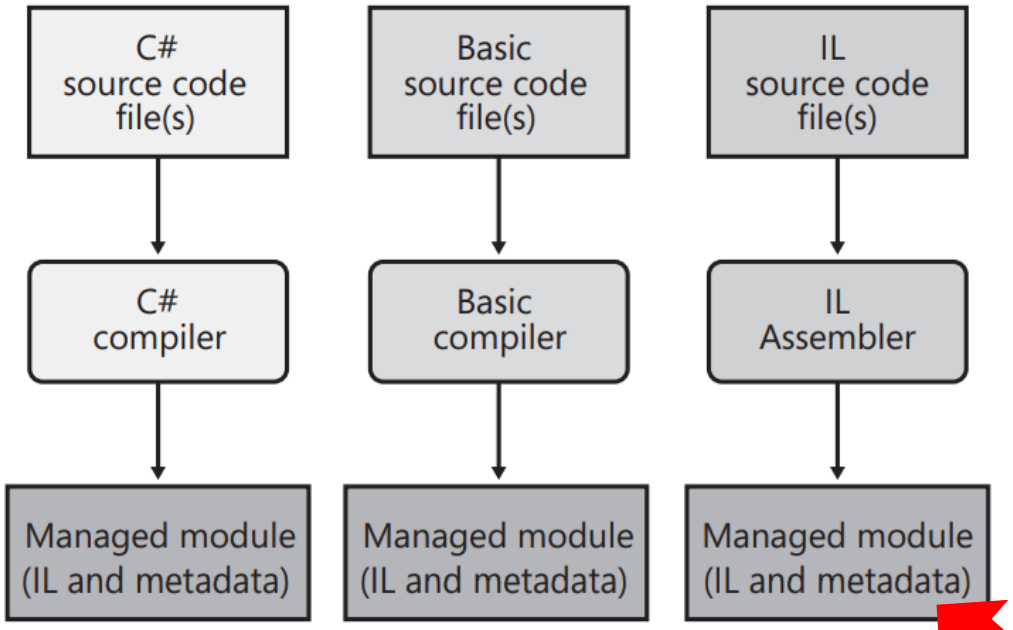
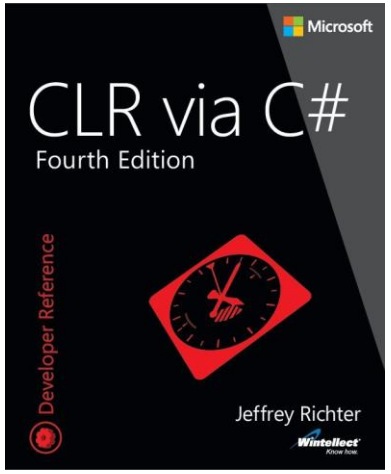


FIGURE 1-1 Compiling source code into managed modules.



Microsoft Press CLR via C#

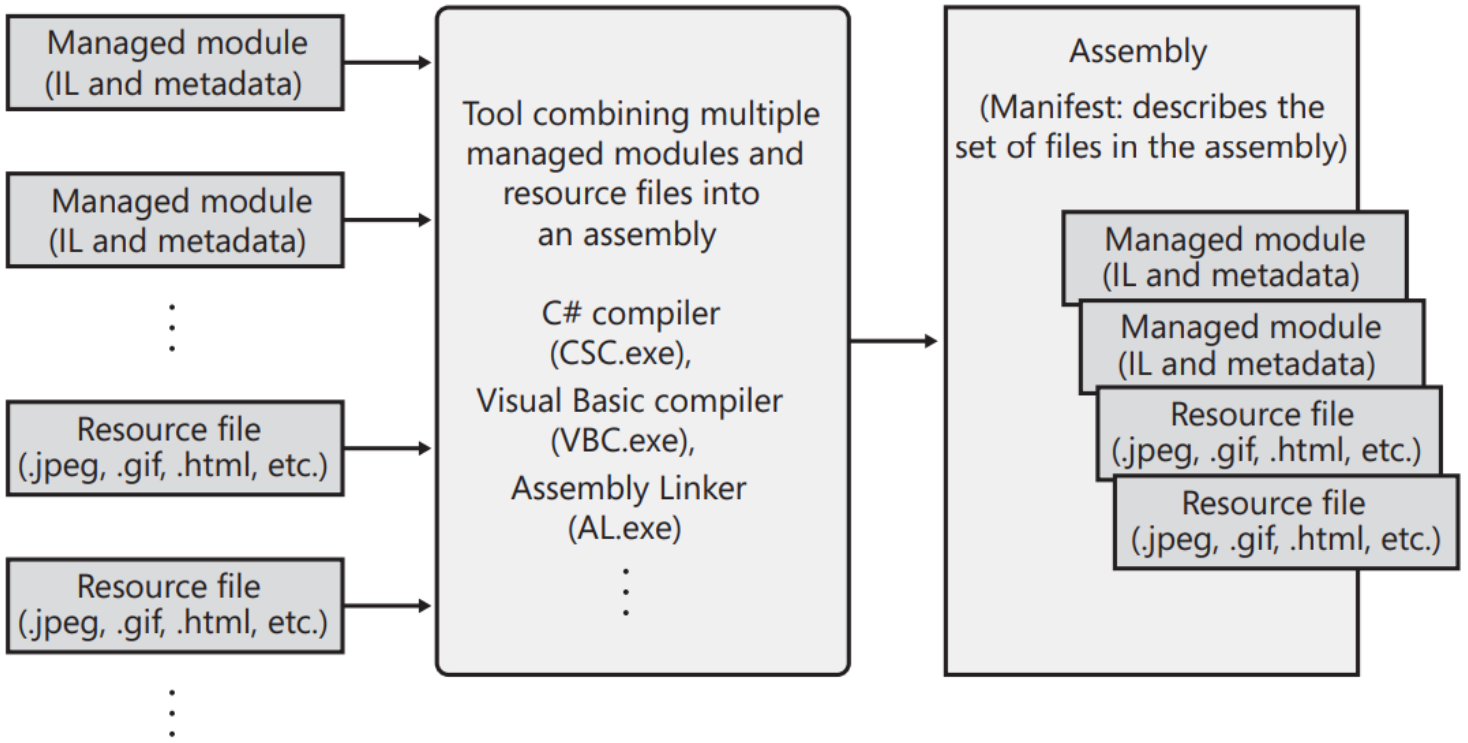
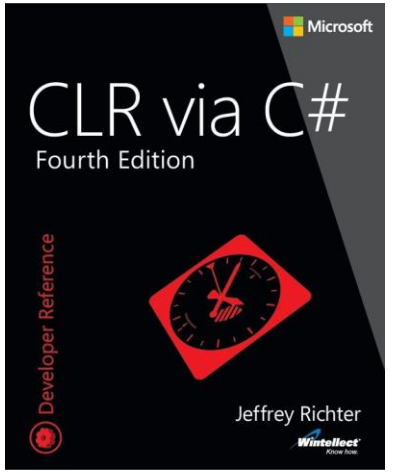


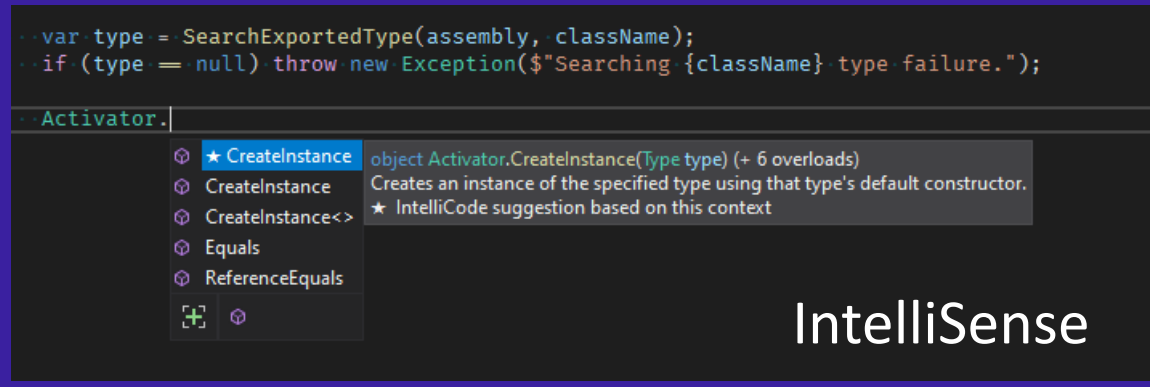
FIGURE 1-2 Combining managed modules into assemblies.



Microsoft Press CLR via C#

用在哪裡？

- 終極的延遲綁定
  - IDE 的 WinForm 控制項屬性視窗
  - Visual Studio 的 IntelliSense
- 及時生成/執行程式
  - 程式碼分析工具
  - 測試應用程式
- 讓使用者能夠自行選擇要執行的實作
- 可大幅簡化程式碼複雜度的時候



代價

- 反射機制的強大增加了開發者的靈活性
  - 針對特定問題提供強大解決方案
  - 對於基礎結構的程式碼非常有用
- 靈活性的代價
  - 效能損失
  - 安全性的限制（反射程式碼可能在某些環境無法使用）
  - 違反封裝原則
  - 程式碼變的更多，更難追蹤與理解

效能開銷

- 類別建構的開銷
  - 一次性的開銷，通常可以忽略
- 執行的開銷
  - 通常會比正常呼叫慢
  - 若應用程式大量使用 Reflection 做法，此問題更為彰顯

不是不能用，是要知道為什麼而用

缺點

- 無法在編譯時期保證型別安全性
  - 嚴重依賴字串標識，所以喪失編譯時期的型別安全
- 執行速度相對較慢
  - 需先掃描執行程序的 Metadata，且會不停的執行字串搜尋
  - 字串搜尋過程中是執行不區分大小寫的比較

```
<Reference Include="Newtonsoft.Json, Version=12.0.0.0, Culture=neutral, PublicKeyToken=30ad4fe6b2a6aeed, processorArchitecture=MSIL">
  <HintPath>..\packages\Newtonsoft.Json.12.0.3\lib\net45\Newtonsoft.Json.dll</HintPath>
</Reference>
<Reference Include="System" />
<Reference Include="System.Buffers, Version=4.0.3.0, Culture=neutral, PublicKeyToken=cc7b13ffcd2ddd51, processorArchitecture=MSIL">
  <HintPath>..\packages\System.Buffers.4.5.1\lib\net461\System.Buffers.dll</HintPath>
</Reference>
```

載入外部 DLL

- System.Reflection
  - Assembly.Load()
  - Assembly.LoadFrom()
    - 可指定特定 DLL 檔案，並載入相依的 DLL
    - 若曾經載入相同標識的 DLL，直接回傳已載入的物件
  - Assembly.LoadFile()
    - 只載入指定的 DLL 檔案
    - 可以將相同標幟的 DLL 多次載入到 AppDomain 中

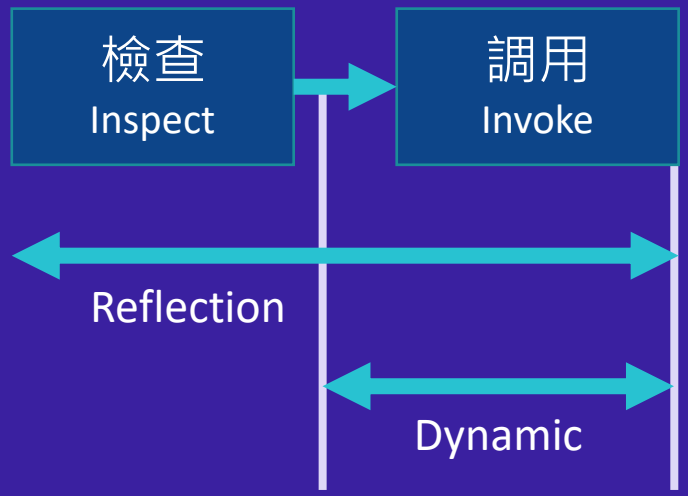
建議每次建置產出 DLL 時都更改版本號，使之具有唯一標識，確保行為符合預期

3 種實體化 API

- System.Activator
  - CreateInstance()
  - CreateInstanceFrom()
- System.AppDomain
  - CreateInstance()
  - CreateInstanceAndUnwrap()
  - CreateInstanceFrom()
  - CreateInstanceFromAndUnwrap()
- System.Reflection.ConstructorInfo
  - Invoke()

從已載入的型別中
實體化物件

Reflection 和 Dynamic 的差異



	Reflection	Dynamic
Inspect (metadata)	Yes	
Invoke public member	Yes	Yes
Invoke private member	Yes	
Caching		Yes
Static class	Yes	

https://www.codeproject.com/Articles/593881/What-is-the-difference-between-2

Dynamic

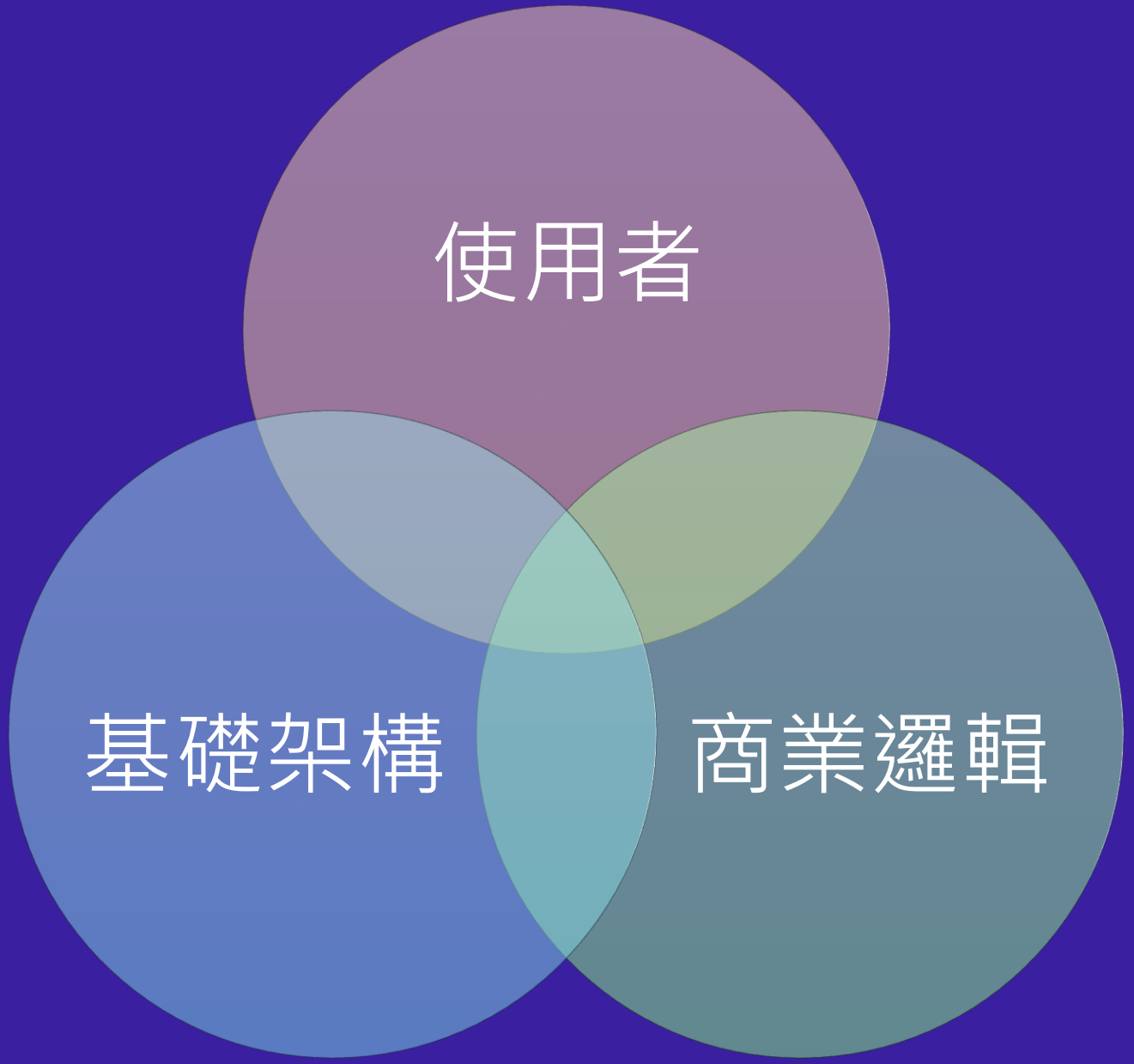
Reflection

Delegate

Expression

KingKong Bruce記事: Reflection-使用反射執行方法的7種方式
https://blog.kkbruce.net/2017/01/reflection-method-invoke-7-ways.html

架構設計的思考點



關鍵的設計原則

- ✓ 關注點分離
  Separation of Concerns (SoC)
- ✓ 單一責任原則
  Single Responsibility Principle
- ✓ 最少知識原理
  Principle of Least Knowledge
- ✓ 不要重複自己
  Don’t Repeat Yourself
- ✓ 最小化前期設計風險
  Minimize Upfront Design Cairns

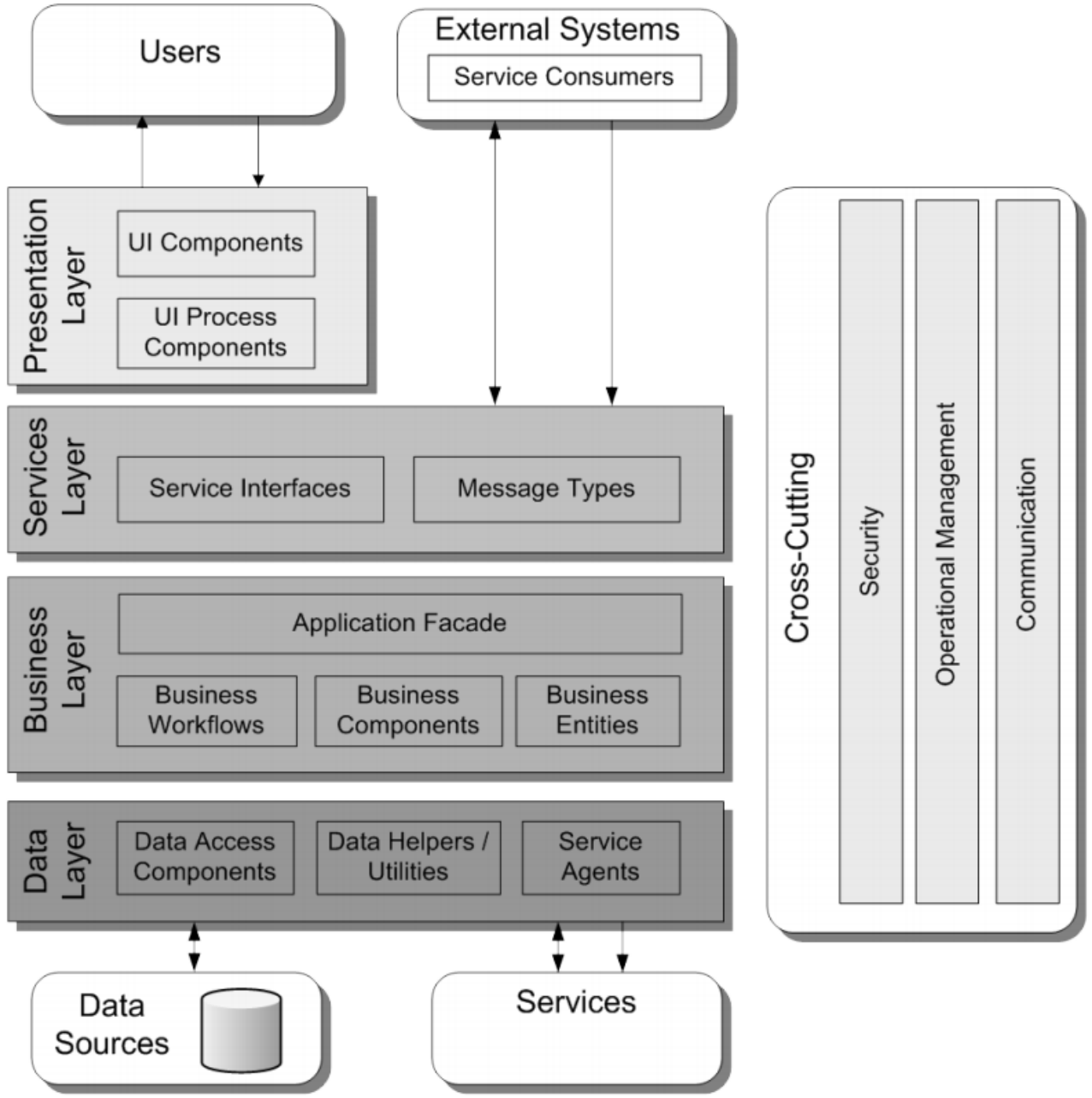
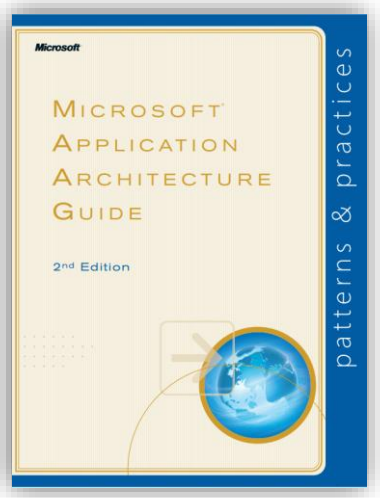
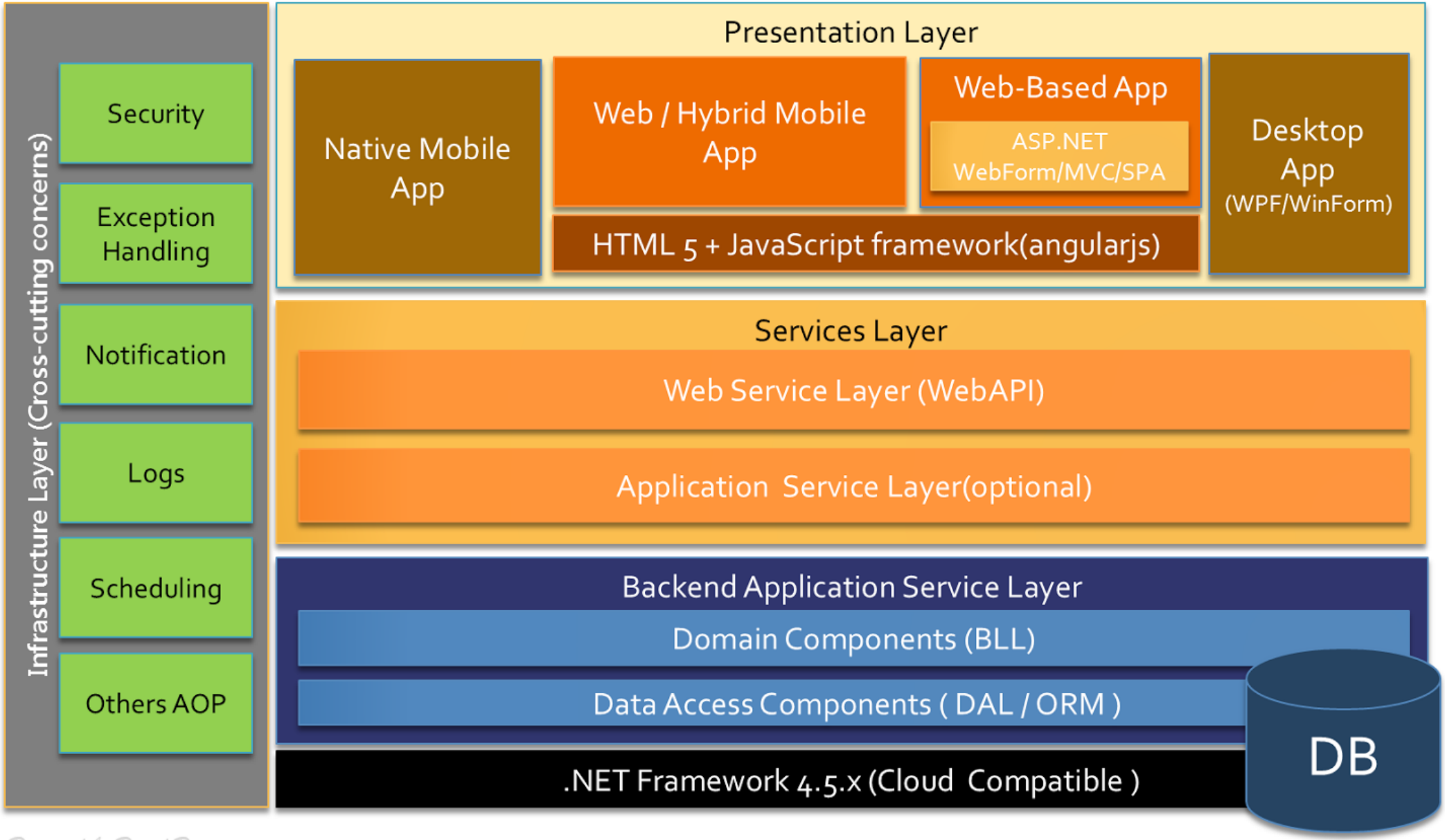


Figure 1 Common application architecture

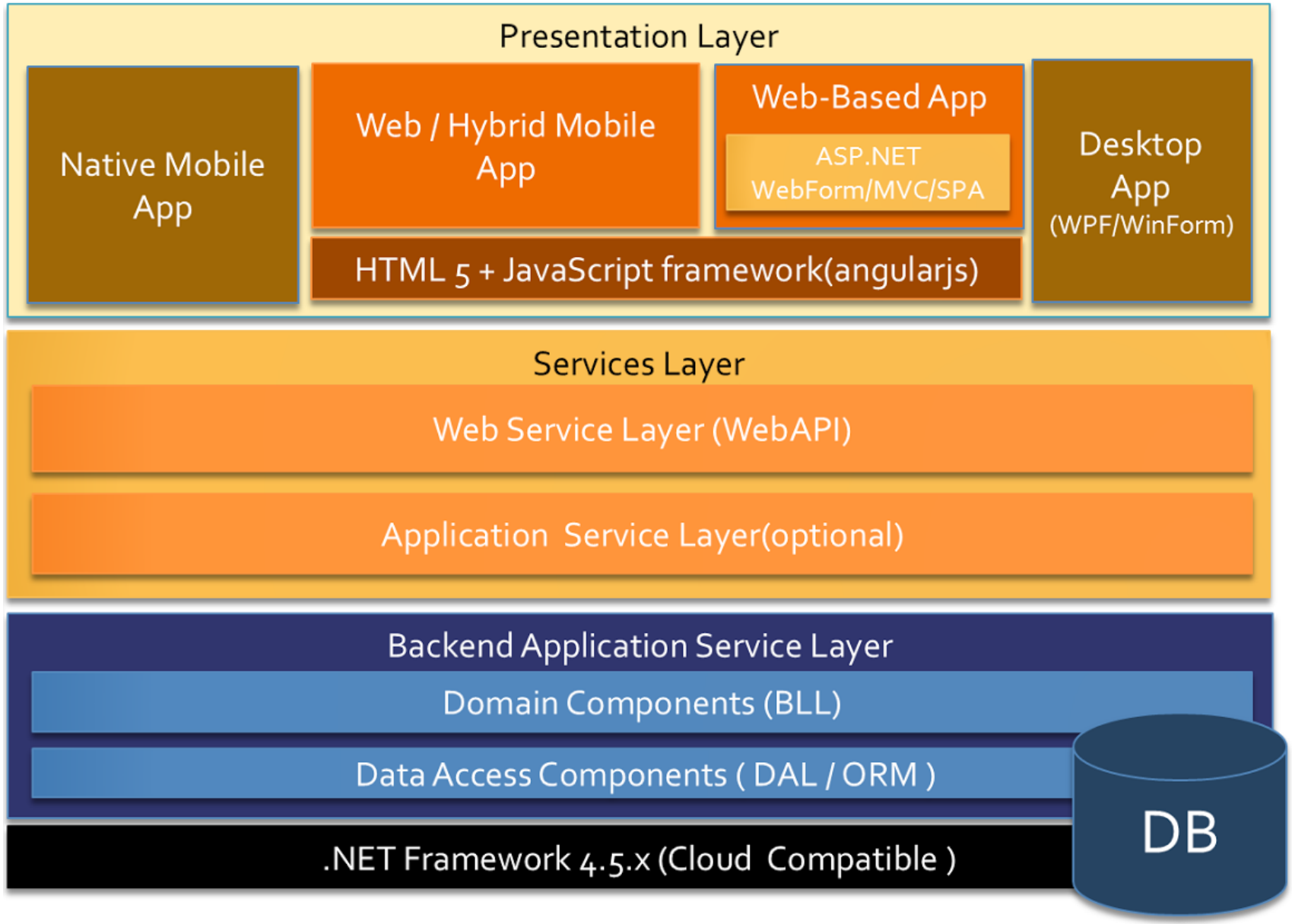


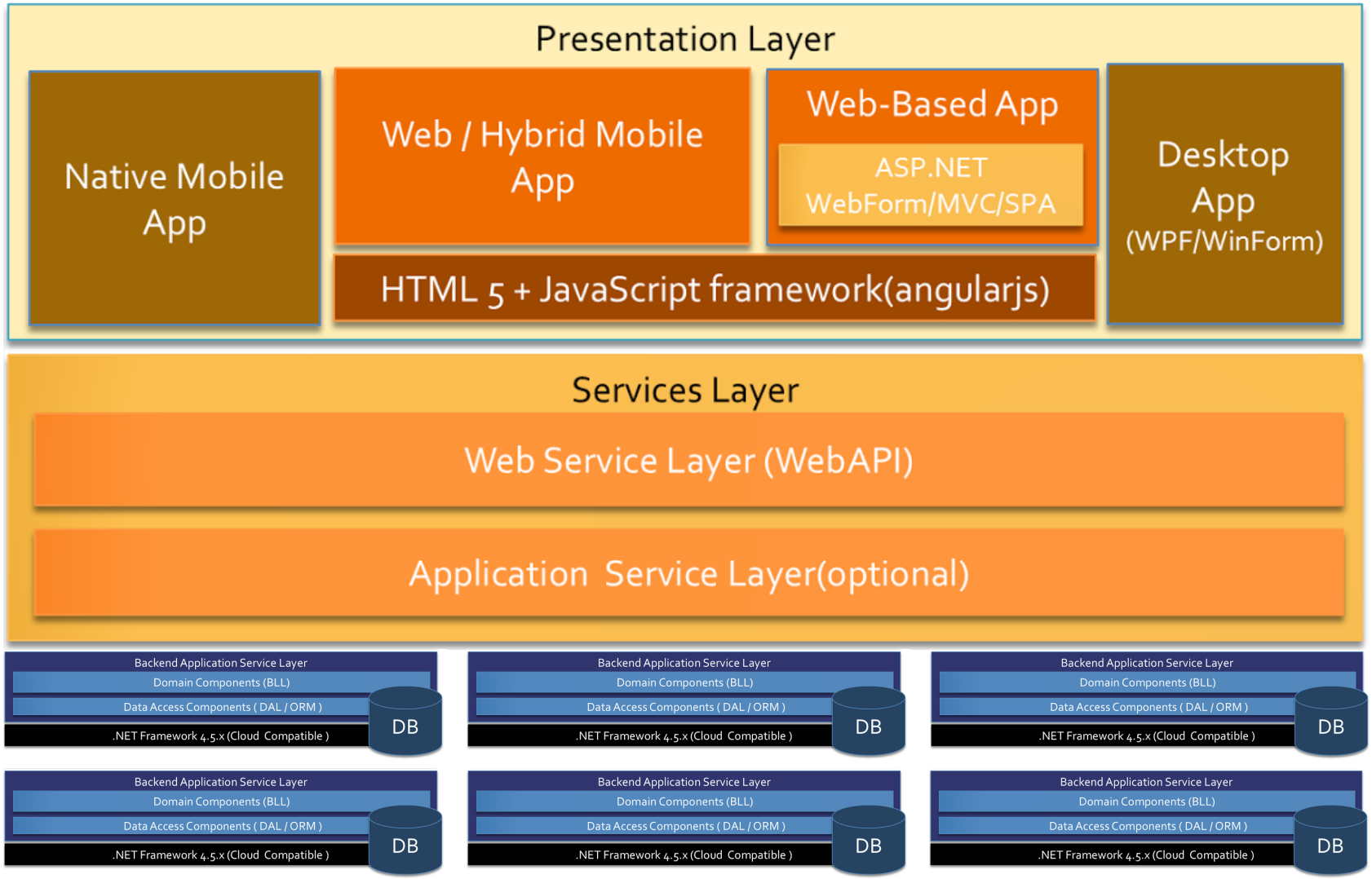
Microsoft Application Architecture Guide

Framework Architecture

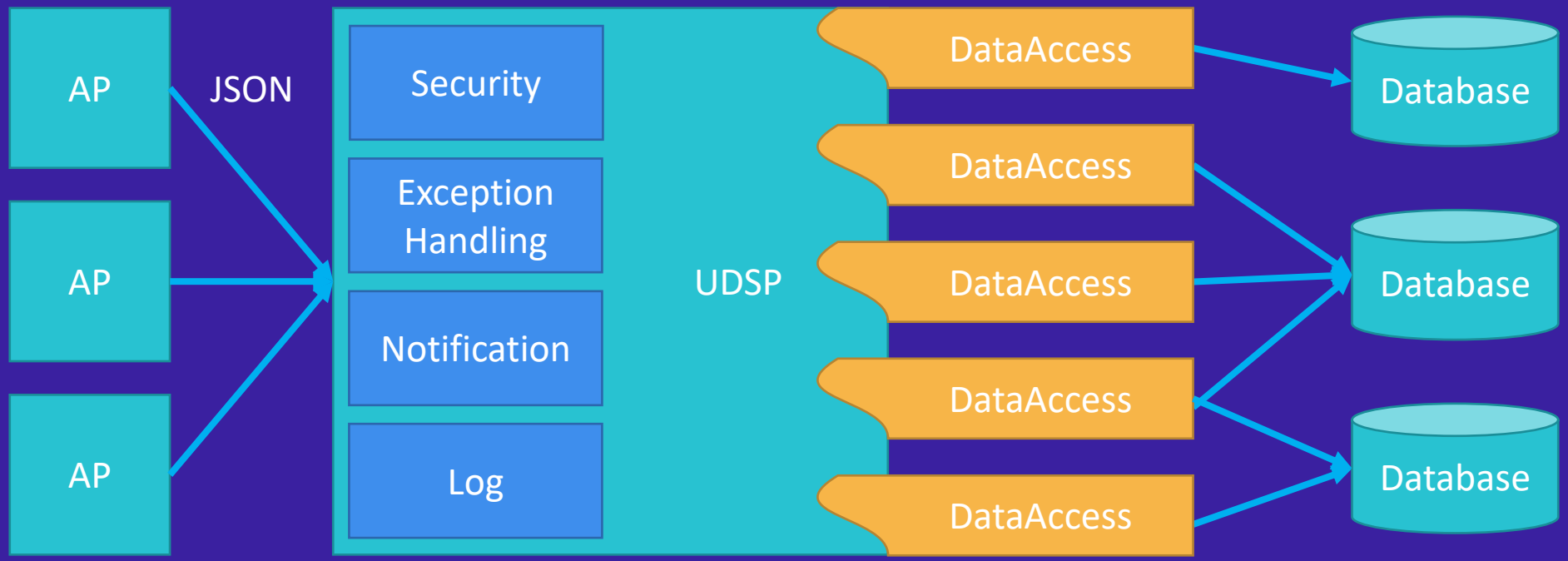


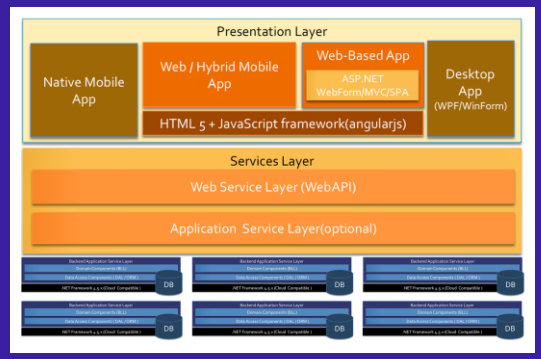
Designed by David Dong


Presentation Layer
Native Mobile App
Web / Hybrid Mobile App
Web-Based App
ASP.NET WebForm/MVC/SPA
Desktop App (WPF/WinForm)
HTML 5 + JavaScript framework(angularjs)
Services Layer
Web Service Layer (WebAPI)
Application Service Layer(optional)
Backend Application Service Layer
Domain Components (BLL)
Data Access Components (DAL / ORM)
.NET Framework 4.5.x (Cloud Compatible)
DB


Presentation Layer
Native Mobile App
Web / Hybrid Mobile App
Web-Based App
ASP.NET WebForm/MVC/SPA
Desktop App (WPF/WinForm)
HTML 5 + JavaScript framework(angularjs)
Services Layer
Web Service Layer (WebAPI)
Application Service Layer(optional)
Backend Application Service Layer
Domain Components (BLL)
Data Access Components (DAL / ORM)
.NET Framework 4.5.x (Cloud Compatible)
DB

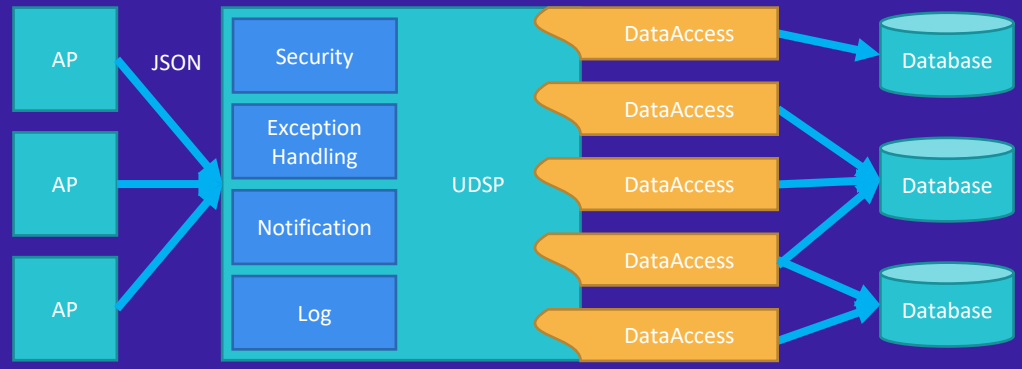
Universal Data & Service Platform



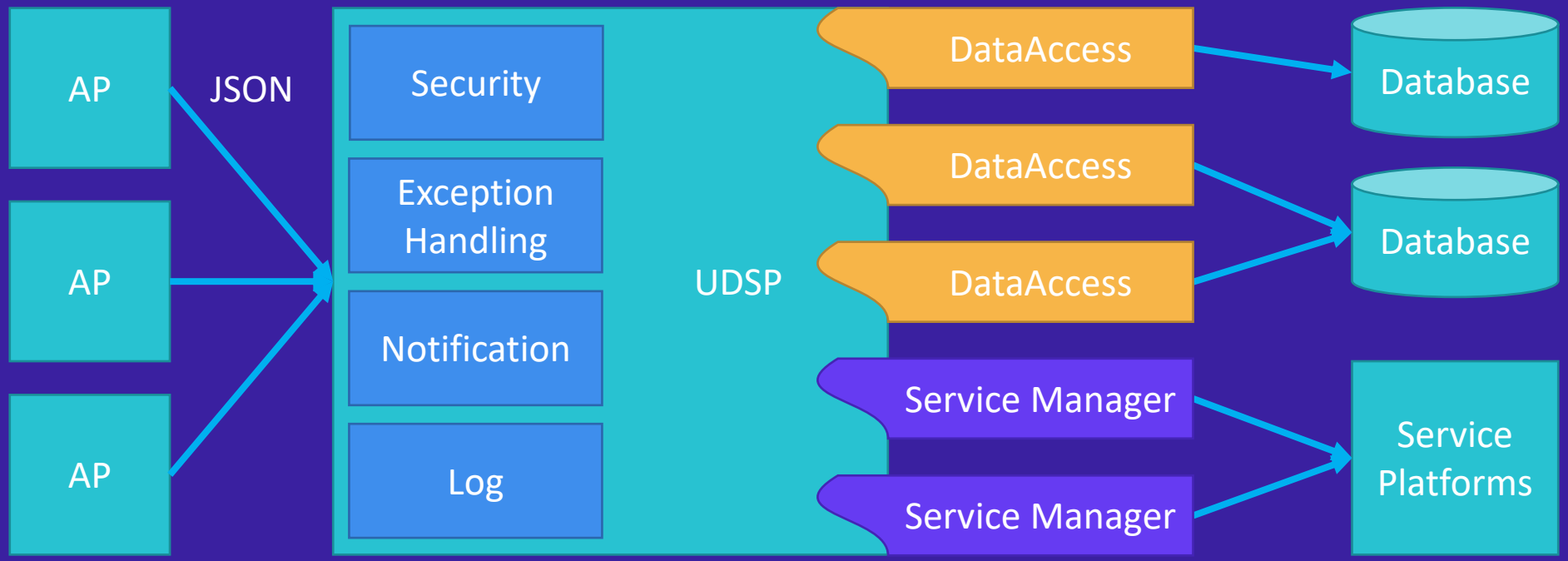


JSON Payload

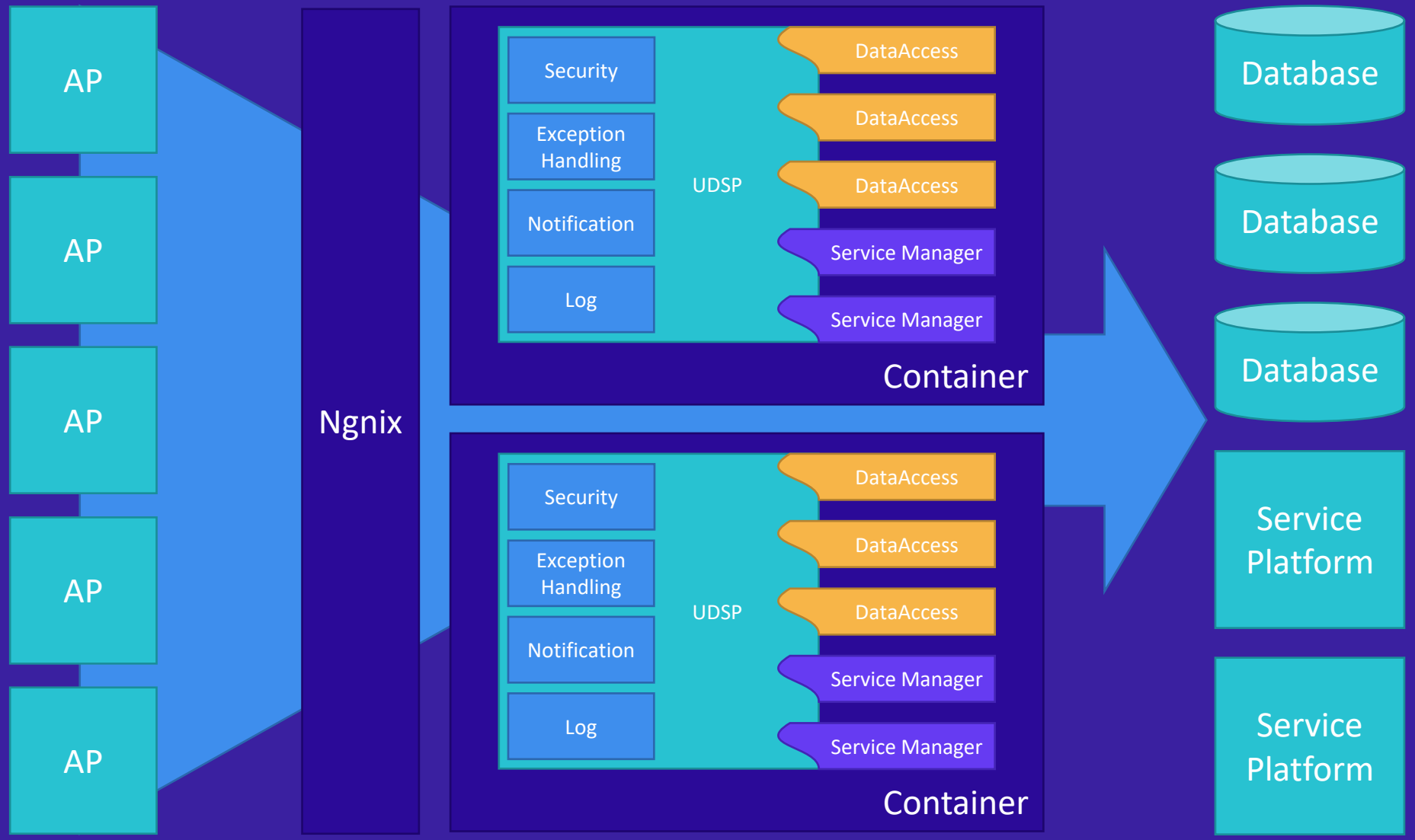
```
{
  "DbName":        "B2BQAS",
  "ProjectName":   "B2B",
  "DllName":       "B2B.DataAccess",
  "ContractName":  "Kingston.Udsp.Contract",
  "ContractType":  "DataService",
  "ClassName":     "TestResultDal",
  "MethodName":    "ReadTestReport",
  "JsonParam":     "{\"Version\":\"20181224\"}"
}
```



Universal Data & Service Platform



Universal Data & Service Platform



Microsoft STUDY4 Build School

Thanks for joining!

.NET Conf 2020

.NET Conf 2020

特別感謝

91APP Technical Network

Red Hat

KKTIX

JET BRAINS

HackMD

MVP Microsoft® Most Valuable Professional

Microsoft

Build School

STUDY4 為學習而生

以及各位參與活動的你們