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Evaluating Web Development Frameworks for Delphi

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Disclaimer

- ❏ This content is mostly focused on 3rd party frameworks and libraries
- ❏ While a lot of time was spent researching, some of the information may be outdated or otherwise incorrect through an error during research
- ❏ Links are provided to the sources, and you are encouraged to double check all information and seek clarification
- ❏ Any exclusion is just an oversight or a result of limited time and space and was not an intentional indication of quality or suitability
- ❏ This information presented here is not intended to indicate superiority or inferiority of one library over another for any use cases
- ❏ Please consider this a good faith effort to represent these libraries and frameworks impartially and accurately
- ❏ I will reach out to the projects, companies, and developers to seek corrections and additional information.
- ❏ Erratas and updates will be published at embt.co/WebDev2019

Thanks!

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Delphi and FireMonkey:
Winning Combination for Cross-Platform Development

⟶ Single Codebase
⟶ Easy-to-tailor platform specific UIs
⟶ One programming language to learn and support

What about Web Apps?

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Delphi's incredible productivity for building amazing apps also extends to the web!

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JAN 2019

DIGITAL AROUND THE WORLD IN 2019

THE ESSENTIAL HEADLINE DATA YOU NEED TO UNDERSTAND GLOBAL MOBILE, INTERNET, AND SOCIAL MEDIA USE

TOTAL POPULATION	UNIQUE MOBILE USERS	INTERNET USERS	ACTIVE SOCIAL MEDIA USERS	MOBILE SOCIAL MEDIA USERS
7.676 BILLION	**5.112 BILLION**	**4.388 BILLION**	**3.484 BILLION**	**3.256 BILLION**
URBANISATION: **56%**	PENETRATION: **67%**	PENETRATION: **57%**	PENETRATION: **45%**	PENETRATION: **42%**

7

Hootsuite we are social

INTERNET USERS OVER TIME

JAN 2019

NUMBER OF INTERNET USERS (IN MILLIONS), WITH YEAR-ON-YEAR CHANGE

Year	Users
2014	2,485
2015	3,008
2016	3,429
2017	3,773
2018	4,021
2019	4,388

2014 → 2015: +21%
2015 → 2016: +14%
2016 → 2017: +10%
2017 → 2018: +6.6%
2018 → 2019: +9.1%

39

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https://blog.hootsuite.com/simon-kemp-social-media/
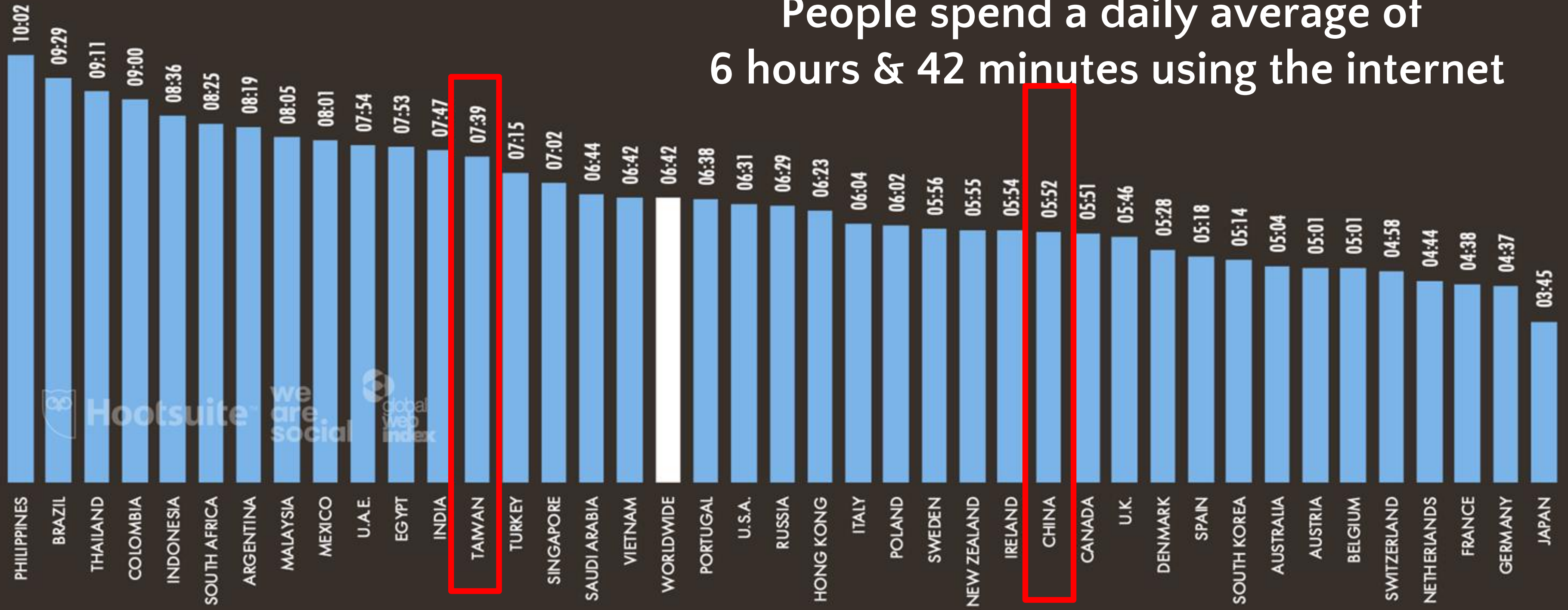
Agenda

❏ Different kinds of web development

❏ Overview of included technologies

❏ Listing of 3rd party solutions

❏ Example source code

❏ Resources for more information

HTML XML JSON
SOAP JS CSS
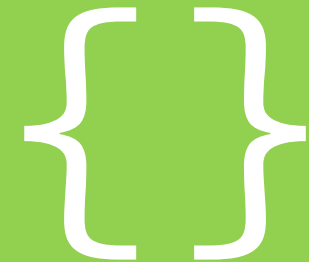AJAX REST

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HTML Client App

HTML (HyperText Markup Language) is used to render a client app in the web browser.

CSS (Cascading Style Sheets) is used to style and present the HTML in a pleasing manner

JavaScript provides interactivity in the application.

AJAX allows asynchronous updates of a web page

These are the languages of the **web browser**!

XML & JSON

XML (eXtensible Markup Language) is similar to HTML (both based on SGML) in that it uses <angled brackets> to indicate tags. It is a text based format for data.

JSON *(JavaScript object notation)* uses {curly braces} to delineate data elements.

Generally speaking XML is more complex than JSON as it is extended by XSL, XSD, DTD, XSLT, and other documents with features like strong types, namespaces, etc.

REST Web API

RESTful (REpresentational State Transfer) describes the way an API interacts. It isn't so much a protocol as a style.

An API exists on a server and clients apps (web or otherwise) connect to it.

REST typically uses JSON to transport the data. It can, but rarely uses XML.

SOAP Web API

SOAP (Simple object access protocol) is an XML based protocol to provide an API allowing remote clients to connect to a server.

SOAP is much more complex, strict, and robust than REST, which was designed as a simpler alternative.

SOAP is still in use for, and preferred for, some specific use cases.

RAD Studio's Included Web Technologies
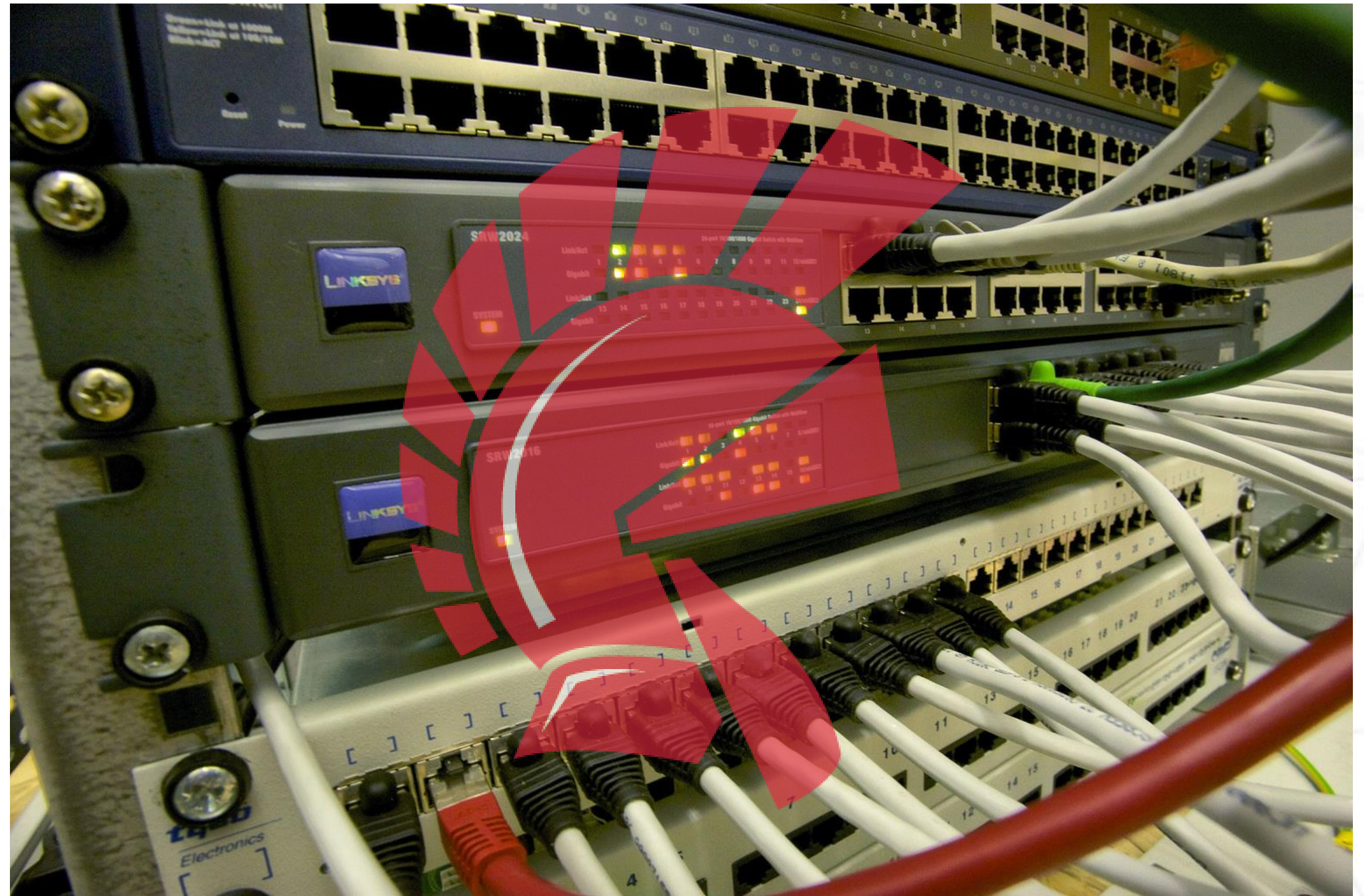
Server Technologies

- DataSnap
- RAD Server / EMS Server
- WebBroker
- SOAP Services

Client Technologies

- REST BaaS Client
- Cloud Client Libraries
- REST Client Library
- HTTP Client Library
- SOAP Clients

Miscellaneous

- Indy Library
- Windows Socket Libraries

Is all of this Delphi Specific?

- Most of these frameworks also work with C++Builder too

- Often times the libraries and samples are written in Delphi

- C++Builder has excellent compatibility with Delphi libraries

- The notable exception is *transpilers* which are focused on Object Pascal

- RAD Studio includes both Delphi & C++Builder

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WebBroker

Server Focused

Server

Delphi Code

IIS or Apache
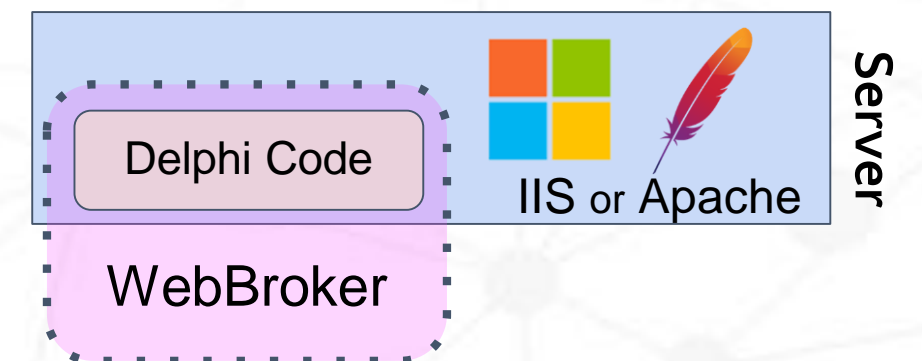
WebBroker

WebBroker

- The foundation of most Delphi powered web technologies
- Key idea: Abstract Server HTTP protocol
  - Concrete classes mapped to CGI, ISAPI, Apache modules, stand alone (Indy)
  - Maps URLs to actions, supports filters and global handlers
- Quick solution for:
  - Simple web server returning HTML
  - Simple web service returning JSON

  - *Warning: the related "producer" components use old-fashioned approach*
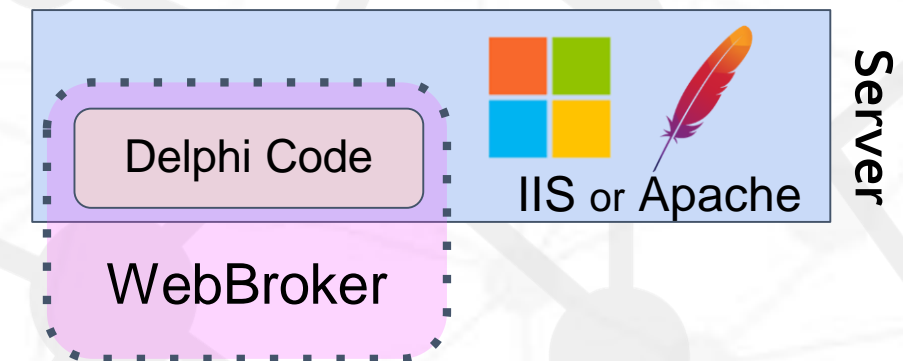
WebBroker Demonstration

Server Focused

Select 3rd-Party Web Frameworks

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Select 3ʳᵈ-Party Web Frameworks

DX

Pascal→JavaScript Transpilers

- TMS WEB Core
- Smart Mobile Studio
- Elevate Web Builder

Client Focused

Client/Server Frameworks

- IntraWeb
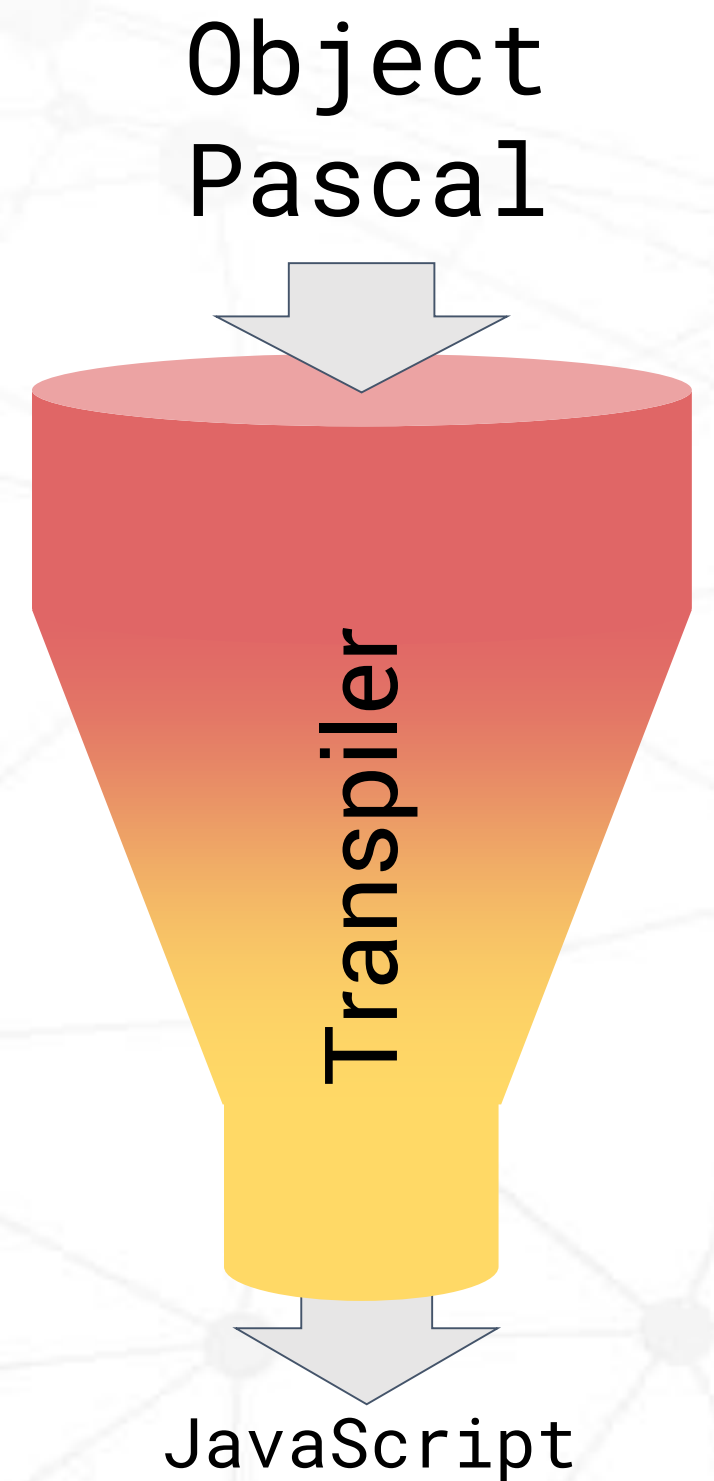- uniGUI
- Kitto^2

Balanced Full-Stack

REST Servers

- Delphi MVC Framework
- mORMot
- Mars Curiosity

Server Focused

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Pascal to JavaScript Transpilers

- **Write in Object Pascal** (dialect based on Delphi), **and translate/compiles it to JavaScript**

- **Frequently based on pas2js or DWSctript**
  - delphitools.info/dwscript (no emitter)
  - wiki.freepascal.org/pas2js (complex to set up)

- **Includes large support libraries**

- **Creates a pure web client solution**
  - Using HTML, JavaScript & CSS
  - Or supporting other JavaScript targets

- **Compatible with many popular server solutions**

- **Doesn't require developer to know JavaScript**

Object Pascal

Transpiler

JavaScript

Client Focused

Elevate Web Builder

DX
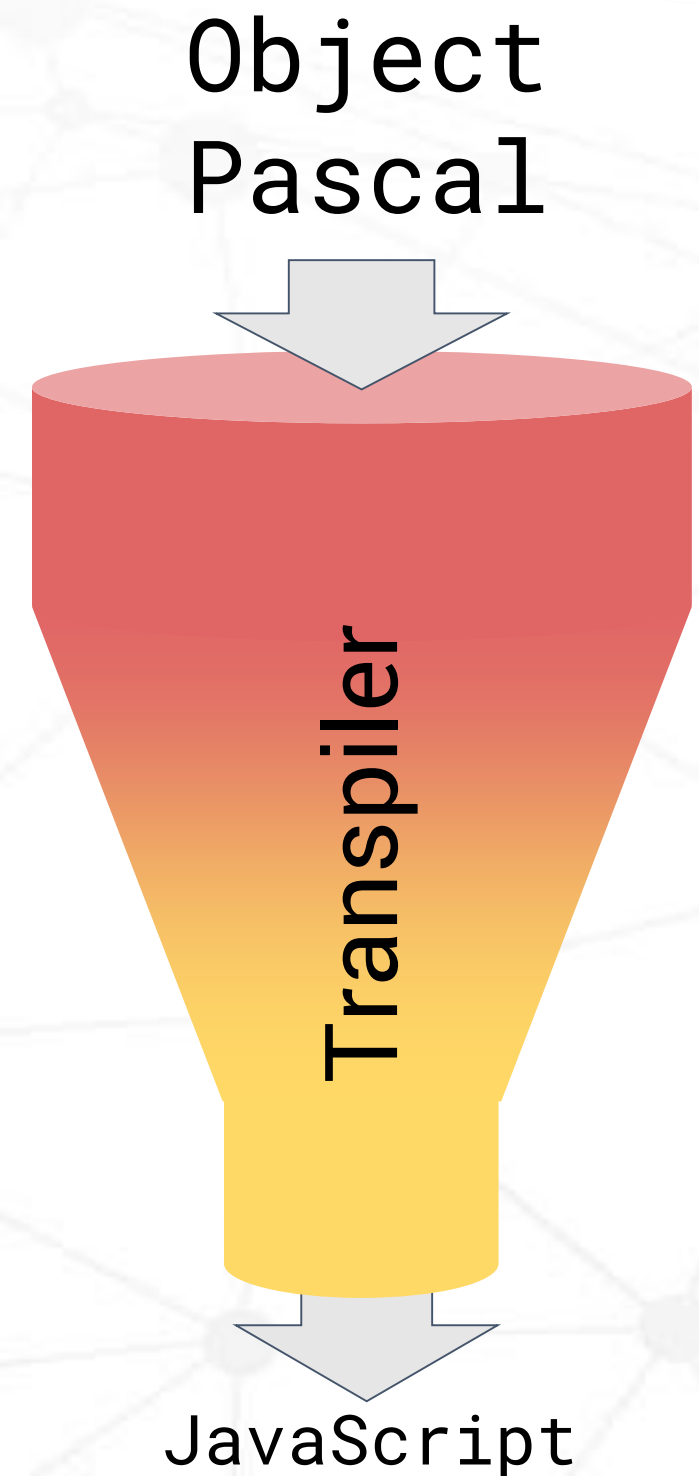
Integration

- ✓ Has its own "Delphi Like" IDE
- ✓ With components similar to VCL
- ✓ Supports using Delphi to create native Elevate Web Builder Web Server modules

Technology

- ✓ Uses familiar Object Pascal dialect
- ✓ Includes TDataSet and Data Access
- ✓ Compiles to optimized JavaScript
- ✓ Includes local web server for debugging and testing

Availability

- ✓ Trial version
  - ○ Only runs from IDE w/o command-line compiler
- ✓ Full version is $359 USD
  - ○ Includes Elevate Web Builder and Elevate Web Server with support for Delphi modules
- ✓ Optional server modules only run on Windows

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elevatesoft.com

elevate WEB BUILDER

elevate software

Smart Mobile Studio (SMS)

DX

Integration

- ✓ Has its own "Delphi Like" IDE
- ✓ Uses familiar Object Pascal dialect

Technology

- ✓ Compiles to pure JavaScript
- ✓ Has lots of targets, like Node.js, Tizen, Console, & Espruino
- ✓ Has own RTL and full visual component framework

Availability

- ✓ Comes in three editions with yearly licenses: Basic, Professional, Enterprise
- ✓ Free for educational purposes
- ✓ Free command–line compiler
- ✓ Current version is 3.0.2

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smartmobilestudio.com

TMS WEB Core

DX

Integration

- ✓ Integrates into Delphi IDE
- ✓ Write Object Pascal and design in RAD Studio, builds pure HTML & JavaScript
- ✓ Works with TMS's cross-platform FNC components

Technology

- ✓ Builds Single Page Application (SPA)
- ✓ Works with popular JavaScript frameworks
- ✓ Compatible with favorite CSS styles
- ✓ Large reusable component set with database access
- ✓ Works with TMS XData, RAD Server and other backends

Availability

- ✓ TMS WEB Core v1.2 Padua beta adds Electron target, camera component, file picker, and more (April 3rd, 2019)
- ✓ Buy stand-alone for € 395 or comes as part of TMS All-Access for € 1695 (70% discount)
- ✓ Includes full source code and 1 year of updates

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tms

tmssoftware.com/site/tmswebcoreintro.asp

Alternatives to Transpilers

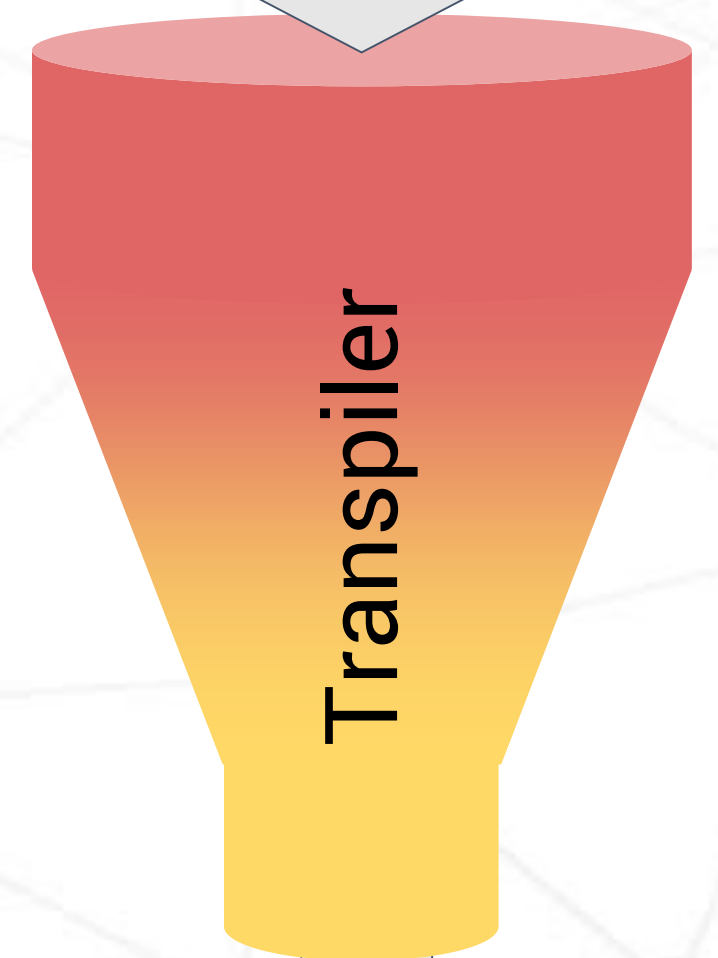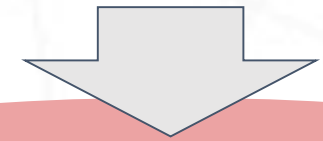- ## Writing JavaScript manually
  - Gives you full access to all the JavaScript libraries, samples, and code base
  - Designed by Mozilla and standardized as ECMAScript
  - developer.mozilla.org/en-US/docs/Web/JavaScript

- ## TypeScript
  - A superset of JavaScript adding type safety while compatible with JavaScript
  - Designed by Anders Hejlsberg at Microsoft typescriptlang.org

- ## Ext JS
  - One of the most popular and powerful JavaScript UI frameworks
  - Community and commercial editions
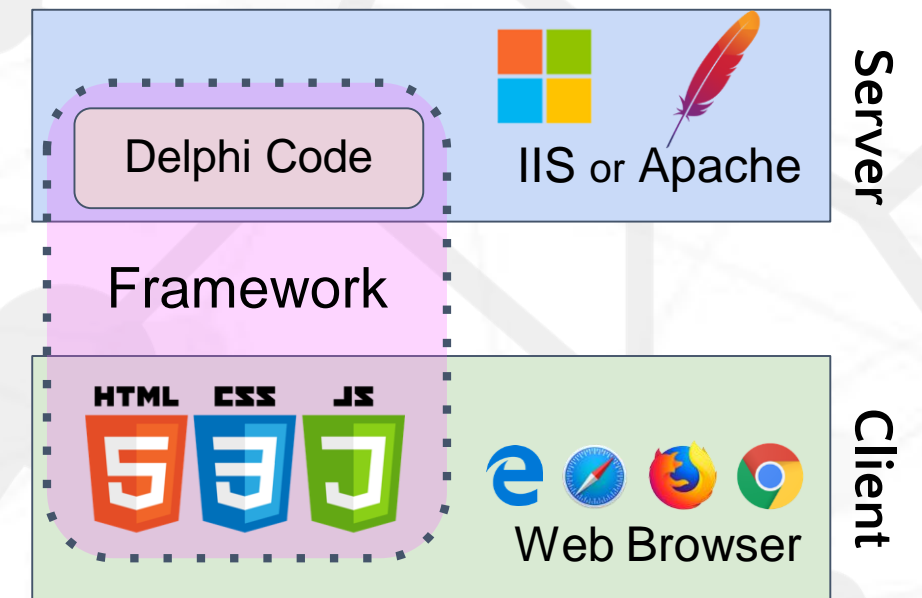 - By Sencha an Idera company sencha.com/extjs
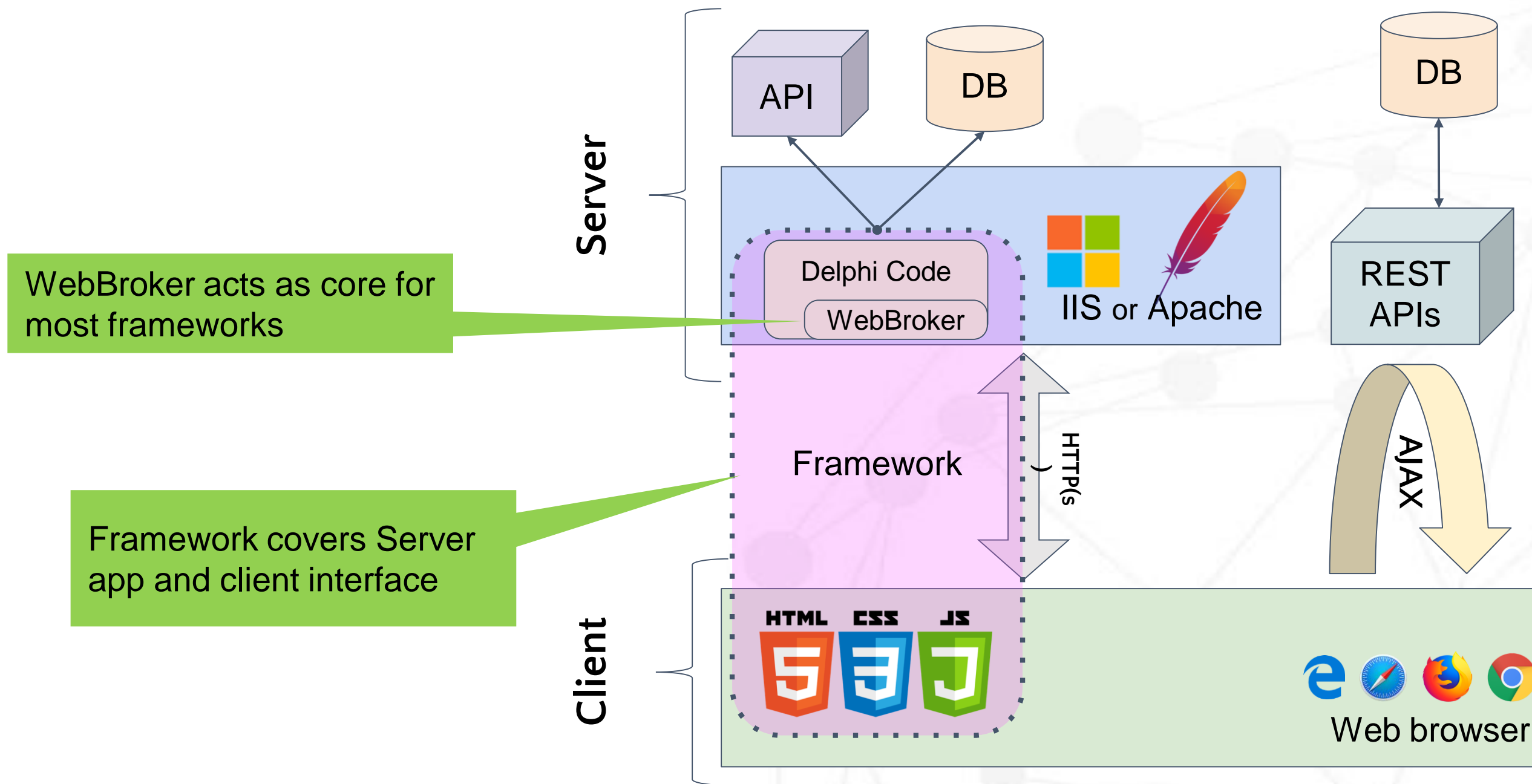
Object
Pascal

Transpiler

JavaScript

DX

Transpiler Demonstration

**Client
Focused**

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Client/Server Frameworks

Balanced
Full-Stack

Server

Delphi Code

IIS or Apache

Framework

HTML CSS JS

Web Browser

Client

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Client/Server Frameworks

DX

Server

API

DB

DB

IIS or Apache

Delphi Code

WebBroker

REST APIs

WebBroker acts as core for most frameworks

Framework

HTTP/s

AJAX

Framework covers Server app and client interface

Client

HTML CSS JS

Web browser

When to Choose:
- Full stack from a single framework
- Both server and visually designed UI in one project
- Balanced approach

Examples: IntraWeb, uniGUI (uses ExtJS), Kitto^2 (uses Ext JS & without designers)

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Balanced Full-Stack

AtoZed Software's IntraWeb

DX

Integration

- ✓ **Installed into IDE**
- ✓ **Modeled on VCL**
- ✓ **De facto standard of Delphi Web GUI**
- ✓ **Available via GetIt**
- ✓ **Bundled in earlier version of Delphi**
- ✓ **Various deployments**
- ✓ **3rd party components**

Technology

- ✓ **Visual Client Designer**
- ✓ **Client built from JS & HTML library**
- ✓ **Delphi UI event handlers run on server**
- ✓ **Extensible via JS or TypeScript**
- ✓ **v14 & v15 work under Linux with WINE**
- ✓ **v17 is bringing native Linux support**

Availability

- ✓ Version v14 is *free* for all Delphi Rio developers
- ✓ Current version is v15 (available for purchase)
- ✓ v17 is coming soon (in private beta)
  More info atozed.com/intraweb/v17/
- ✓ Install v14 from GetIt
  Details atozed.com/intraweb/bundled/10-3-rio/

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intraWeb

ATOZED software

atozed.com/intraweb

FMSoft uniGUI Web Application Framework

DX

Integration

✓ Installs Into Delphi IDE
✓ Very VCL like in design and use
✓ Includes seamless support of Sencha Ext JS and an OEM license for it

Technology

✓ Allows optional JavaScript for client side events
✓ Delphi VCL like server side event handlers
✓ Desktop & Mobile support
✓ Includes data aware controls
✓ New HyperServer includes:
  ○ Enhanced scalability
  ○ Remote deployment
  ○ Enhanced load balancing
✓ Linux support coming in v2

Availability

✓ uniGUI Equinox (1.90.0.1495)

4 Editions
✓ Trial Edition
✓ Personal
✓ Professional

Ext JS Classic Only

✓ Professional Complete

(Complete includes Ext JS Modern Toolkit which adds mobile support)

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uniGUI.com

uniGUI web application framework

Ethea Kitto² Data-driven Web Toolkit

Integration

- ✓ Has its own Kitto IDE (Kide²)
- ✓ Installs libraries in Delphi IDE too
- ✓ Uses Ext JS 6 for UI
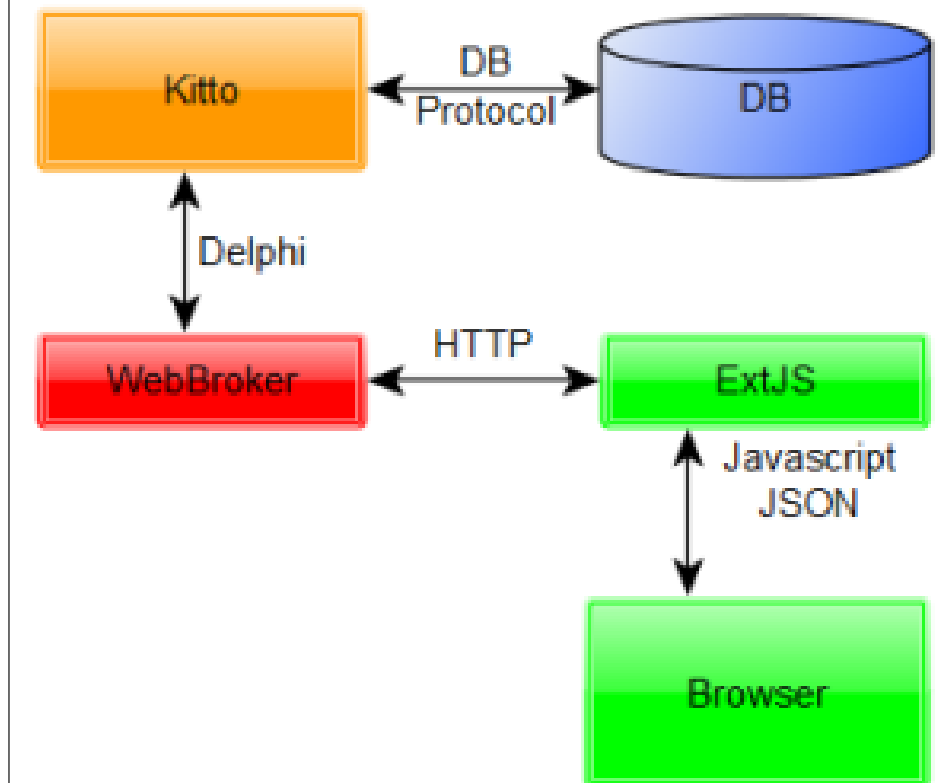- ✓ Supports optional JavaScript and CSS for customization

Technology

- ✓ No Visual Designer
- ✓ Map data model on to database
- ✓ Uses WebBroker for backend
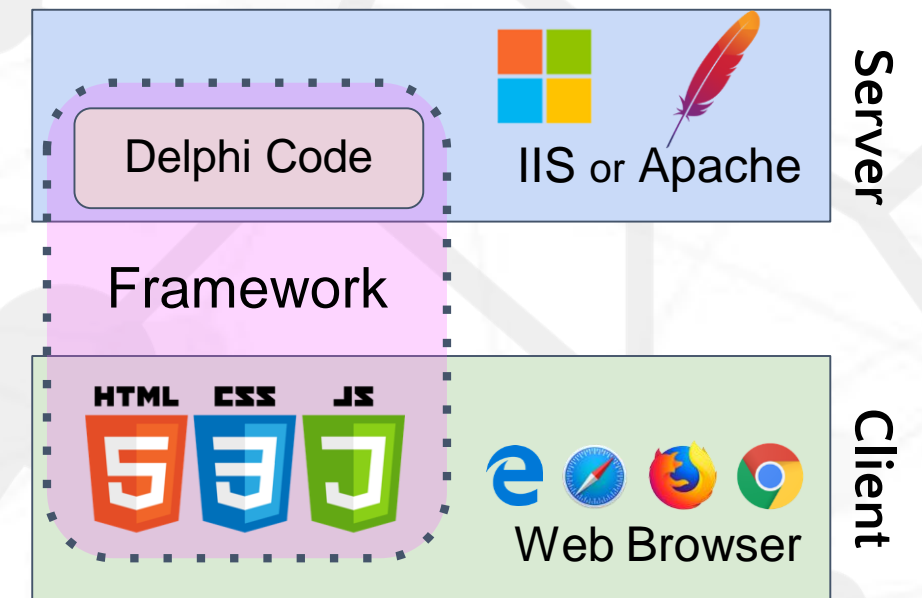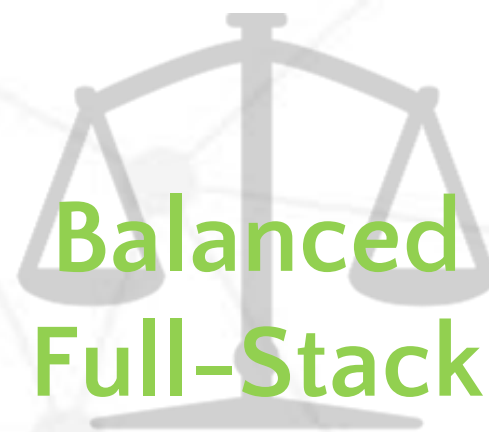- ✓ Makes it easy to use Ext JS to build client

Availability
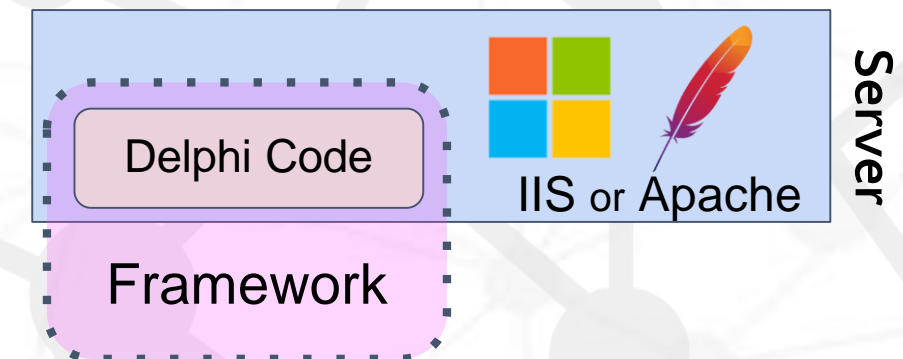
- ✓ Open source
- ✓ On GitHub
- ✓ Apache 2.0 License

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Client/Server Demonstration

Balanced Full-Stack

DX

REST Servers

**Server
Focused**

Delphi Code

Framework

IIS or Apache

Server

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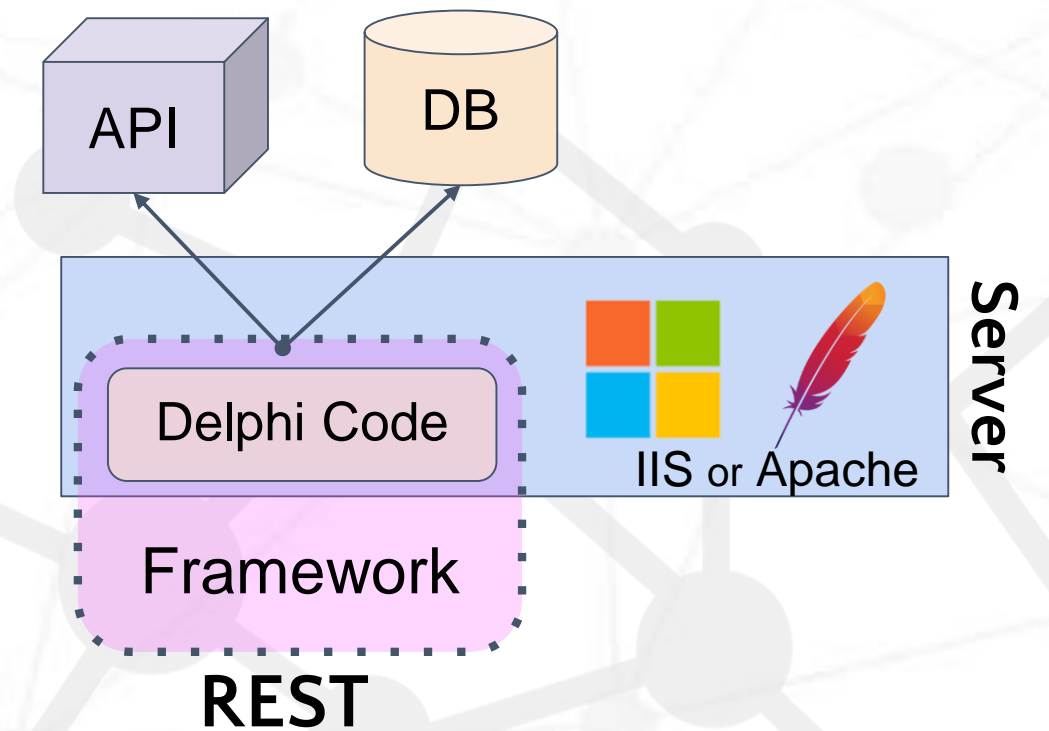
REST Servers

- Provides a REST API interface to remote resources
  - Can also serve other web content

- Included with Delphi Enterprise & Architect
  - RAD Server
  - DataSnap
  - WebBroker

- Open source projects:
  - Delphi MVC Framework
  - MARS–Curiosity Delphi REST Library
  - Synopse mORMot ORM/SOA/MVC Framework

API

DB

Delphi Code

IIS or Apache

Framework

Server

REST

Server Focused

Synopse mORMot ORM/SOA/MVC Framework

DX

Integration

✓ Full technology stack with it's own way of doing things

✓ Doesn't use WebBroker

✓ Client–Server architectures: HTTP, named pipes, or GDI messages

✓ Integrated SpiderMonkey JavaScript engine for server side business logic

Technology

✓ ORM/ODM: objects persistence on almost any database (SQL or NoSQL)

✓ SOA: organize your business logic into REST services

✓ Clients: consume your data or services from any platform, via ORM/SOA APIs

✓ Web MVC: publish your ORM/SOA process as responsive Web Applications
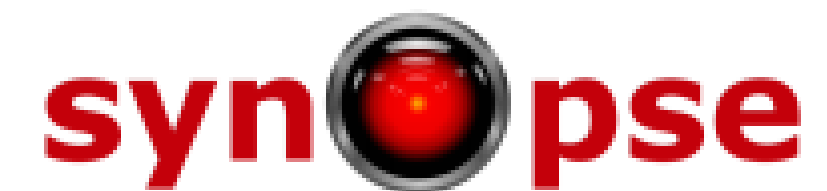
SOA = Service Oriented Architecture
ORM = Object Relational Mapper
ODM = Object Document Mapper

Availability

✓ Open Source: MPL–1.1+, GNU GPL–2.0+, or GNU LGPL–2.1+

✓ mormot.net

synopse

mORMot

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synopse.info

MARS–Curiosity Delphi REST Library

DX

Integration

- ✓ REST Server built on WebBroker
- ✓ Uses modern Delphi features
- ✓ Install into Delphi IDE
- ✓ Advanced dataset support with FireDAC
- ✓ Powerful cross–platform sync/async client library

Technology

- ✓ Designed to be Lightweight
- ✓ Easy and powerful
- ✓ 100% RESTful Web Service
- ✓ Run on Windows & Linux
- ✓ MARSCmd utility to bootstrap new projects

Availability

- ✓ Open Source: MPL–2.0 License
- ✓ Working to integrate DelphiCrossSocket

MARS CURIOSITY

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Delphi MVC Framework

DX

Integration

- ✓ REST Server built on WebBroker
- ✓ Includes Delphi IDE Wizard
- ✓ Runs under Apache or IIS on Windows & Linux

Technology

- ✓ Specialized renders to generate text, HTML, JSON
- ✓ RESTful (RMM Level 3) compliant
- ✓ JSON–RPC 2.0 Support with automatic objects remotization

Availability

- ✓ Open Source: Apache License 2.0
- ✓ Book coming soon

github.com/danieleteti/delphimvcframework

delphimvcframework

3.1.0-lithium

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RAD Server & DataSnap

DX

Both included with Delphi Enterprise & Architect Editions
Both provide REST APIs and are under constant development

DataSnap

- **Building blocks for flexibility**
- **Multiple access protocols**
  - REST
  - TCP/IP
  - Pure HTTP/HTTPS
- **Backwards-compatible with COM/DCOM**

RAD Server

- **Turnkey solution – ready to go**
- **Includes user management, API analytics, & console**
- **Offers a modern REST and methods mapping, first class JSON support**
- **Multi-Tenancy Support**

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RAD Server + Ext JS

RAD Server offers REST API hosting

- **Focused on web service architectures, not web UIs**
  - Although we have introduced some web hosting features
- **Matches with separate HTML+JS web development tool like ExtJS**

Why is this relevant?

- **Using mainstream web technologies for web development allows developers to get the best of both worlds (great backend and data access from Delphi, Web UI tooling for the client)**

RAD Server + Ext JS in Practice

- **Use RAD Server to expose database data via JSON REST**
  - Using 10.3 EMS Components is the easiest approach
- **Use Sencha Architect to build the client**
  - Define the data model and server URL
  - Define the UI to display the data

What's coming? Planning a deeper integration!

Other Delphi Web Frameworks and Resources

Other Delphi Web Frameworks and Resources

- *eSeGeCe's* sgcWebBroker & WebSockets – esegece.com
  - Extension to WebBroker and additional components for WebSockets
- */n software's* IP*Works – nsoftware.com/ipworks
  - Extensive collection of network and web protocols
- Raudus Web Framework – raudus.com
  - Not too recently updated – uses Ext JS, similar to uniGUI

Open Source Web Frameworks and Resources

- DelphiWebScript – delphitools.info/dwscript
- MVCBr – github.com/amarildolacerda/MVCBr
- Overbyte ICS & MiddleWare – overbyte.eu
  - Internet Component Suite is similar to Indy
  - MiddleWare n-tier development framework
- Delphi Cross Socket – github.com/winddriver/Delphi-Cross-Socket
  - Windows | macOS | iOS | Android | Linux

Remoting Systems

- *Cybele Software's* Thinfinity VirtualUI
  - **cybelesoft.com/delphi-web**
  - **Simple modifications to your Windows program allow it to run over the web.**
- App virtualization
  - **No changes necessary, but optional APIs**
  - **Mostly focused on making existing apps web enabled. Usually offers developer APIs**
  - **rollapp.com**
  - **cameyo.com**

Choosing a Web Framework

JavaScript Knowledge *required* for client?

Note: JavaScript is the language of interactivity in the browser, so some knowledge is always good.

Framework	Need Client JavaScript	RAD IDE Integration	Visual UI Designer	Includes Client GUI	Includes Server	License & Availability
Sencha Ext JS	Yes	Standalone	Yes*	Yes	Compatible	Included*
AtoZed IntraWeb	Optional	Yes	Yes	Combined	Combined	Free v14 (or buy v15 & v17)
Ethea's Kitto2	Optional	Both	No	Yes	Combined	Open Source
FMSoft uniGUI	Optional	Yes	Yes	Combined	Combined	Commercial
Elevate Web Builder	No	Standalone	Yes	Yes	Compatible	Commercial
Smart Mobile Studio	No	Standalone	Yes	Yes	Compatible	Commercial with Free CLC
TMS WEB Core	No	Yes	Yes	Yes	Compatible	Commercial with Free CLC
DataSnap	N/A	Yes	No	No	Yes	Included
Mars–Curiosity	N/A	Yes	No	No	Yes	Open Source
MVC Framework	N/A	Yes	No	No	Yes	Open Source
RAD Server	N/A	Yes	No	No	Yes	Included
Synopse mORMot	N/A	Yes	No	No	Yes	Open Source
WebBroker	N/A	Yes	No	No	Yes	Included

- uniGUI and Kitto2 allow optional writing of JavaScript to execute in the client
- IntraWeb supports extensibility through TypeScript, a type safe superscript of JavaScript
- Sencha Ext JS is a JavaScript framework for building a client UI
- The other server side solutions often include compatibility or samples to jumpstart your client, but no client designers.

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Visual Client UI Designer

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RAD Server	N/A	Yes	No	No	Yes	Included
Synopse mORMot	N/A	Yes	No	No	Yes	Open Source
WebBroker	N/A	Yes	No	No	Yes	Included

- Sencha Ext JS includes Sencha Architect with a visual drag and drop design system
  sencha.com/products/architect
- Kitto² Includes the Kide² client designer, but it is not visual

Similar to the VCL & FMX visual designers. Almost WYSIWYG.

Get the UI & UX just right.

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RAD Studio
IDE Integration

Becomes part of your favorite development tool. Right where you need it without interrupting your work flow.

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Smart Mobile Studio	No	Standalone	Yes	Yes	Compatible	Commercial with Free CLC
Ethea's Kitto2	Optional	Both	No	Yes	Combined	Open Source

- Most also include some libraries for use from the IDE for compatibility
- RAD Server includes compatibility to make it easy to work with Ext JS, even though Ext JS is also independent
- Kitto[2] Is used from the IDE and also via its Kide[2]
- uniGUI includes an Ext JS OEM license

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Client vs. Server

Everything you need to build an amazing looking graphical user interface client

And a backend server to provide all the data!

Framework	Need Client JavaScript	RAD IDE Integration	Visual UI Designer	Includes Client GUI	Includes Server	License & Availability
Mars-Curiosity	N/A	Yes	No	No	Yes	Open Source
MVC Framework	N/A	Yes	No	No	Yes	Open Source
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RAD Server	N/A	Yes	No	No	Yes	Included
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FMSoft uniGUI	Optional	Yes	Yes	Combined	Combined	Commercial

- Sencha Ext JS is a client GUI library that can be used with any backend system, while some (like RAD Server) have specific Ext JS extensions.
- IntraWeb, Kitto², & uniGUI are "full stack" in that they include both the client and server in one framework. The difference being Kitto² doesn't include a visual designer directly. And uniGUI includes an Ext JS OEM license.
- TMS WEB Core & SMS support various backend server solutions. TMS All-Access includes XData server for backend data support.
- Elevate Web Builder includes Elevate Web Server supporting custom Delphi modules

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License & Availability

Most offer free time limited trials, and some offer free reduced use or functionality versions.

The Open Source libraries often offer paid support options.

Most all also offer a source included option.

Framework	Need Client JavaScript	RAD IDE Integration	Visual UI Designer	Includes Client GUI	Includes Server	License & Availability
Elevate Web Builder	No	Standalone	Yes	Yes	Compatible	Commercial
FMSoft uniGUI	Optional	Yes	Yes	Combined	Combined	Commercial
Smart Mobile Studio	No	Standalone	Yes	Yes	Compatible	Commercial with Free CLC
TMS WEB Core	No	Yes	Yes	Yes	Compatible	Commercial with Free CLC
AtoZed IntraWeb	Optional	Yes	Yes	Combined	Combined	Free v14 (or buy v15 & v17)
DataSnap	N/A	Yes	No	No	Yes	Included
RAD Server	N/A	Yes	No	No	Yes	Included
WebBroker	N/A	Yes	No	No	Yes	Included
Sencha Ext JS	Yes	Standalone	Yes*	Yes	Compatible	Included*
Ethea's Kitto2	Optional	Both	No	Yes	Combined	Open Source
Mars-Curiosity	N/A	Yes	No	No	Yes	Open Source
MVC Framework	N/A	Yes	No	No	Yes	Open Source
Synopse mORMot	N/A	Yes	No	No	Yes	Open Source

- Sencha Ext JS, RAD Server, & DataSnap are features of Delphi Enterprise & Architect Editions (Ext JS is only included as a part of the Architect bundle).
- Ext JS is available under the GPL, a commercial license, & a community edition
- IntraWeb v14 is free for Delphi developers, while v15 & v17 are available for purchase
- TMS WEB Core & SMS have an optional free Command-Line compiler

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Framework	Need Client JavaScript	RAD IDE Integration	Visual UI Designer	Includes Client GUI	Includes Server	Server Platforms		
						Windows	Linux	Other
AtoZed IntraWeb	Optional	Yes	Yes	Combined	Combined	Windows	Linux	Windows, Linux* (v17), Apache, IIS
WebBroker	N/A	Yes	No	No	Yes	Windows	Linux	Windows, Linux, Android*
DataSnap	N/A	Yes	No	No	Yes	Windows	Linux	
Ethea's Kitto2	Optional	Both	No	Yes	Combined	Windows	Linux	
Mars-Curiosity	N/A	Yes	No	No	Yes	Windows	Linux	
MVC Framework	N/A	Yes	No	No	Yes	Windows	Linux	
RAD Server	N/A	Yes	No	No	Yes	Windows	Linux	
Synopse mORMot	N/A	Yes	No	No	Yes	Windows	Linux	
FMSoft uniGUI	Optional	Yes	Yes	Combined	Combined	Windows		
Elevate Web Builder	No	Standalone	Yes	Yes	Compatible	Windows		Browser, Windows*
Sencha Ext JS	Yes	Standalone	Yes*	Yes	Compatible			Browser
TMS WEB Core	No	Yes	Yes	Yes	Compatible			Browser
Smart Mobile Studio	No	Standalone	Yes	Yes	Compatible			Any

- WebBroker Android isn't officially supported (limited testing), and other WebBroker based frameworks may work there too
- IntraWeb is adding Linux in v17, while v14 & v15 are Windows only but work on Linux under WINE
- mORMot Linux is via FPC for now
- Elevate Web Builder support for the Elevate Web Server is Windows only, but could work with other servers on other platforms
- uniGUI has Linux support planned for v2
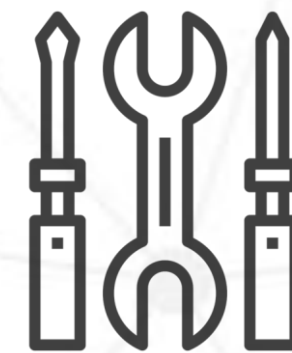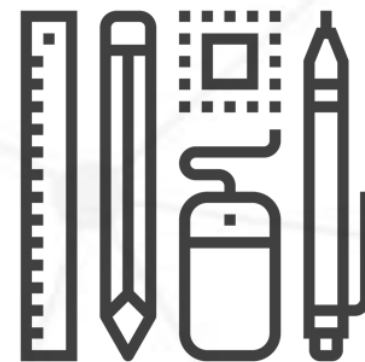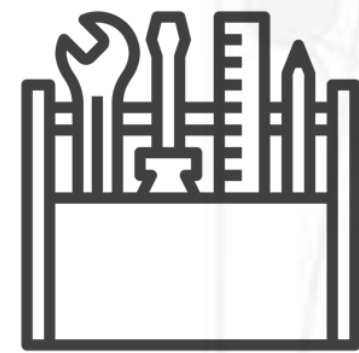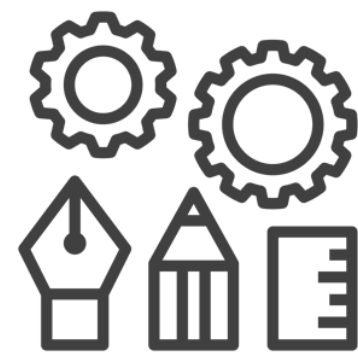
Server Platforms

Windows support typically includes IIS or Apache, and possibly Windows Service or Standalone server.

Linux uses Apache.
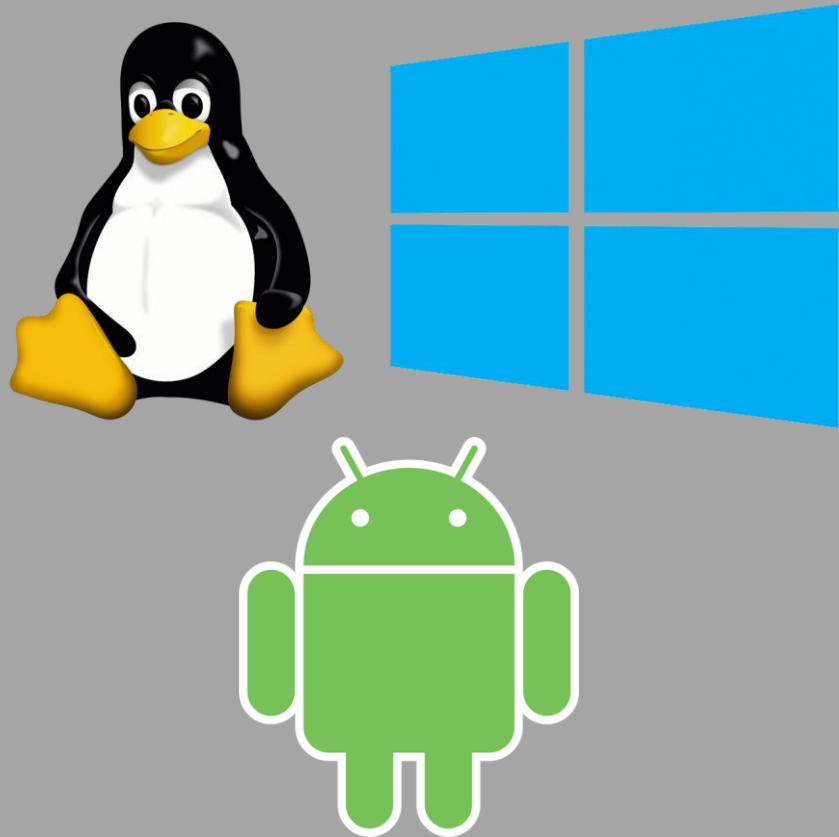
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