RAD Studio 11.1 Alexandria

embarcadero®

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Introducing

RAD Studio 11.1 Alexandria

embarcadero®

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The Landscape

- **Microsoft released Windows 11**
  - Fully focused on it, key reason for picking “11”
  - New dev platform Windows App SDK
    (aka Project Reunion)

- **Transition to ARM on desktop**
  - Led by Apple with macOS
  - Plus, ARM reigns on mobile platforms

- **Developers on 4K**
  - High resolution and multi screen are common for developers
  - Growing also for end-users

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What's Great in RAD Studio

Developer Productivity - Shipping is a feature. Get to market 5x faster with Delphi and C++Builder

Fast Native Apps - With native compilers, RAD Studio gives your apps the speed they need (no bloat)

Database Access - Key to Delphi's initial design, database access is integral to RAD Studio

Powerful C++ Libraries - Hundreds of C++ libraries can be used in C++Builder or Delphi in RAD Studio

Platform API Access - Gives you access to all the platform APIs on all platforms

Visual Designers - Forget prototyping in another tool, just design it and finish it in the RAD Studio IDE

Strong Community - Full of Technology Partners, MVPs, trainers, authors and developers

Backward Compatibility – You have an investment in your code, RAD Studio keeps that relevant

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RAD Studio 11.0 Summary

I. Large Focus on IDE

- IDE High DPI and High DPI enabled form designer
- VCL styles in VCL designer; improvements to FMX designer and Multi-window design/code for a unit
- LSP quality and new C++ code formatter
- New Welcome page
- Visual Studio Code LSP support
- Minimal installer improvements

II. Delphi and C++ compilers and toolchains

- C++ Quality: RTTI (components); exception handling
- Delphi macOS 64 ARM (M1) compiler and toolchain
- Minor Delphi language improvements

III. Libraries Improvements

- Delphi RTL quality: TZipFile, 64-bit data structures, Bluetooth LE
- VCL Modernization work
- Better FMX High DPI on Windows and desktop integration, including WebView 2
- Android API 30 support and related work

III.Additional Delphi Platforms

- Support for WSL 2 (Windows Subsystem for Linux)
- Including WSLg (Linux GUI) on Windows 11

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RAD Studio 11.1 Overview

I. Focus on Quality and Improvements

- Usability, performance, stability
- Some new small IDE features

II. Better Code Insight and LSP

- For both languages, Delphi and C++

III. Platforms and Tooling

- Official support for Windows 11, macOS 12 Monterey, iOS 15, and Android 12

IV. Libraries

- Performance and quality improvements and small additions to Delphi RTL, database libraries, VCL, FireMonkey

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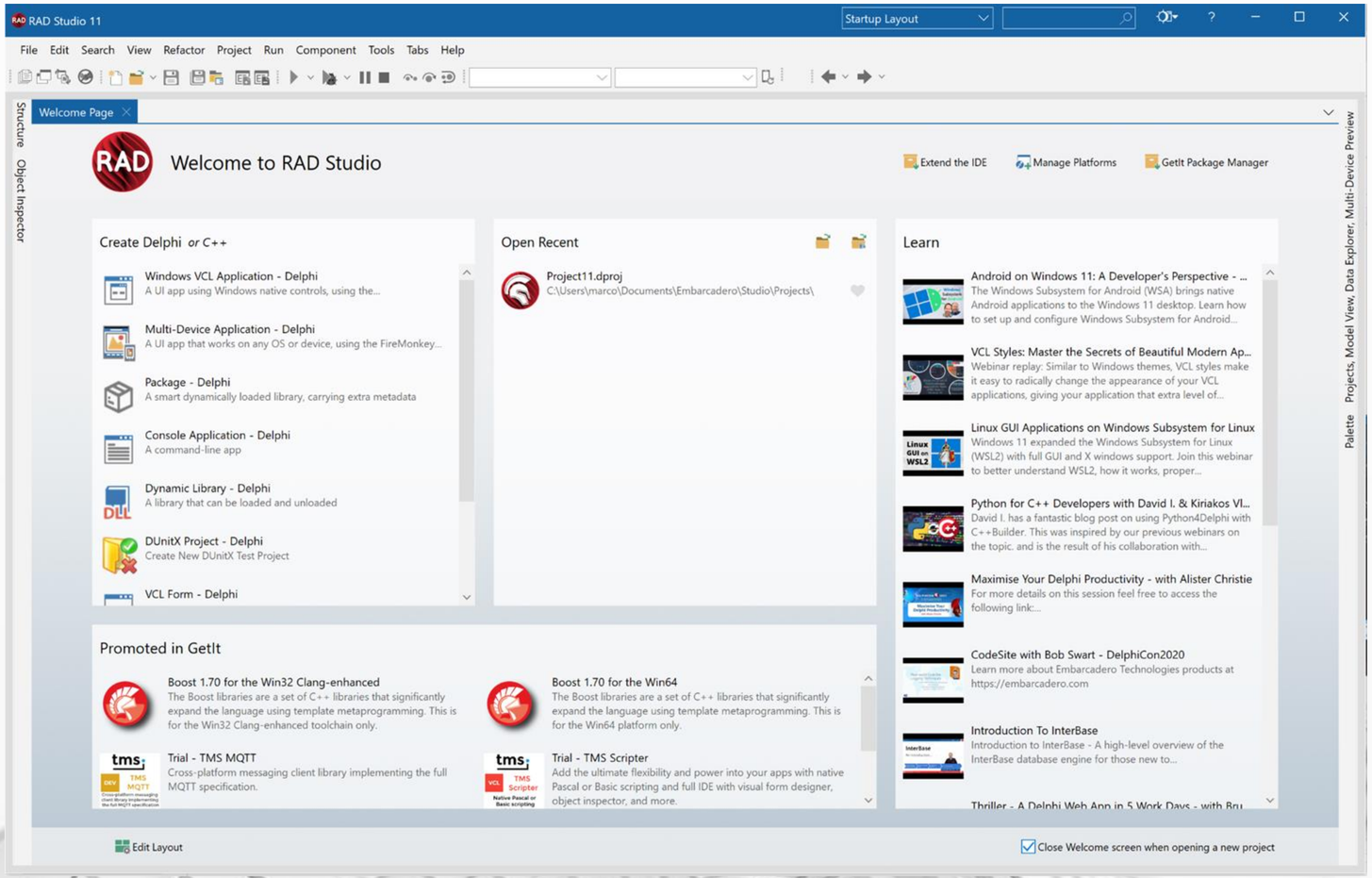
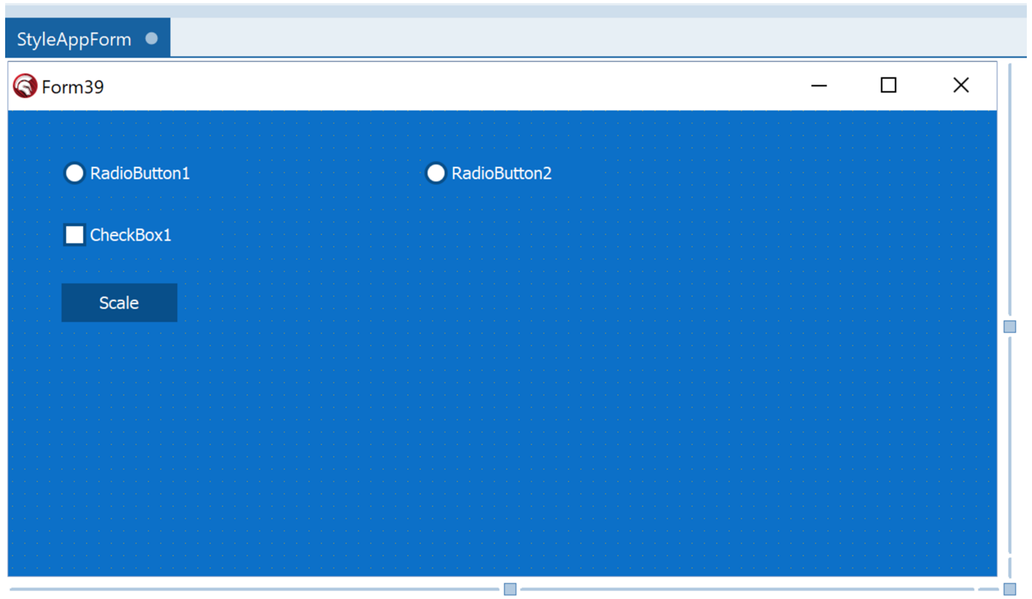
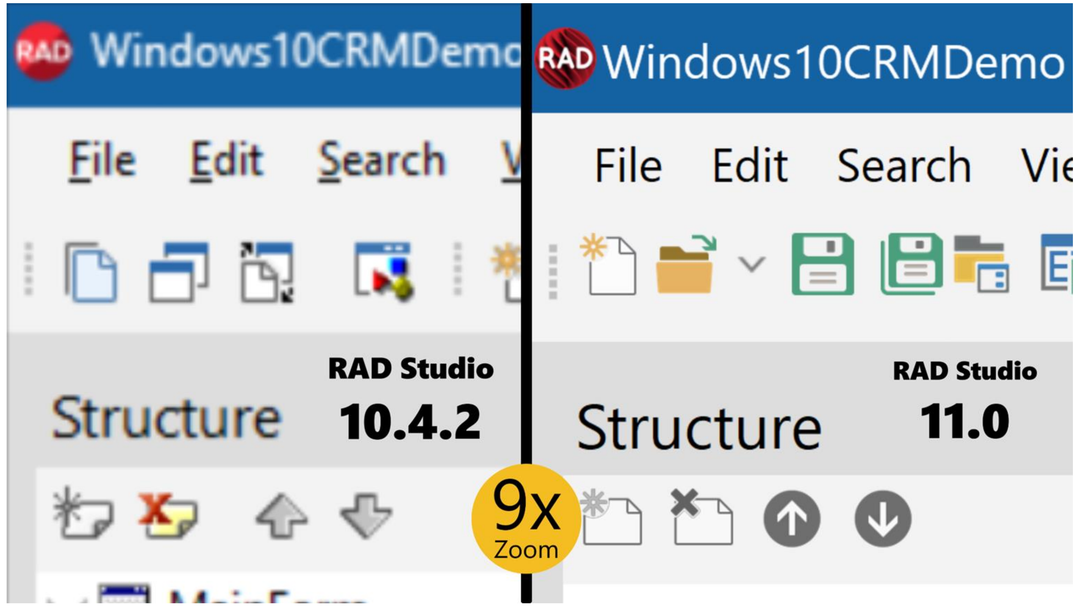
I.RAD Studio IDE



11.0: IDE and Designers

- High DPI IDE
  - Crisp fonts in all windows and the editor
- High DPI enabled form designer
- Active Styles in VCL Designer





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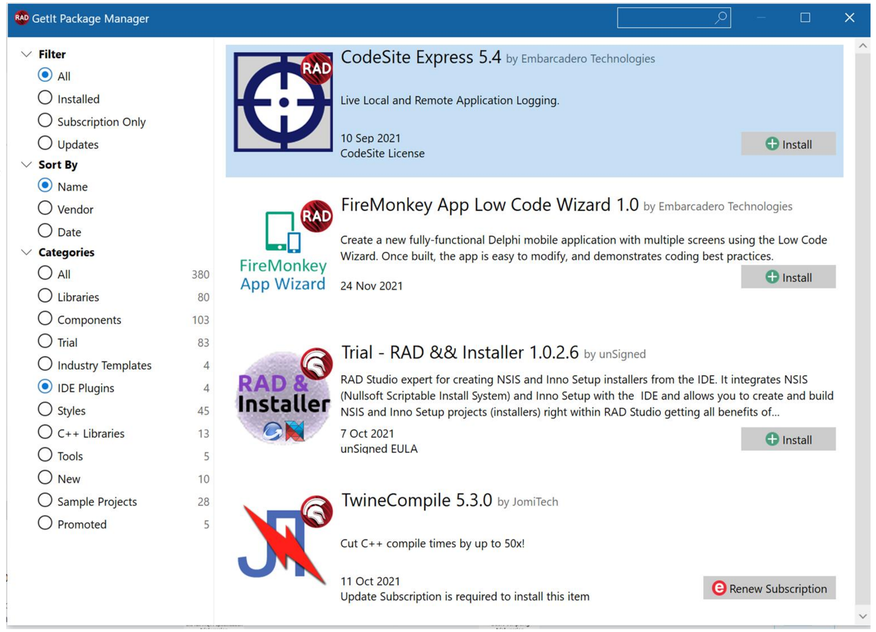
11.1: IDE Quality

- Extensive High DPI IDE quality
  - Better use of the IDE with Remote Desktop
  - Improvements in Toolbar, font sizing
  - Better scaling when dragging windows between different resolution monitors
  - Additional IDE Fix Pack integration
- Improved High DPI designers for VCL and FireMonkey and the styled VCL form designer
- GetIt dialog enhancements with image caching and reworked UI (based on VCL TControlList)
- “Start working” in user mode



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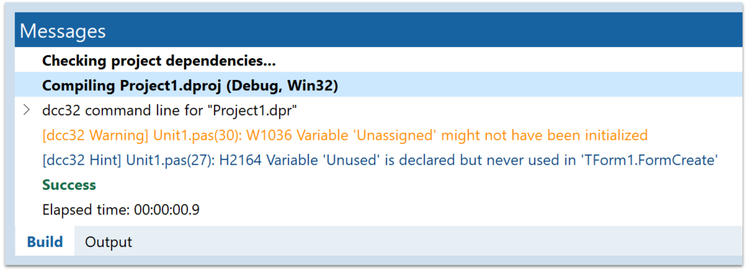
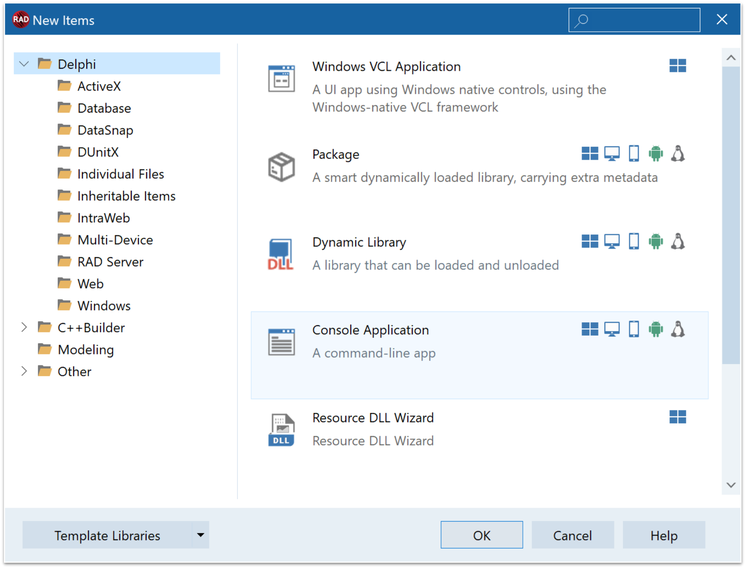
11.1: IDE Enhancements

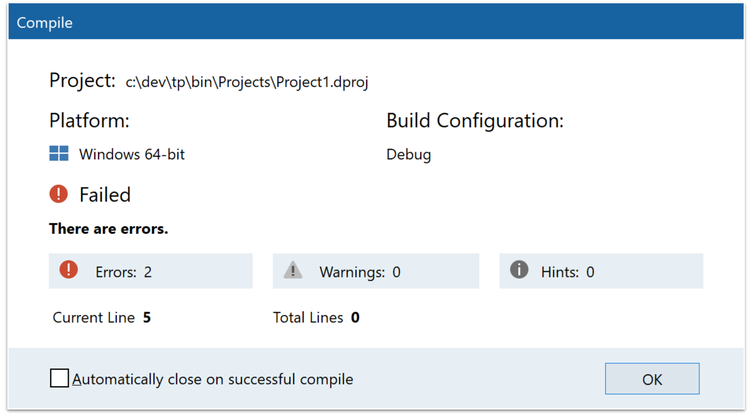
- Messages view: errors, warnings, and hints are differentiated by color (the colors can be customized)



- New Items dialog: available platforms for each item
  - Also uses TControlList and offers other views



- The Compile dialog shows the platform and build configuration



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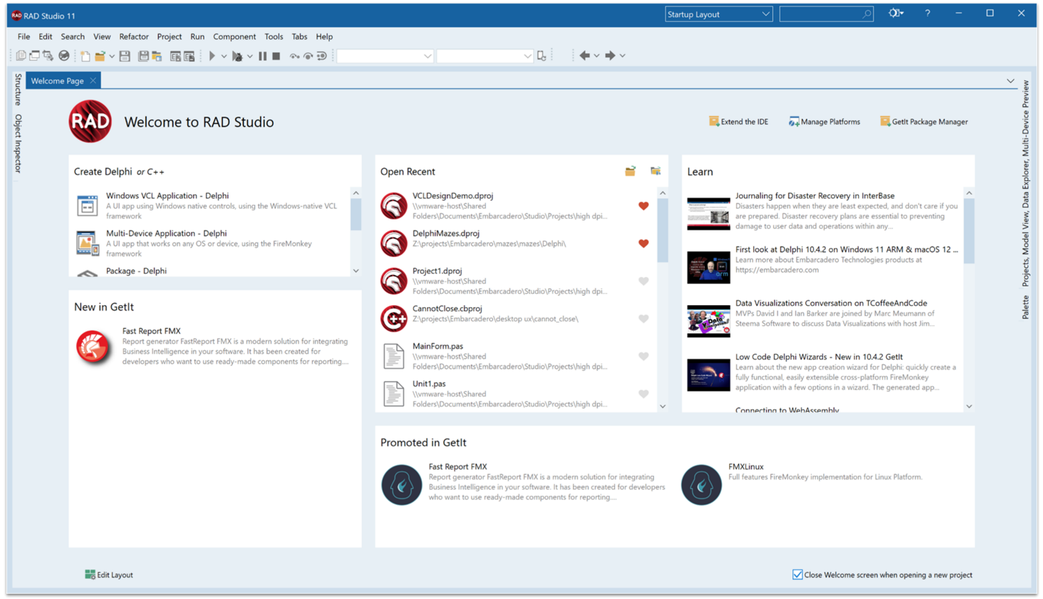
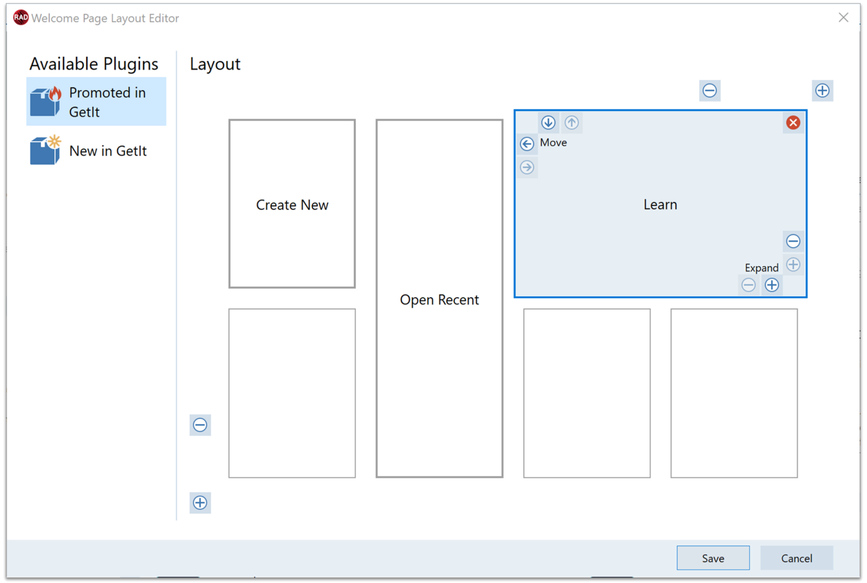
11.0: New Welcome Page

- New native Welcome page, VCL based and flexible
- Layout and content is fully customizable: show what and where you want





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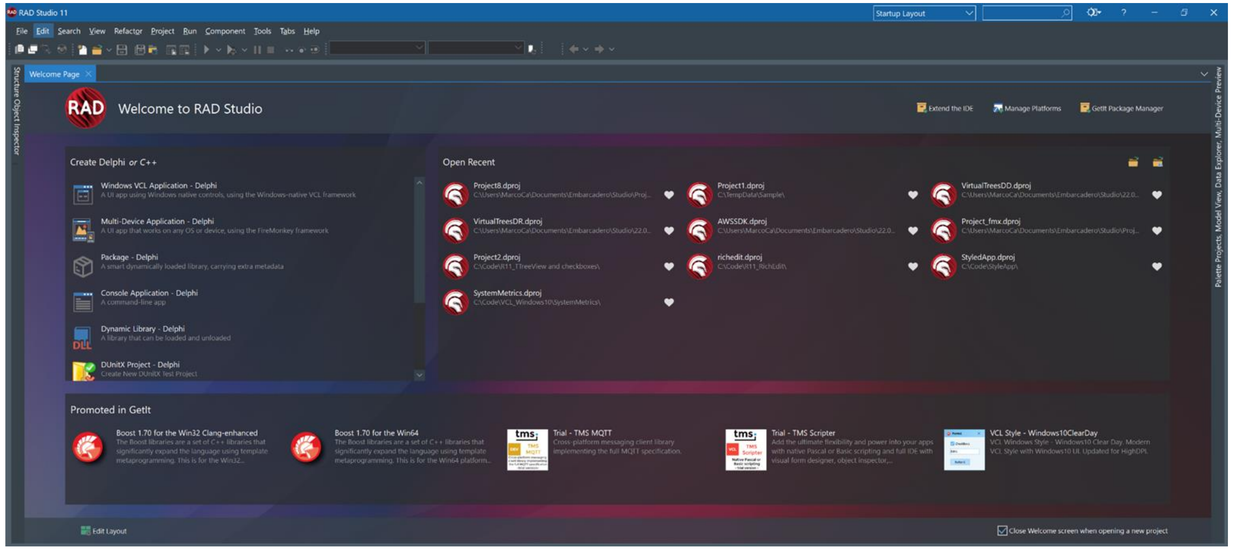
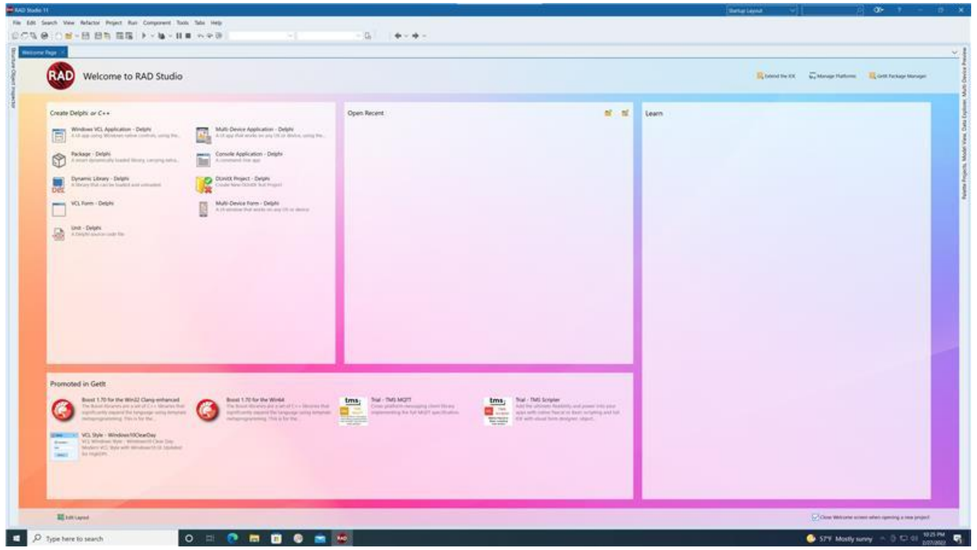
11.1: Welcome Page Updates

- Background wallpapers
  - Predefined for each of the 3 styles, you can use a custom image
- Supports adding custom frames with ToolsAPI
  - Demos on github.com/Embarcadero/RADStudio11Demos
    in Object Pascal ➤ VCL ➤ VCL WelcomePage





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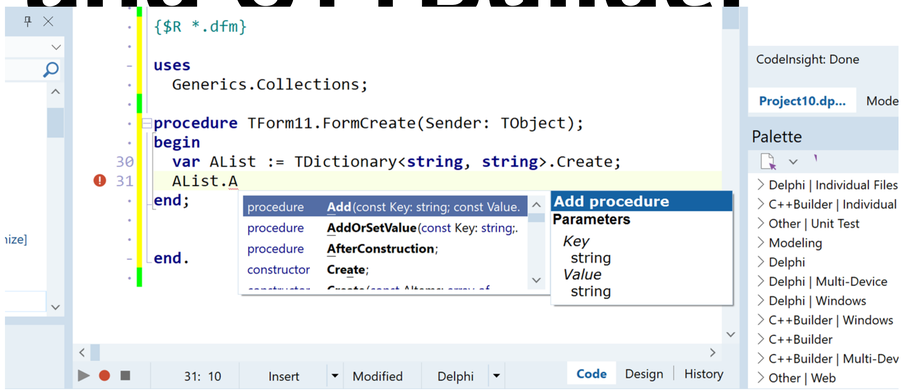
11.1 Code Insight Across Delphi and C++Builder



- Delphi LSP quality work
  - Big performance improvements, in common scenarios operations are **5-30x faster**
  - Biggest changes for units with lots of dependences
  - Improvements: type parameters when completing a class declaration, including T in a generic declaration, and showing set types

- Extensive C++ cquery quality work
  - Significant improvement to the features and performance (eg 30s down to 2 seconds)
  - *Planning a special C++ only followup release soon with even more improvements*

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II. C++ and Delphi Compilers and Tools

11.0 Compilers

- New Delphi macOS 64-bit ARM target platform
  - Universal binary (package Intel + ARM)
- Minor Delphi language enhancements
  - Binary literals and digit separator support
  - Inline assembler support for AVX instructions (AVX-512)

- C++ Compilers
  - Improved RTTI (for components)
  - Further work on exception handling
  - CMake: revision of functionality and packages it can handle
  - C++/Delphi interop improvements

```
10  begin
      try
        var I : Integer := 1_000_000; // Thousands Separator
        Writeln(I);
        I := %1001001; // Binary Literal
        Writeln(I);
16      Readln;
      except
        on E: Exception do
          Writeln(E.ClassName, ': ', E.Message);
20    end;
    end.
```

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11.1 Compilers and Debuggers

- Delphi compilers improve stability and performance (when used by LSP engine)
- The Delphi and C++Builder Window compilers have additional support for ASLR, DEP/NX, and TSAWARE platform security settings, now enabled by default
- New Delphi Debuggers based on LLDB
  - Delphi macOS 64-bit ARM debugger
  - Delphi Android 64-bit debugger
    - *Part of strategic direction for RAD Studio debuggers to LLDB*
- C++ compiler, STL and RTL quality
  - Further improved Delphi RTL integration
    - For example, dynamic array with STL iterators

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New Linker Options

- **Data Execution Prevention (DEP)**
  - Allows the system to mark one or more pages of memory as non-executable preventing code from running from these regions of memory, making it harder to exploit ***buffer overruns***.
- **Address Space Layout Randomization (ASLR)**
  - Randomly arranges the address space positions of key data areas of a process, including the base of the executable and the positions of the stack, heap and libraries.
  - Prevents exploitation of memory corruption vulnerabilities.
- **High-entropy 64-bit ASLR** *(Only in 64-bit applications)*
  - Allows ASLR to use the entire 64-bit address space.
- **Terminal Services**
  - Create Terminal Server aware (TSAWARE) applications.

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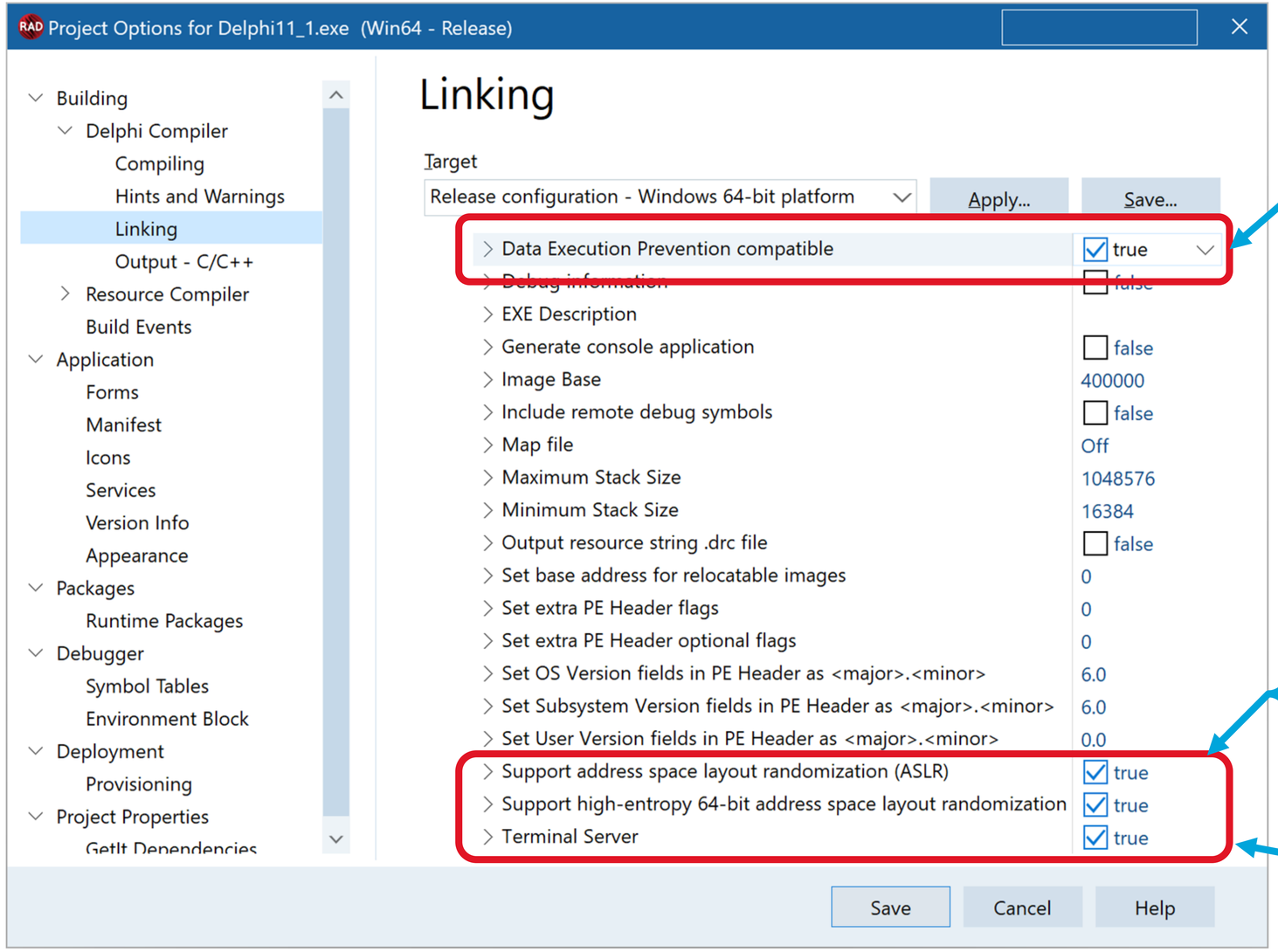
New 11.1 Delphi Compiler Linking Options



- Data Execution Prevention (DEP)
- Address Space Layout Randomization (ASLR)
- High-entropy 64-bit ASLR
- Terminal Server

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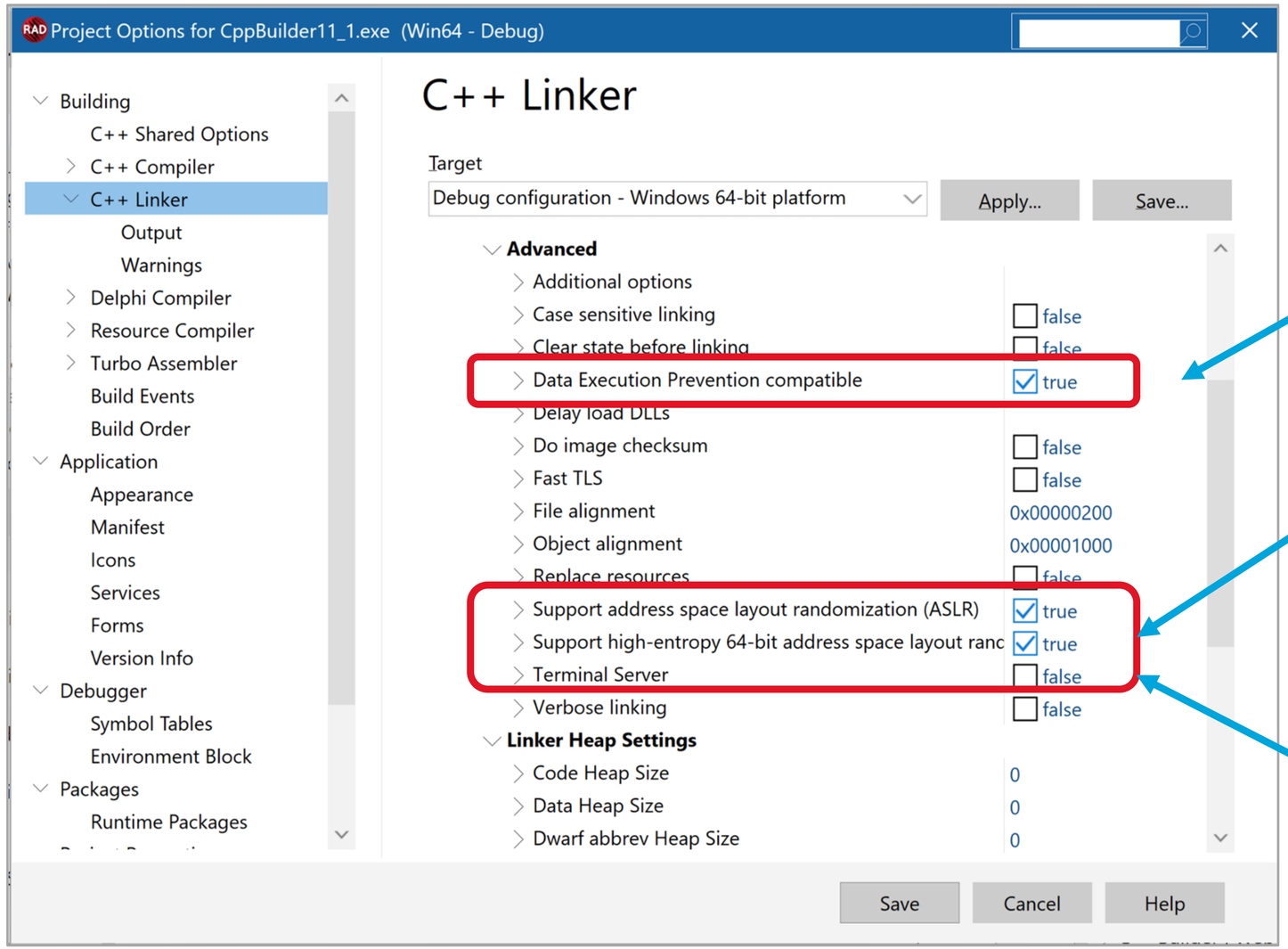
New 11.1 C++Builder Linker Options



- Data Execution Prevention (DEP)
- Address Space Layout Randomization (ASLR)
- High-entropy 64-bit ASLR
- Terminal Server

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11.0

11.1

Process Explorer - Sysinternals: www.sysinternals.com [WIN11-RAD-BETA\jim]

File Options View Process Find Users Help

Process	PID	DEP	ASLR
Delphi11_0(Win32).exe	10032	Disabled	
Delphi11_0(Win64).exe	4504	Enabled (permanent)	
Delphi11_1(Win32).exe	9160	Enabled (permanent)	ASLR
Delphi11_1(Win32)Pkgs.exe	8948	Enabled (permanent)	ASLR
Delphi11_1(Win64).exe	560	Enabled (permanent)	ASLR
Delphi11_1(Win64)Pkgs.exe	8960	Enabled (permanent)	ASLR

Delphi 11.1 Alexandria

Same project compiled with
Default Win64 Release Settings
Under Delphi 11.1 Alexandria

Delphi11_1(Win64)Pkgs.exe:8960 Properties

Threads | TCP/IP | Security | Environment | Job | Strings
Image | Performance | Performance Graph | GPU Graph

Image File

Delphi11_1

Version: 1.0.0.0

Build Time: Fri Mar 11 13:48:22 2022

With runtime packages

Path:

C:\Users\jim\Desktop\EXESecurity\Delphi11_1(Win64)Pkgs.exe Explore

Command line:

"C:\Users\jim\Desktop\EXESecurity\Delphi11_1(Win64)Pkgs.exe"

Current directory:

C:\Users\jim\Desktop\EXESecurity\

Autostart Location:

n/a Explore

Parent: explorer.exe(3144)

User: WIN11-RAD-BETA\jim

Started: 1:48:50 PM 3/11/2022 Image: 64-bit

Comment:

VirusTotal: Submit

Verify

Bring to Front

Kill Process

Data Execution Prevention (DEP) Status: Enabled (permanent)

Address Space Load Randomization: High-Entropy, Bottom-Up

Control Flow Guard: Disabled

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Security Code and Secure Application

- **C++Builder/Delphi 10.4.2 Supports TLS 1.2**
  - Combined with O.S. Setting can make your Web Server, DataSnap Server, RAD Server, RESTful Server pass “Vulnerability Weakness Scan”
- **OWASP(**Open Web Application Security Project®) **Top 10**
  - Required by Government Regulations and Private Company Requirement
  - C++Builder/Delphi support basic code scan → Code Audits/Code Metrics
  - C++Builder/Delphi are now researching how to implement OWASP security scan tools

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OWASP(Open Web Application Security Project®) Top 10	C++Builder/Delphi相關?	是否可由靜態分析找到?
A1 Injection	是-dbExpress/FireDAC TQuery元件 LDAP API/元件	是
A2 Broken Authentication	是-程式碼規範	部份
A3 Sensitive Data Exposure	是-資料庫儲存,資料庫元件, 物件/資料 Serialization	部份
A4 XML External Entities	是-XML文件, XML分析引擎	部份
A5 Broken Access Control	是-程式碼規範	部份
A6 Security Misconfiguration	是-應用程式設定,OS設定	部份
A7 Cross-Site Scripting	否	部份
A8 Insecure Deserialization	是-物件/資料反Serialization	部份
A9 Using Components with Known Vulnerabilities	是	是
A10 Insufficient Logging and Monitoring	是-程式碼規範	否

Security Code and Secure Application

- **C++Builder/Delphi Security Code Scan相關資源**
  - TMS FixInsight - https://www.tmssoftware.com/site/fixinsight.asp
  - CodeHealer for Delphi - http://www.socksoftware.com/default.php
  - SonarCube - https://www.sonarqube.org/
  - https://github.com/JAM-Software/SonarDelphi
  - DerScanner - https://derscanner.com/

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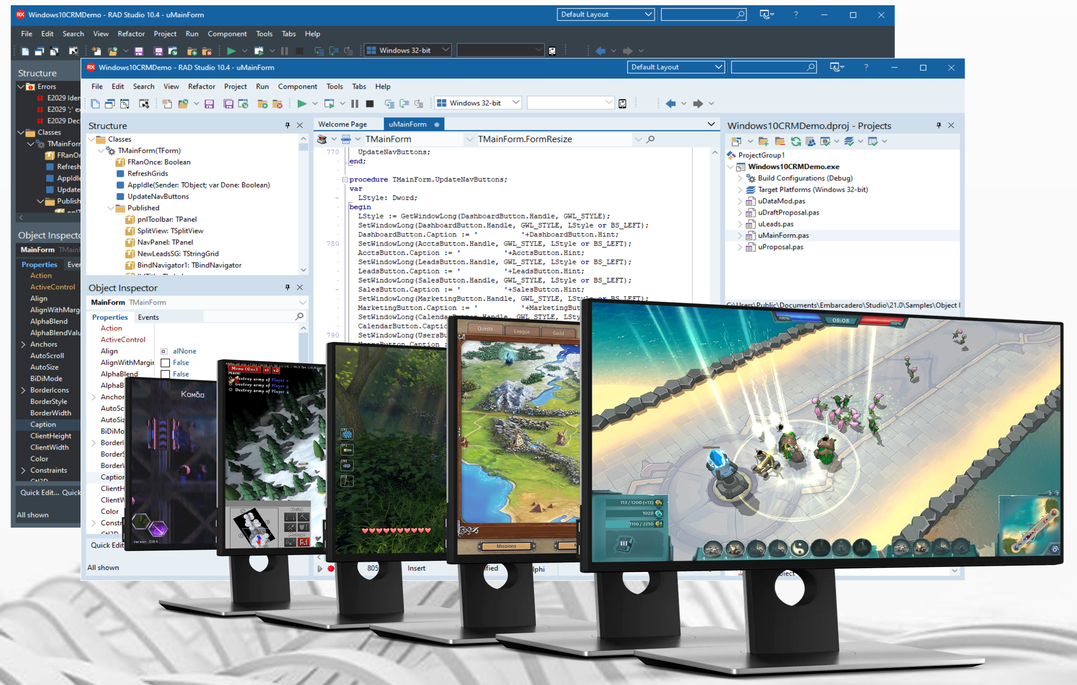
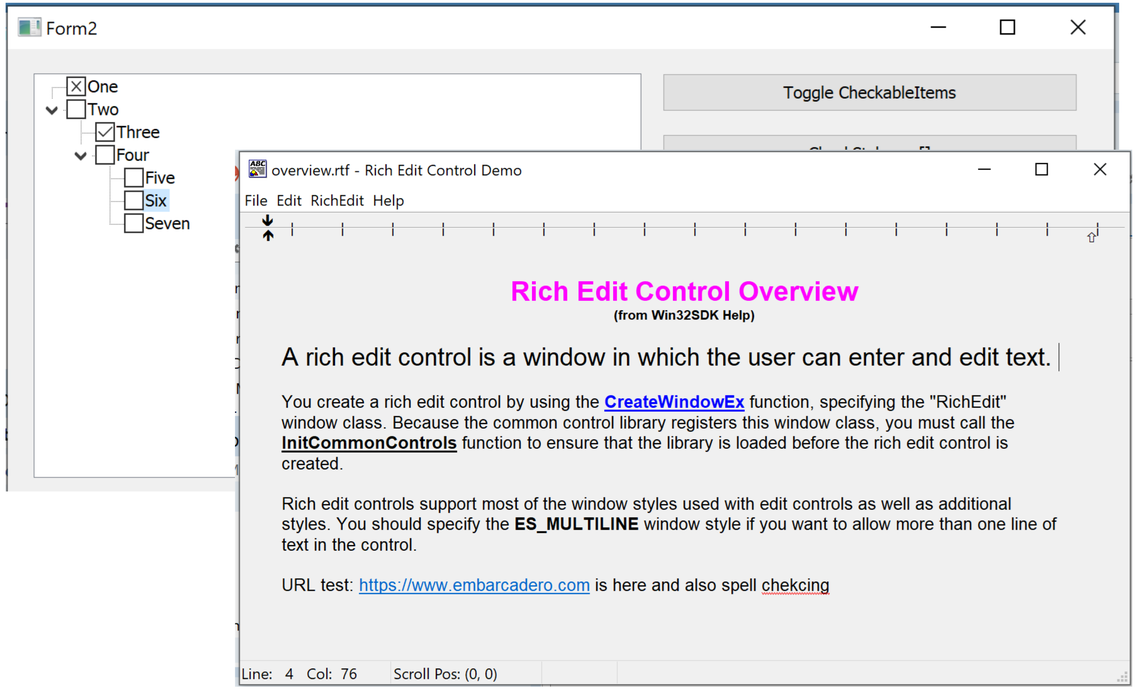
III. RAD 11.1 Libraries Quality & Improvements



“Alexandria” VCL Improvements

- **11.0: Modernization Work**
  - “New” RichEdit implementation (RichEdit 4.1)
  - Large collection of small improvements focused on removing XP legacies
  - New TDBLabeledEdit component



- **11.1 VCL** focus on recent features
  - Including enhanced TTreeView, TRichEdit, TEdgeBrowser, TLabelledEdit and TNumberBox, flickering and DoubleBuffering, VCL High-DPI and scaling issues
  - A Delphi WinUI3 demo (available in GetIt)
    - Part of our Windows App SDK focus

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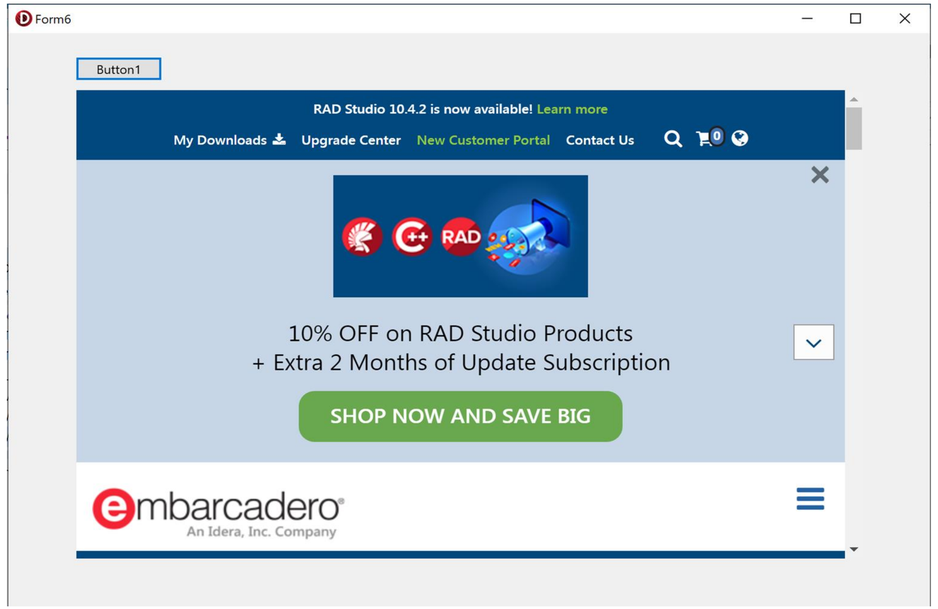
FireMonkey in “Alexandria”



11.0 Desktop and Mobile Improvements

- Better FMX Windows and desktop integration
- FireMonkey Windows High-DPI improvements
  - From pixels to device independent units (PX to DP)
- Target Android API 30 (AndroidX, in-app purchases, matching new Play Store requirements)
- WebView 2 (Chromium Edge) implementation of `TWebBrowser`

11.1 Quality Work

- `TListView` and `TWebBrowser` quality
- Improved Android SDK integration
- Windows High DPI-related issues
- Performance and much more

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Delphi RTL in “Alexandria”

- **11.0 Key Features**
  - `TZipFile` (including Zip64, files deletion, quality improvements and optimizations)
  - Large data structures (and 64-bit) improvements
    - Lists, large stream operations, dictionary improvements for hashing and capacity
  - Record helpers for `TDateTime` and `TCurrency`, `UTCNow` function
  - New core classes: `TNoRefCountObject` and `TPointerStream`
  - Bluetooth LE quality (for most platforms)
  - Performance optimizations and RTTI improvements (open array support)
  - PPL Thread pool statistics

- **11.1 Delphi RTL optimization and quality work**
  - New `TURLStream` class (a `TStream` descendant with support for async operations)
  - Support for Window 11 and Server 2022 in the `TOSVersion` data structure

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11.1 Data and Internet Improvements

- Data RTL and FireDAC Improvements
  - FireDAC Structure View integration
  - Support for MariaDB 10.6, SQLite Encryption Extension (SEE), Firebird 4 new data types
- RAD Server
  - New REST SysAdmin endpoints for logs handling, backups management, and database validation
  - Integrated deployment feature for RSLite

    RAD Server Lite (introduced in 11.0): Embeds IBToGo, easy to deploy, unlimited deployment, limited throughput
- Web Technologies
  - WebBroker on Android
  - DataSnap quality

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Additional Product Initiatives

- Appercept's AWS SDK for Delphi
  - Long term distribution deal, included in Enterprise and Architect
  - New releases expected at a constant pace

appercept AWS SDK for Delphi

- Delphi UI libraries (VCL + FMX) for Python
  - Free UI library for Python developers
  - Upgrade to a Delphi license for additional power and features
  - Also, you can use Python in Delphi applications

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I. Focus on Quality and Improvements

- Usability, performance, stability
- Extensive High DPI IDE quality (and Remote Desktop)
- Improved High DPI designers for VCL and FireMonkey and the styled VCL form designer
- Welcome Page now offers background images and supports adding custom frames
- GetIt dialog with cached images and a reworked UI
- Small new IDE features

II. Better Code Insight and LSP

- Significative C++ cquery LSP engine work
- Delphi LSP performance focus and quality

III. Platforms and Tooling

- Official support for Windows 11, macOS 12 Monterey, iOS 15, and Android 12
- Delphi macOS 64-bit ARM debugger and Android 64-bit debugger based on LLDB
- C++ STL and RTL improve

IV. Libraries

- Performance and quality improvements and small additions to Delphi RTL, database libraries, VCL, FireMonkey
- Some new small features

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