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The new curriculum: teaching code in schools



WIN! See page 8
for details

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grey matter
software know how

There are some things we're happy to pay for, and some things we're not, and in the digital world, there's little rhyme or reason between the two. I am quite happy to pay the BBC nearly £150 a year for the privilege of watching a handful of TV channels without being interrupted by inane advertising, and up until just a few years ago, there were enough people prepared to pay for mobile phone ringtones to create a billion dollar industry. And yet we still seem unwilling to pay anyone for accessing their website, preferring instead to enter into an ambiguous and often downright dangerous relationship with a largely unknown collection of marketing companies.

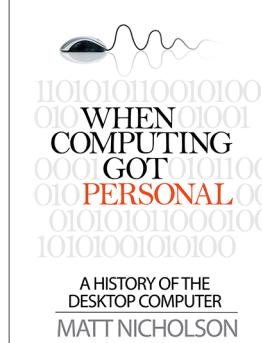
Walk into a cinema, buy a ticket with cash, and you can watch a film without the cinema having any idea who you are. As long as you've got a valid ticket, they're happy. Even if you pay by credit card, the cinema would have to take deliberate and indeed illegal steps to intercept the data transferred between you and the credit card company. Buy a ticket through the same cinema's website, though, and the chances are that you will be asked, at the very least, for your email address, so providing them with a unique key that can be linked to any other personal data held by any other website that has your email address.

Exactly how little we think about such matters has been highlighted by the many data hacks that have occurred recently, the most recent at the time of writing being the exposure of more than 30 million people signed up to the adultery website Ashley Madison, most of whom obviously felt quite safe entering their email addresses and, in some cases, real names.

Yes, creating and maintaining a website costs money, and that needs to be recouped. The current model, adopted by all but a few notable exceptions, is to sell on personal data, either directly or indirectly by selling advertising opportunities. Quite why a cinema chain needs to do this is another matter, as it is presumably already making money from selling the tickets themselves, but the model has proved so successful, and we so happy to accept it, that no-one seems interested in considering any other.

Of course there are other business models that could be adopted, and were even considered way back when the Web was young. Micro-payments, for example, charged every time you view a page, were considered and even made it to a W3C Working Draft in 1999, but abandoned because the infrastructure couldn't handle it. However in these days of megabit data rates and bitcoin technologies, surely it's time to revisit such alternatives.

Matt Nicholson, Editor, *HardCopy*



Forty years of extraordinary innovation, cunning business deals, boardroom tantrums and acrimonious lawsuits

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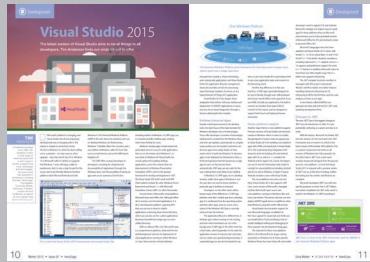
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Software News

Collaboration gets top billing as Microsoft ships Office 2016

Microsoft • www.greymatter.com/microsoft/

Microsoft has shipped Office 2016, a milestone release of the productivity suite it originally launched back in 1988. Available for Windows, Mac and Windows tablets, with satellite apps for iOS and Android, the suite's new features include real-time co-authoring capabilities imported from Microsoft's web-based Office Online, enhanced cloud storage including cross-device recent document lists, improved data security for Enterprise users, and integration with the Cortana personal assistant and 'Hello Windows' biometric login. Boxed editions are available for

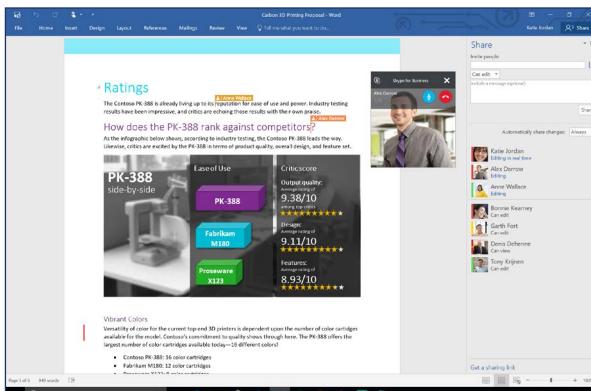
one-time purchase, but the focus is now heavily on the subscription-based, cloud-shipped Office 365 product, with the company promising new feature updates on a monthly basis for 365 users.

As before, the Office suite comprises the core Word, Excel and PowerPoint business applications, accompanied (depending on edition) by Outlook (email/calendar), OneNote (digital notebook), Publisher and Access (desktop SQL database), with the specialist Visio and Project apps available by separate purchase/subscription. Cross-application enhancements include simplified document sharing and co-authoring via OneDrive and SharePoint, with real-time typing updates in Word, plus integrated access to previous document versions from SharePoint and OneDrive for Business. Skype for Business (formerly Lync) video conferencing and instant messaging is also integrated, while usability is enhanced with a new 'tell me' feature which generates on-the-fly menus based on search text, and Bing-powered Smart Lookup for importing Web-based content directly into documents.

Outlook now features permission-based,

OneDrive-buffered email attachments and 'Mail Triage' for diverting low-priority messages. Excel gains new chart types, one-click forecasting and integrated publishing to Microsoft's Power BI enterprise data visualisation system, while PowerPoint now features screen recording and handwriting recognition for creating equations, and the latter also works in Word. Office 365 users also get Office 365 Groups (team organisation), 365 Planner (a 'lite' project management application) and early access to GigJam, a product from Microsoft's Ambient Computing Team which promises "a breakthrough way for people to involve others in their business tasks." 365 subscribers also get 1TB of OneDrive space.

Office 2016 runs on Windows 7 or later (Windows 8 for tablets) and Mac OS X 10.10, with apps available for iOS 7 and Android 4.4 (KitKat). The Mac version shipped first in July, with Windows following from late September. Office 365 users face a staggered auto-update schedule stretching into early 2016, although instant manual downloads are available for most customers. Two boxed editions – Home & Student and Home & Office – are available, each for Windows and Mac.



Office 2016 is all about collaboration.

Intel adds Big Data Analytics to Parallel Studio XE

Intel • www.greymatter.com/intel/

Intel has launched Parallel Studio XE 2016, a new edition of its compilers, libraries and tools package aimed at High Performance Computing (HPC) development. Heading the new features list are the big data crunching Intel Data Analytics Acceleration Library (DAAL) and a new Vectorization Advisor tool, alongside an MPI Performance Snapshot tool, Windows 10 and Visual Studio 2015 support, and compatibility with Intel's latest Xeon (Skylake) and Xeon Phi (Knights Landing) processors.

The new DAAL provides "highly optimised algorithmic building blocks for all data analysis stages." Available for Windows, Linux and OS X, and developed by Intel's Math Kernel Library

(MKL) team, it supports batch, streaming and distributed processing, is compatible with data platforms including Hadoop, Spark, R, and Matlab, and boasts performance gains of up to 200 times compared to open source alternatives.

Vectorization Advisor analyses code to find loops that could be converted to SIMD (Single Instruction Multiple Data) parallel processing, identifying obstacles and offering advice on data organisation.

Parallel Studio XE 2016 is available for Windows, Linux and OS/X in Composer, Professional and Cluster editions, each including C++ and/or Fortran compilers, DAAL and MKL. The Professional edition adds parallel

Advisor tools while the Cluster edition adds the MPI tools and libraries.

- Intel has also launched its 6th generation Core processors, based on its Skylake microarchitecture and 14nm manufacturing technology. Describing it as "our most scalable processor family ever", the company proved the point by announcing no fewer than 48 processor variants. New features in the processors and associated chipsets include support for USB Type-C and 4K H.265 Playback, plus optimisation for Windows 10's Cortana and Windows Hello. Intel is claiming improvements of 60 percent in performance and power consumption compared to earlier processors.

Embarcadero targets Win 10 with latest RAD Studio

Embarcadero • www.greymatter.com/embarcadero/

 Development tools vendor Embarcadero has gone the extra mile in embracing Windows 10, not only adding Windows 10 compatibility to its multi-target platform RAD Studio suite, but also renaming the product after Microsoft's home town. Formerly RAD Studio XE8, the package is now RAD Studio 10 Seattle, with its new Windows 10 capabilities joined by an improved IDE and development workflow, expanded project capacity, new 32-bit CLANG-based C++ compiler and a long list of detail updates.

RAD Studio 10 Seattle gives C++ and Delphi (Object Pascal) developers Windows 10 Styles, UI elements and APIs, delivered via its Windows-targeted VCL library and multi-platform, desktop-to-IoT FireMonkey (FMX) framework. Although FMX apps use the

FireMonkey runtime rather than Microsoft's UWP/WinRT for device independence, APIs are provided for UWP-based services such as Windows 10 Notifications. New Windows 10-style controls include SplitView and RelativePanel, while VCL now has 4K screen and multi monitor support.

The RAD Studio IDE has been 're-architected' with its own improved multi-monitor support, plus over 20 coding productivity innovations and a large memory model which doubles its project size capacity. Other FireMonkey highlights include support for iOS 8.4, Android 5.1.1 and ARM 64-bit, plus Android Services, Mouseover hints, enhanced clipboard (bitmap) transfers, Bluetooth LE (Low Energy) support and a TBeaconDevice class. Embarcadero's venerable, Borland-derived

32-bit C++ compiler now takes second billing behind a compiler based on the CLANG open-source project, with features including complete C++ 11 compatibility and ARC-based (as in Automatic Reference Counting) memory management on mobile.

- Embarcadero has also released RAD Solution Pack, a suite of heavyweight VCL and FMX tools and components for C++ and Delphi. Contents include Steema TeeChart, Fast Report, FastCube data array analysis, Woll2Woll rich grid components, CodeSite Studio 5 live application logging and AppAnalytics, billed as the first analytics service for mobile, desktop, and wearables. Also included are Konopka Signature VCL UI Controls and BeaconFence GPS-Free user location tracking.

Flexera moves into cybersecurity with Secunia acquisition

Flexera • www.greymatter.com/flexera/

 Installation tools and software asset management specialist Flexera has taken a logical step into cybersecurity with the acquisition of Copenhagen-based vulnerability management vendor Secunia. The move will place Secunia's Vulnerability Intelligence Manager alerting system and Corporate Software Inspector security patch generator alongside Flexera's FlexNet Manager Suite and AdminStudio application packaging solution, a development which Flexera hopes will encourage enterprises to "connect the strategic dots between Software Asset Management and cybersecurity."

Vulnerability Intelligence Manager provides "verified, accurate and comprehensive" data on existing and new software vulnerabilities, with a database of over 50,000 systems and applications. The system provides SMS alerts, workflow management ticketing and customised reports, plus advisory data including criticality ratings and recommended mitigation. Corporate Software Inspector provides multi-platform vulnerability scanning, with preconfigured patches for 20,000 programs (including "practically every program that runs on Microsoft operating systems"),

plus integration with patch deployment solutions including Microsoft System Center and WSUS.

Secunia CEO Peter Colsted said "The synergies from this acquisition will enable enterprises to more proactively address cybersecurity threats as a core part of their processes for managing application usage." Existing Secunia customers include RBS, Oxford University and the European Space Agency.

 IS NOW


Oracle takes three strikes at the Cloud

Oracle • www.greymatter.com/oracle/

 Database and middleware giant Oracle has spent 2015 reinforcing its credentials in the Cloud sector, with a major launch, a tactical alliance and a strategic acquisition strung neatly across the summer.

In June the company launched Oracle Mobile Cloud Service (MCS), a Backend as a Service (BaaS) offering aimed at enterprises deploying mobile client apps. The emphasis is on security and metrics, freeing developers from the need to engineer secure connectivity and

providing those all-important insights into who is using the apps and when. The system works with any client that supports RESTful APIs, with native iOS and Android SDKs provided.

In July Oracle added another language to the MCS SDK list, namely Microsoft C#. This came courtesy of a partnership with write-once, deploy-many platform vendor Xamarin, whose support for C# has made them a top-three provider. In return, Xamarin gets exposure through Oracle's marketing channels. What

Microsoft's Azure team thinks of the arrangement remains to be seen.

Finally in August, while New York's elite were relaxing in the Hamptons, Oracle was downtown acquiring Maxymiser, the cloud-based marketing optimisation vendor. With a hit rate of over 20 billion 'customer experiences' a month, Maxymiser's technology adds heavyweight A/B testing, audience-segment discovery and predictive personalisation to Oracle's Marketing Cloud.

News in brief

GFI upgrades FaxMaker

Security and messaging specialist GFI Software has launched GFI FaxMaker 2015, a major upgrade of its enterprise fax and SMS system. New features include a web-based client, allowing faxes to be sent and managed from desktop and mobile devices, along with a web-based reporter and integration with external reporting applications. Also new is integration with GFI Archiver, providing a searchable message audit trail, and mixed mode Active Directory integration via GFI Directory. GFI FaxMaker is sold on subscription only, with usage-based packages for SMEs upwards.



Microsoft develops Linux-based OS

Microsoft has developed an operating system based on Linux – but don't throw away your Windows manuals yet, as it's currently only for use on switching hardware in the company's Azure cloud infrastructure. Microsoft describes Azure Cloud Switch (ACS) as "a cross-platform modular operating system for datacentre networking", and says it allows faster testing and debugging, and a single software stack across multiple vendors' hardware. Underpinning it is an unspecified Linux kernel version, while the cross-hardware compatibility is courtesy of the Switch Abstraction Interface (SAI), which Microsoft developed for the Facebook-led Open Compute Project.

Arcserve makes backup simple for SMEs

Arcserve, the data protection vendor spun out of software giant CA last year, has launched the UDP 7000 Appliance, billing it as "the industry's first complete data protection appliance" for SMB and mid-market



Arcserve's UDP 7000 Appliance offers 'set and forget' backup and disaster recovery for SME and medium enterprises.

customers wanting set and forget solutions. Based on Arcserve's Unified Data Protection and Assured Recovery technologies, the system offers agentless backup for vSphere and Hyper-V systems, bare metal to granular recovery options and cloud compatibility. Five models are available, offering from 1 to 26TB of data storage, with higher capacities to come.

Embarcadero adds Performance IQ to DB PowerStudio 2016

Embarcadero's DB PowerStudio XE 6 suite of database developer/DBA tools has been reborn as DB PowerStudio 2016. As well as 2016 editions of its DBArtisan database admin tool and Rapid SQL cross-platform SQL IDE, the updated suite contains a new performance management add-on, Performance IQ, which monitors databases instances and visually highlights the underlying causes of performance issues. Features include metrics to identify the effects of index growth and 'noisy neighbours', and analytics showing how revisions to SQL statements have performed over time. DB PowerStudio 2016 also features DB Team Server, a collaborative platform for DBAs.

New job finder site for Delphi/C++ developers

If you're a Delphi/C++ Builder developer looking for a new challenge, or an employer looking for Delphi/C++ Builder skills, then the answer could be at Delphi Jobs Board, a new independent online service for posting CVs and vacancies. It's free to candidates, and includes a checklist feature

Competition Winner

The winner of Issue 66's competition prize, a GoPro HD Naked HERO courtesy of Intel, is Gareth van Essen from Blinkbox. Congratulations Gareth!

for listing your experience with specific Delphi/C++/RAD Studio technologies. Employers can also advertise free (premium options are available), with features including a smart CV search to find those specific skills. The system covers vacancies worldwide, and freelance and permanent jobs. Check it out at delphijobsboard.com.



DelphiJobsBoard

Microsoft recognises Grey Matter's cloud expertise.

Grey Matter (publisher of HardCopy) is proud to announce that it's been awarded Gold Cloud Platform Partner status by Microsoft, in recognition of the company's cloud service expertise and the number of businesses it's successfully migrated to the cloud. Matthew Whitton, General Manager of Grey Matter said "Gold Cloud Platform recognition from Microsoft demonstrates that we have the experience and knowledge to understand the technical requirements of moving to the cloud – either in an IaaS, SaaS, Hybrid or total cloud solution – as well as being able to offer expert licensing and pricing advice." Visit Grey Matter's Microsoft Azure showcase at greymatter.com/corporate/showcase/microsoft-azure/.

Stellar speaker lineup for Future Decoded 2015

Microsoft has announced a stellar speaker lineup for its Future Decoded event in London on 10-11 November. Keynote speaker on Business Day (10th) is Microsoft CEO Satya Nadella, with others including Martha Lane Fox and Mike Stone, Chief Digital Officer for the Ministry of Defence. Technical Day (11th) includes Professor Brian Cox, Scott Guthrie (Microsoft EVP Cloud and Enterprise) and Chris Bishop from Microsoft's Cambridge research centre. Breakout sessions include 'UWP decoded' and 'Tomorrow's World of Web Development', and Grey Matter will be there. Full details at futuredecoded.microsoft.com.

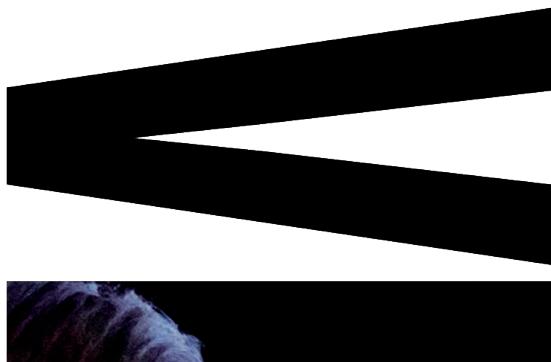
Grey Matter hosts Intel at Computing Insight 2015

If your interest is High Performance Computing, reserve 8-9 December and head for the Ricoh Arena in Coventry, where the old Machine Evaluation Workshop (MEW) event has been transformed into Computing Insight UK 2015. The main programme ranges from 'Predictive archaeology' to 'Experiences and recipes for particle-mesh algorithms', and there are breakout sessions plus an exhibition of the latest HPC hardware and software, with Grey Matter hosting a stand for Intel Software. More at tinyurl.com/ogok5gw and #CIUK.

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WIN a Sony HD Action Camcorder courtesy of Grey Matter!

As its name suggests, the HDR-AS30V Sony Action Cam with Wi-Fi and GPS comes Wi-Fi enabled, making it easy to share photos and video with other devices, and with GPS, keeping a record of your location. It also features a high-quality ZEISS lens and Exmor R CMOS Sensor, together with SteadyShot to ensure you get the best results every time.

To enter our competition, answer the question below, fill out the rest of the form and send it to:

Sony HD Action Camcorder competition
Grey Matter Ltd
Prigg Meadow
Ashburton
Devon TQ13 7DF

We will also accept entries submitted online at
www.greymatter.com/hc/competition



Issue 67
Sony HD Action Camcorder

entry form

Question: Which platform/platforms can you develop apps for with Visual Studio 2015?

- A: Windows B: Android
C: iOS D: All of the above

Answer:

Your details

Name _____
Job Title _____
Company _____
Address _____
Postcode _____
Telephone _____
Email _____

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(note that we keep your information private and will not sell or rent your data for marketing purposes).

Which version of Visual Studio are you currently using?

- 2005 2008 2010
 2012 2013 2015

Do you have MSDN?

- Yes No

What other developer tools do you use?

TERMS AND CONDITIONS OF ENTRY

1. No purchase necessary for entry to this competition.
2. The prize is one Sony HD Action Camcorder (colour may vary from that shown above). There is no cash alternative.
3. Completed entries must be received by Friday 20 November 2015.
4. Entries submitted online at www.greymatter.com/hc/competition or completed on a photocopy of this page will be accepted.
5. Only one entry will be accepted per person.
6. Winner is decided by random draw from correct entries received by the closing date.
7. The winner will be announced on Monday 23 November 2015 and notified either by email or by telephone.
8. The judges' decision must be accepted as final and no correspondence will be entered into regarding the decision.
9. Employees of organisations connected with this competition are not eligible for entry.
10. Grey Matter reserve the right to use the winner's name in promotional materials.

The competition promoter is Grey Matter Ltd, Prigg Meadow, Ashburton, Devon TQ13 7DF.



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Gold Cloud Platform
Silver Cloud Productivity



Visual Studio 2015

The latest version of Visual Studio aims to be all things to all developers. Tim Anderson finds out what it's got to offer.



TIM ANDERSON

A freelance journalist since 1992, Tim Anderson covers a wide range of technical topics and is well versed in modern programming tools, techniques and technologies.

His recent work has appeared in publications including Guardian Technology, The Register, Computer Weekly, Hardcopy, IT Expert, vnu.net.com and ITJOBLOG, as well as his own popular blog at www.itwriting.com.

Microsoft's platform is changing, and Visual Studio, the all-encompassing development tool, is changing with it. This release is shaped by several key trends. The first is Windows 10, which has been rolling out to customers – in many cases as a free upgrade – since the end of July 2015. Windows 10 is Microsoft's effort to deliver an upgrade that Windows 7 users will enjoy, unlike its predecessor, but it is also a step forward for the secure and touch-friendly Windows Runtime platform which Microsoft introduced with

Windows 8. The Universal Windows Platform (UWP) is the next step in its evolution and runs on desktop Windows, the forthcoming Windows 10 Mobile, XBox One consoles, and a new edition of Windows called IoT Core that runs on small devices such as the ARM-based Raspberry Pi.

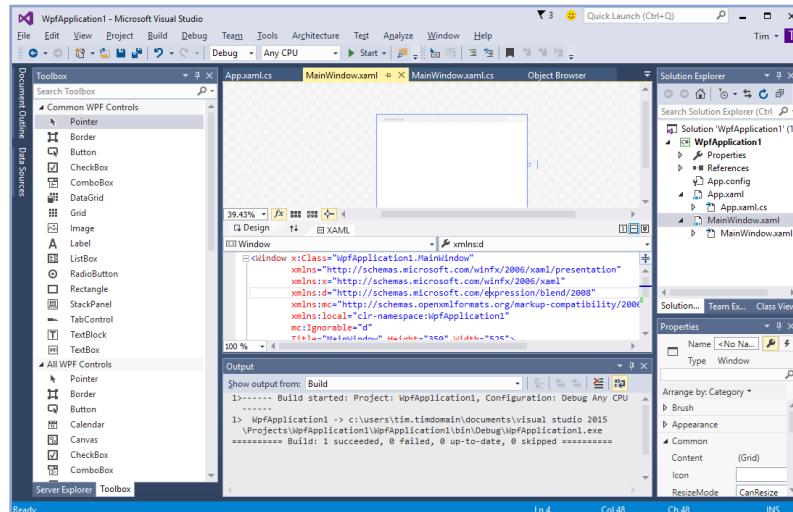
The UWP offers several advantages to developers, including the simplicity and discoverability of deployment through the Windows Store, and the possibility of having an app work across numerous form factors

including mobile. In Windows 10, UWP apps run in a window just like desktop apps, making them more familiar for users.

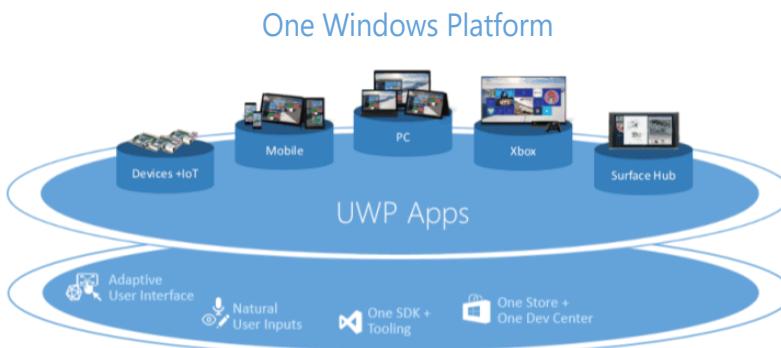
Windows desktop apps remain important, particularly since it is easy to write applications that run on all versions since Windows 7, or even back to Windows XP. Visual Studio has several options for building desktop applications, and in this version there are improvements to Windows Presentation Foundation (WPF), which is the primary framework for desktop development in .NET. The Visual Studio IDE itself is built with WPF. Other options include the older Windows Forms framework and Visual C++ with Microsoft Foundation Classes (MFC) or other frameworks.

Second, there is Microsoft's cloud platform, Microsoft Azure and Office 365. Although Office 365 is mainly a set of hosted applications, it is also a development platform, exposing APIs that you can use in cloud or mobile applications, and using Azure Active Directory, which you can also use for custom applications. Businesses benefit from single sign-on and a unified directory.

With or without Office 365, Microsoft Azure is a comprehensive platform, ideal both for test and development and also for deployment of cloud applications running on either Windows or Linux. Azure services include database



This is what the Visual Studio 2015 development environment looks like.



The Universal Windows Platform gives developers the tools they need to target many device types from a single code base.

management, analytics, virtual networking, auto-scaling web applications, and Visual Studio Online for application lifecycle management. Azure also provides services for processing input from large numbers of sensors, as in a typical Internet of Things (IoT) application.

Visual Studio 2015 has deeper Azure integration than before, with easy creation and deployment of ASP.NET applications to Azure, and new Azure-based diagnostics through a feature called Application Insights.

Building Universal Apps

Despite small improvements to the desktop tools, the main focus of the improvements for Windows developers are in Universal apps. These offer developers a number of advantages. Deployment is usually from the Windows Store, and users get updates automatically so complex setup routines are not needed. Customers can discover apps more easily, thanks to Store search which is built into Windows 10. Business apps can be deployed via the Business Store, a forthcoming feature that lets businesses assign apps to users so they receive them automatically. UWP apps are also safer for the user, making them more likely to be installed.

In Windows 10, UWP apps run in a desktop window, unlike Store apps in Windows 8, and the user does not need to know whether a particular app is desktop or universal.

Developers, on the other hand, will be keenly aware of the differences. A UWP app behaves more like a mobile app than a desktop app. It is sandboxed from the operating system and from other apps, and can access only a subset of the Windows API. Data is normally retrieved over the internet.

The application lifecycle is different too. A desktop app is either running or not running, and even when minimised can run in the background. A UWP app on the other hand has a third state, called Suspended. In this state the application remains in memory but code does not run, unless you specify background tasks. A suspended app can also be terminated at any

time, so you must handle the Suspending event to save your application state, and restore it in the Resuming event.

Another key difference is in the user interface. A UWP app is generally designed to be touch-friendly, though users with keyboard and mouse should still be well supported. If you use XAML to build your application, the built-in controls are chunkier than typical Win32 controls for this reason, and are designed to support both touch and keyboard/mouse interaction.

Cross-platform support

Another major theme is cross-platform support. Previous versions of Visual Studio have focused mainly on Windows when it comes to mobile, though Apache Cordova made an appearance in Visual Studio 2013 for building cross-platform apps with HTML and JavaScript. In Visual Studio 2015, this is joined by deep integration with Xamarin's tools for building iOS and Android apps with C#, as well as C++ compilers for Android and for Apple's iOS. Games developers can use C# and the third-party Unity toolkit to compile for several platforms including Android and iOS as well as Windows. A Hyper-V based Android emulator comes with Visual Studio.

The cross-platform story does not end there. Visual Studio 2015 also supports .NET Core, a new version of Microsoft's managed runtime that is both open source and cross-platform, running on Windows, Mac and Linux (see below). This means that you can now deploy ASP.NET applications on platforms other than Windows using Microsoft's official tools.

Visual Studio also has better support for non-Microsoft languages. In addition to first-class support for JavaScript and JSON, you can install Python Tools and Node.js tools to enable intelligent editing and debugging for these popular web development languages.

The rationale for these cross-platform efforts is that Microsoft is no longer relying exclusively on Windows for its future growth. Windows Phone has never taken off, and mobile

developers need to support iOS and Android. Microsoft's strategy is to make it easy to create apps for these platforms that use Microsoft cloud services, just as it has provided versions of Microsoft Office for iOS and Android in order to promote Office 365.

Microsoft's languages have also been updated, and Visual Studio 2015 comes with Visual C++ 15, C# 6.0, Visual Basic 15 and F# 4.0. Visual C++ 15 has better standard compliance, including improved C++ 11 support, some C++ 14 support, and preliminary support for some C++ 17 features. In addition, Microsoft claims to have fixed over 500 compiler bugs. The C++ editor now supports refactoring.

The .NET compiler has been rewritten in managed code (the project codenamed 'Roslyn') and this enables new editor features including enhanced refactoring for C#, refactoring in VB for the first time, and live code analysis and fixes as you type.

A new feature called IntelliTest can generate test data and unit tests for .NET code, speeding development time.

Changes to .NET

The new .NET Core is the biggest change to .NET since its introduction in 2002. It is also potentially confusing, so a quick overview is in order.

With this release, Microsoft has forked .NET into two streams. On the one hand is the .NET Framework, now at version 4.6, which is the latest release of the familiar .NET platform. This is a system component and works on all versions of Windows from Vista upwards. On the other hand is .NET Core, a new more modular framework designed from the ground up to be cross-platform – so new that Visual Studio 2015 is released with a preview version of .NET Core as, at the time of writing, neither the tooling nor the runtime and libraries are complete.

Microsoft developed .NET Core with two specific purposes in mind. One is .NET Native, true native compilation for .NET code, which is used for the Windows 10 UWP. According to

.NET 2015

.NET Framework
ASP.NET 5
ASP.NET 4.6
WPF
Windows Forms

.NET Core
ASP.NET 5
.NET Native
ASP.NET 5 for Mac and Linux

Common

Runtime
Next gen JIT
SIMD

Compilers
.NET Compiler Platform
Languages Innovation

NuGet packages
.NET Core 5 Libraries
.NET Framework 4.6 Libraries

.NET Core is a fork of the .NET Framework, used for ASP.NET 5 and Universal Windows Platform apps.

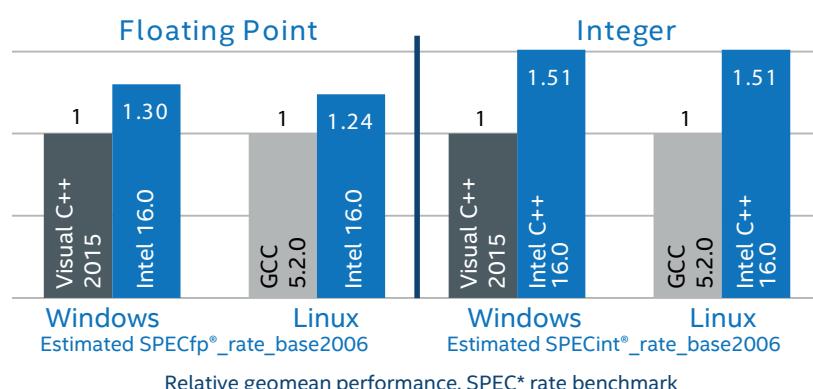


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Software



Microsoft, it would not have been possible to implement .NET Native without refactoring .NET to be more modular, enabling the compiler to strip out everything that is not used by the application. The other is the latest version of Microsoft's web application framework, namely ASP.NET 5.

The company also made the decision to make .NET Core open source, making all its source code available on GitHub. The project is among those managed by the .NET Foundation, whose directors are Miguel de Icaza, responsible for the Mono project (open source .NET) and co-founder of Xamarin (.NET for iOS and Android); Gianugo Rabellino from Microsoft Open Tech and the Apache Foundation; and Jay Schmelzer, Director of Program Management for Visual Studio.

Why bother with .NET Core when Mono has existed for years? The answer is that unlike Mono, .NET Core is supported by Microsoft and much of the code is shared with the .NET Framework and its libraries. Both projects will continue, but with increased cooperation. Mono will also benefit from access to .NET Core code.

The .NET Core project does not cover desktop applications such as those built with Windows Presentation Foundation (WPF) or Windows Forms. The reason is that these frameworks have too many Windows-specific dependencies. Mono on the other hand does support desktop applications. Since it is open source, it is also possible that other GUI frameworks based on its code could be developed in the future.

In the case of .NET Native, the use of .NET Core is invisible to the developer. Visual Studio ensures that your code is compatible. Applications benefit from faster start-up time and in some cases improved performance, thanks to full native code compilation.

ASP.NET 5, on the other hand, is compatible with both .NET Core and the .NET Framework. On Windows, the developer can choose which runtime to use. Cross-platform ASP.NET 5 must use .NET Core.

One of the key differences when an ASP.NET 5 application is deployed on .NET Core is that the runtime is deployed with the application, rather than having a dependency on a system component. This approach means there is less risk that an operating system update will break the application. Another implication is that those developers working on the framework itself have a little more freedom to make changes without breaking deployed applications. The downside is that servicing is harder since you cannot rely on operating system updates if, for example, a security problem is found in .NET Core.

Microsoft has said it will come up with solutions to the servicing issue but it is not yet clear how this will be handled.

There are two parts to .NET Core. The runtime is called CoreCLR, and the core libraries CoreFX. Both are distributed through NuGet, the package manager built into Visual Studio. Applications are deployed with only the libraries they need, and the componentised design for CoreFX means that unnecessary code is kept to a minimum.

All .NET applications need a runtime layer that hosts the Common Language Runtime (CLR) and bootstraps the application. Microsoft has developed a new cross-platform runtime host called the .NET Execution Environment which is designed for ASP.NET 5 but can also be used for console applications. The .NET Execution Environment (DNX) also includes tools for installing, creating and managing NuGet packages, so once DNX is installed you have all the essentials for building and running .NET applications. DNX can even use the .NET Framework instead of the CoreCLR, so it is consistent.

Once DNX is installed you can use the .NET Development Utility (DNU) to manage NuGet

packages or package an application for deployment. For example the command 'dnu restore' will find the application dependencies, listed in a JSON configuration file called project.json, and download them. The command 'dnu build' will generate output for deployment, including the DNX runtime for executing the application.

Another key tool is the .NET Version Manager (DNVM). Installing DNVm is the first step in setting up a .NET Core development environment. You can use DNVm to install and upgrade DNX.

Microsoft also has a simple cross-platform development environment in the form of Visual Studio Code, based on Google's Chromium runtime. Using Visual Studio Code with .NET Core you can develop, build and deploy ASP.NET applications on a Mac or on Linux. Git support is built in, and you can use Git's push command to deploy and update applications, for example those hosted on Azure.

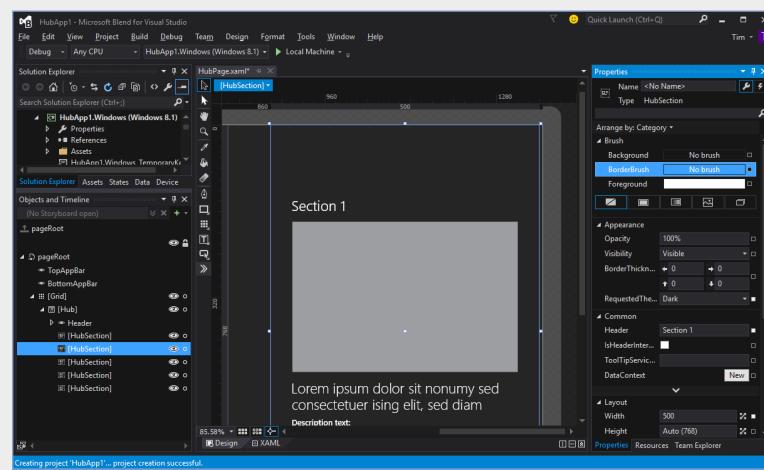
The .NET Core project is a huge transition for Microsoft and full of potential. We could, for example, envisage a future update to Visual Studio 2015 that lets you select between Windows, Mac and Linux targets when using

Visual Studio Blend

XAML is the layout language used by the UWP, WPF and Silverlight, and Blend is the XAML designer that comes with Visual Studio. This has been redesigned, with a new streamlined user interface and XAML IntelliSense. XAML debugging means you can inspect the state of the XAML 'visual tree' at runtime.

Blend uses the same project format as Visual Studio, and you can open a XAML file in Blend simply by right-clicking the file from within Visual Studio. There is a XAML visual designer in Visual Studio itself, but Blend has several advantages in that you can create animations visually; convert shapes and text into paths that can be reshaped; use behaviors (snippets of code) to add interactivity; import artwork from Adobe PhotoShop or Illustrator; and visually modify controls templates and styles.

Although Blend is a separate application, you can work on the same files seamlessly using both Blend and Visual Studio. However Blend is a more designer-centric tool and easier than Visual Studio for those with design experience. Developers who are familiar with in-depth XAML coding may prefer to work in Visual Studio.





the Publish wizard for ASP.NET 5 projects.

However there are two things worth emphasising. The first is that the .NET Framework is not going away. ASP.NET 5 runs on both the .NET Framework and .NET Core. Secondly, .NET Core is still in early preview (UWP apps aside). It is not yet a viable option for production, and the speed at which it evolves depends on open source community involvement as well as Microsoft's own efforts to make cross-platform .NET a reality.

Licensing

Your licensing options with regards to Visual Studio 2015 are complicated and, unless your needs are very straightforward, you are advised to speak to a Microsoft partner such as Grey Matter to ensure you don't pay more than you need.

That said, in most situations the best way to obtain Visual Studio 2015 is to purchase an appropriate MSDN subscription for each intended user. This will come with Windows, Windows Server and SQL Server, together with a licence to use Team Foundation Server, as well as a level of technical support and e-learning that depend on the Edition you choose.

Of the four MSDN subscription options, three come with Visual Studio:

Visual Studio Professional with MSDN is the core Visual Studio edition and comes with all the tools you need to build Windows desktop, Windows Store, Windows Phone, web and cloud applications, as well as Universal Windows Apps, in a variety of languages. Unit testing is included, as is access to Microsoft Azure and Visual Studio Online.

Visual Studio Test Professional with MSDN does not include development tools but is instead aimed at test specialists and comes with test case management tools including Lab Management for testing distributed applications, and more comprehensive support for Visual Studio Online. However it does not include load or web performance testing, which are reserved for the Enterprise edition.

Visual Studio Enterprise with MSDN adds the full range of Microsoft server products, together with Office Professional Plus which can also be installed on one device for

Responsive design

Applications designed for Windows 10 should scale nicely. In order to achieve this, Microsoft recommends designing for three size classes: small, medium and large. You do not have to worry about actual pixel density since Windows automatically scales the UI using a system of 'effective pixels', meaning that actual sizes remain consistent irrespective of the actual number of pixels.

The system will take care of much of the effort of scaling to different display sizes, but developers still have work to do in order to create a responsive design that adapts automatically to the current size. This is called an Adaptive layout. Alternatively, you can create a Tailored Layout, where you provide separate designs for each device type. At runtime, you can query the DeviceFamily, which returns values like 'Desktop' or 'Mobile', and load pages accordingly.

If you choose an Adaptive layout you can use XAML Triggers to change layout according to size. For example, you might have a panel which should only be visible if the application width is above a certain limit, expressed in effective pixels. In XAML you can define a VisualState that sets the panel's Visible property to Visible subject to an AdaptiveTrigger with a MinWindowWidth property. Such techniques let you create a design that works on multiple devices.

production use, and a Developer Subscription to Office 365. Tools exclusive to this edition include code coverage and review, web load and performance testing, IntelliTest, coded user interface testing, Lab Management, full Team Foundation Server with sprint planning and backlog management, and the full range of architectural and modelling tools. If you currently have a Premium or Ultimate edition then you will be automatically converted to the Enterprise edition.

Alternatively, if you are not interested in collaborative development, targeting Microsoft Azure or facilities such as load testing, then you can purchase a retail licence to Visual Studio Professional itself, or download Visual Studio Community or Visual Studio Code 2015 free of charge which allow you to build non-enterprise applications.

MSDN and Visual Studio licences allow a single user to install and use the software on any number of devices, but only for the purpose of designing, developing, testing and demonstrating the project they are involved in, so each member of your team will need a separate licence. Note that this limitation applies to all the software that comes with an MSDN subscription, so you need a separate licence to any of the server products if you use them for anything other than software development.

If you want to work with Team Foundation Server then you need Windows Server and Team Foundation Server licences for each server installation, plus both Windows Server and Team Foundation Server Client Access Licences (CALs) for each user. A server licence and the necessary CALs are included when Visual Studio is bought with any of the MSDN options, but not with the stand-alone licence that comes with the retail version.

A retail version of Team Foundation Server comes with five CALs. There is also a free

Express edition that supports up to five users, but with some restrictions and no SharePoint integration.

Visual Studio Online is a subscription-based service that is charged per user per month, with the first five users free of charge. A licence to access Visual Studio Online is included with all editions of Visual Studio 2015, with the exception of the Community edition. In addition, any number of users, sponsors and other stakeholders can have limited access to a Visual Studio Online account for submitting feedback, entering and editing work and backlog items, and suchlike.

Access to Microsoft Azure is included as part of Visual Studio Professional with MSDN, with increased levels of service as you move to the Enterprise edition, and this can be used to run production applications as well as for development and testing.

All of the MSDN options that include Visual Studio 2015 can also be purchased through any Microsoft Volume Licensing programme. Stand-alone licences to Visual Studio Professional can be bought retail or through the Open programme, and there are special options for government, educational and academic use, and for software start-ups.

Note that a conventional MSDN subscription gives you 'perpetual user rights' which means you can continue to use it after your subscription has expired, although you will no longer receive updates or have access to the download site should you need to reinstall (so make sure you keep copies of the installation files and keys). However this is not the case if MSDN is bought as part of a Volume Licensing scheme where your right to use the software expires with your subscription.

Current customers with active MSDN subscriptions can download the version of Visual Studio 2015 appropriate to their subscription from the MSDN website.



Find out more

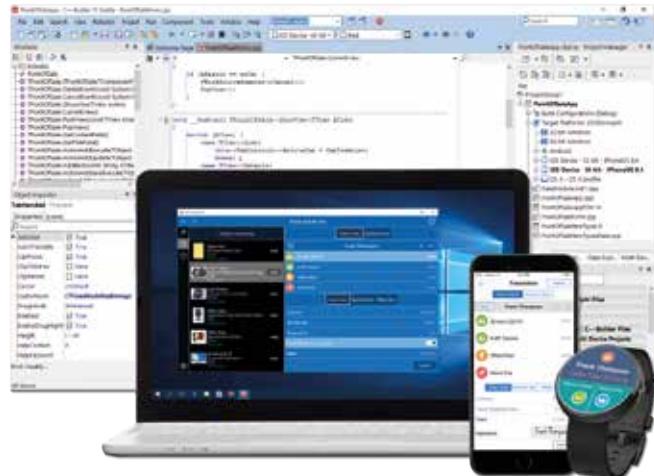
This is a big release of Visual Studio, encompassing major changes to the .NET platform and reflecting the importance of cross-platform web and mobile for today's developer. This article can only touch on some of those changes, which is why we have created a special website to cover the features of this powerful tool in more depth.

See www.greymatter.com/hc/visualstudio2015 for more details.



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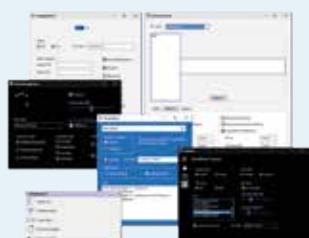
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Containing the problem

Simon Bisson explains what containers are and how they can help deliver your applications.

SIMON BISSON

Simon is a freelance IT writer and technology consultant who has worked on large scale Web architectures, mobile Web projects and XML solutions for clients in both the private and public sector.

simonb@hardcopymag.com

The modern data centre is a complex mix of hardware and software, simplified by new layers of abstraction that turn it into a private cloud of compute, network, and storage fabrics. Virtualisation makes it easier to deploy new servers, to assign storage, and to reconfigure networks on the fly. But there's one piece of the story missing: the applications. How can we manage them like we manage our data centres, automating everything in the application lifecycle?

That's where software containers come into their own, adding a new layer of virtualisation that abstracts the interface between software and operating system. Applications don't need to install on the operating system: they just need to be built into containers that can then be loaded and run on any supported platform. That doesn't mean Windows apps will run on Linux and vice versa: applications will still need to access the OS features they'd normally use, but this access is now managed and protected. Where possible containers offer abstractions of common OS

services, so for example, a network connection will look like a standard OS networking API, but in fact be a NAT connection over the OS's networking stack.

The popular face of modern containerisation is Docker, and it's not surprising just how popular it's become as it's easy to use, it's open source, and it's supported by an ecosystem of tools and products built around its APIs. Docker gives you a simple command line tool for building and managing containers, with support for most major operating systems. A Docker container wraps the user-space for an application, allowing it to run isolated from other applications on a server, sharing system resources and mapping networking so that connections are routed through a local firewall.

There's a lot more to containerisation than wrapping and running applications. If you're going to use it in your data centre, then you need to automate everything. Docker's product suite also includes Machine, a tool to automate container host creation; a cluster manager in Swarm; and Compose, a tool for orchestrating containers across a cluster of servers. All have APIs for management tooling, and can be called with a single command line, making it easy to script your container architectures.

Docker's tools are supported by many vendors, from dedicated Linux-based operating systems to support for OS X, and it's now being built into the next release of Windows Server. Download the latest technical preview of Windows Server 2016 from TechNet, and you'll find that you've downloaded two files. One is a

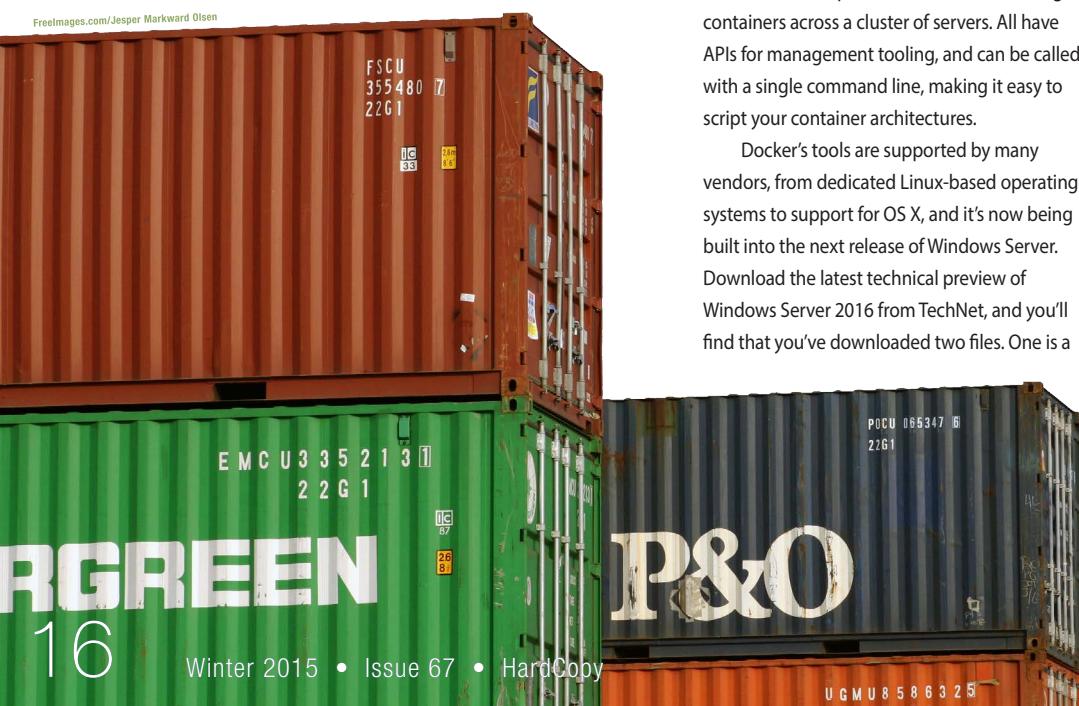
familiar ISO image for a full-blown Windows Server installation, the other is a WIM (Windows Imaging Format) image of a Windows Server Core preconfigured with support for Windows Server Containers. You can also download a PowerShell script that sets up a Windows Server Core VM, ready for you to try out Windows Server's container support.

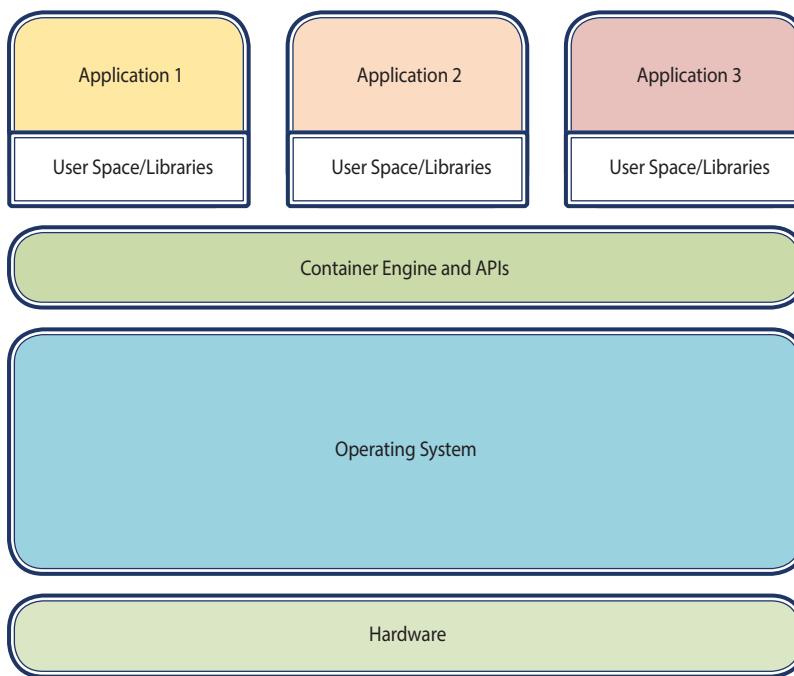
You build and use containers in Windows Server 2016 using either PowerShell or Docker (but not both, at present). The familiar Docker command-line and API are built into Windows Server, while the PowerShell option allows you to remotely manage your containers with PowerShell remoting. Under the hood, both approaches are using the same Docker container image format, making it easier to share images between systems. Microsoft is planning to deliver another option, namely Hyper-V Containers, which will allow you to deliver a thin Windows Server OS running in a VM hosting Docker containers, so increasing application isolation and allowing you to run nested virtual machines on top of Microsoft's new Nano Server or on Azure.

How it works

It's easy to think of containers as new, but in fact the underlying technologies have been around since the mainframe days. The same concepts that let applications share mainframe resources without affecting each other underlie technologies like Docker and rckt, building on ideas familiar from Linux's LXC container model and Solaris' Zones. Best thought of as the direct descendants of the virtual private servers offered by hosting companies, containers are a modern form of operating-system level virtualisation, providing applications with a secure, isolated user-space where they can run without affecting other code running on the same server and using the same operating

Freelimages.com/Jesper Markwardt Olsen





Container technology helps isolate applications from one another.

system.

What's new with technologies like Docker is that they define a set of APIs between the container and the host OS, along with a packaging format and a set of metadata for describing the contents of the container, and its requirement. There's also the option of differential containers, which apply their contents to a base file system. That way you can have a container that has your preferred web server configuration, and a series of containers that host web applications for that server container. It's an approach that can save on disk space by allowing reuse of core application infrastructure.

So what does it all mean? There's a reason why containers have become popular tools in the last couple of years, and it's the rise of DevOps.

Containers are essentially an element of architectural abstraction. Much as a hypervisor abstracts the OS from hardware, so a container abstracts an application from the OS. As we move to a world of automated, programmable infrastructures, containers become the endpoint of a build process, encapsulating your services and their dependencies. Instead of deploying code, we just swap in a new container with the latest version, using tools like Docker controlled by modern build tools like Jenkins, and managed by configuration management tooling like Chef.

As cloud platforms become more important to developers, it's clear that containers are a technology that simplifies the process of deploying applications at cloud scale.

That's why they're at the heart of many new cloud services. Amazon's AWS has its Container Service up and running, and Microsoft is looking at offering similar on Azure, with Windows Server TP3 container hosts available in the Azure VM gallery.

Tools for managing containers at a data centre or cloud level are already available. Perhaps best described as data centre operating systems, management frameworks like Apache Mesos and Google's Kubernetes are able to deploy and manage container-hosted services, providing a data centre-scale scheduler and tools for handling available resources. Applications can be defined as groups of containers and deployed to individual servers, or across an entire virtual infrastructure.

There's a lot to be said for working this way. You can build an application, configure its infrastructure, and deploy in minutes. Working with a continuous delivery model allows you to push code several times a day, encapsulating each build in its own versioned container. If an application update fails, you can quickly fall back to the last known good container, and just carry on working. Deploying a complete application becomes a matter of deploying all its containers, using tools like Docker Compose to manage placement in a server cluster.

Switching to working with containers does mean changing the way you think about development and deployment, and it's not surprising that the container model is at the heart of much modern DevOps thinking. Talk to the folk from Chef, and they'll note that this is part of the process of "moving left", bringing

operations into the development workflow, and tying infrastructure and configuration management into the same tools that you use to build your applications. Decoupling application lifecycle management from server configuration management makes a lot of sense, simplifying the build process and reducing the risk of server configuration mismatches between development machines and production. Code that runs in a container on a development machine will run on a server without any changes.

Containers are also changing the way we build operating systems. There's a concept in research operating systems called the Library OS, which configures OS modules to provide only functions that are needed for its applications. It's a flexible, lightweight and very secure way of working, and was used by Microsoft Research as the basis of its Drawbridge OS.

Containers are letting us deliver something that, while not quite a Library OS, is closer to the concept than anything in public use. For example, CoreOS's Linux is designed to support Docker and rkt containers, giving you a thin operating system layer that adds functionality via a library of functional containers. RancherOS goes even further, with a set of Docker containers for core OS functions, abstracting as much of Linux's user-space as possible. These containers then host another set of higher-level containers for your applications.

The ideal would be an OS that configured itself based on the manifests and other metadata offered by a container. That's still some way in the future, but with a little work you can have a set of containers that deliver only the services you need to run your applications, so simplifying configuration management and deployment while making your infrastructure a lot more flexible and a lot more secure.

If you're building cloud-scale applications, and considering using micro-services at the heart of your architectures, then it's well worth considering a container as the standard deployment unit for your code. It simplifies both scaling and updating an application, as well as giving you a foundation for future continuous delivery models.



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Safety first

System backup has changed with the advent of virtual machines and the cloud. Kay Ewbank looks at your options.



One of the most important tasks for anyone managing a computer system is to ensure that if something goes wrong with that system, the users can continue working with their data and applications intact. This holds true whether the system is a single home PC, a small network, or thousands of networked machines spread over many sites. The need is the same whether the machines are real or virtual, and whether the data those users want is stored on a local drive, a network attached drive, or in the cloud.

Along with this increase in locations for data storage has come ever increasing amounts of data to be managed. Backing up and restoring many gigabytes or even terabytes of data involves a lot of bandwidth, to the point where normal working can be compromised by the amount of data being transferred. Many companies bite the bullet and dedicate a full system with its own servers and hardware so data can be backed up in full on a weekly basis with daily incremental backups. If that's not a possibility, then backup software needs to be sophisticated enough to back up data without stopping normal network use.

The increasing popularity of virtual machines and cloud storage make backup more complicated, if only in being sure you're actually backing up all the data you need to. Knowing how many virtual machines are in existence in your system, and what data is associated with them, is one problem – particularly as some of those machines might not be mounted when the backup is carried out. Cloud based data is even trickier. While many cloud providers do offer backup, that might not be sufficient to meet the regulatory requirements of your particular situation. And what would happen if a problem occurred at the cloud provider?

An increasing number of companies are using the cloud as the backup location, but this does need to be carefully thought through. You can be reasonably sure a tape stored in a safety

deposit box at the bank will still be there should you actually need it: can you be equally sure your cloud provider will still be in business and will have retained your data? Another drawback of cloud backups is the time it takes to backup and restore data. Some cloud backup companies have resorted to copying customers' data onto disks and sending them out via courier, which gives an indication of just how long the process takes.

Backup is one area where third party software still offers significant advantages over that provided with the operating system – assuming of course that your operating system has backup utilities included.

Windows Backup

There's a strong case for saying that the backup market is so strong because the facilities Windows offers are so feeble, both for servers and desktops. Windows Server 2012 has its own basic solution called Windows Server Backup. This is made up of a Microsoft Management Console (MMC) snap-in, some command-line tools, and Windows PowerShell scripts. You can use it to back up a full server (all volumes), selected volumes, the system state, or specific files or folders. If you're using the version of Windows Server aimed at small and medium-sized businesses (SMBs), namely Windows Server Essentials, then you get a slightly friendlier wizard-based system that can make use of Windows Azure Backup. You can set the backup to back up data from PCs connected to the network daily, and if you need to restore data, you can choose individual files and folders or entire PCs. The software has built-in compression, throttling and encryption prior to the data being transmitted to the cloud.

On the desktop the backup method depends on which version of Windows you're using. Windows 10 has both the File History option and Windows Backup and Restore, while Windows 8 is limited to File History, and earlier

versions have only the Backup and Restore.

File History carries out an automatic backup every hour, backing up all documents stored in the Libraries, Desktop, Favourites and Contacts folders. This can be turned off by the user of the machine, or using a group policy setting in a network situation. Other options let you configure where to store the backup on external devices, and you can change the time period.

The drawback of File History is that it is limited in which data can be stored using it, and it doesn't support storing data in the cloud. One point to note is that the Windows 10 version of File History only backs up files in the Libraries list in a particular account, not in the Favourites or Desktop.

Versions of Windows other than Windows 8 come with Windows Backup and Restore, which lets you back up folders, libraries, and drives to another drive, a DVD or the local network. There are limitations to Backup and Restore, particularly the 'restore' element. If you want to restore an image, the hardware needs to be identical. Windows Backup is also notoriously slow, running to hours or even days, and not having a 'resume' option should the machine be turned off part way through.

Symantec Backup Exec 2015

Backup Exec has been the biggest name in the backup arena since the days the product was owned by Veritas, but went through a troubled period after being taken over by Symantec, particularly in the incarnation of the unpopular Backup Exec 2012. Thankfully Symantec put a lot of work into improving matters with Backup Exec 2014, which was greeted with relief and enthusiasm due to its improved performance.

Backup Exec 2015 has built on that positive vibe, extending integration into virtualised environments, and adding new cloud connectors. However, some customers have been concerned by recent moves that saw the

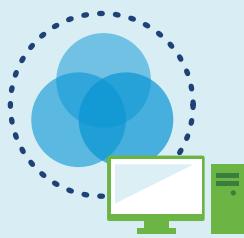
**KAY
EWBANK**

Kay is a database consultant specialising in EIS, financial analysis and GIS systems. While much of her work is based in London, being a consultant gives her the freedom to sail, travel and help out as a part-time sheep farmer.

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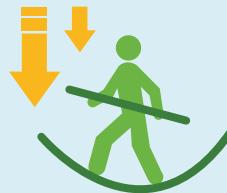
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dropping of the Backup Exec appliance bundles that contained both the software and hardware bundled to provide physical and virtual server backup with integrated deduplication. More uncertainty was caused by the splitting of Veritas from Symantec into a separate company. Backup Exec is reverting to the Veritas stable, which is pleasing those customers who felt Symantec had taken wrong turns with the software, but adding a degree of uncertainty as to how the new company will develop.

One of the biggest complaints about Backup Exec 2012 was the way the user interface had been streamlined with a new management console that was supposed to be easier to use, but which many users found less accessible and where some of the more advanced features of earlier releases were no longer available. Things have got somewhat better in Backup Exec 2015, but experienced administrators still say the old interface offered more options.

In practical terms, Backup Exec 2015 works with virtual, physical and cloud based backups, and you can recover VMs, applications, databases, files, folders and singular application objects. The most recent version improves integration with VMware and Hyper-V. It recognises new VMs as they are added to your network and automatically protects them, and you can create a backup of a system that will be converted into a virtual machine for either Hyper-V or VMware. If you need to recover physical or virtual servers, there's a Simplified Disaster Recover (SDR) step by step recovery to make things easier, and you can make use of snapshot agents to recover individual virtual machines.

arcserve Backup

Arcserve is back as an independent company, with arcserve Backup and arcserve Unified Data Protection as its major products. Those with long memories will remember arcserve as being the major player back in the days of Novell Netware and Windows NT backup, before they became part of the CA megalith. The company is now separate again, and is intent on making itself as popular as it originally was, with a strong focus on service level agreements and a new version of the product in the shape of arcserve Unified Data Protection (UDP).

In terms of features, arcserve Backup has everything bar the kitchen sink. It works well with real, virtual and cloud environments, and supports tape, disk and the cloud as storage for your backups. It is very configurable, with options ranging from all-inclusive software that lets you back up physical and virtual file servers, email servers, database servers and application

Action	Node Name	Plan	Hypervisor	PFC Status
	centos8	Linux - Agentless	vsphere	Details
	DC01 arcserve.lab	Agent Plan		
	MANAGER arcserve.lab			
	production arcserve.lab	Exchange 2013		
	replica arcserve.lab			
	RPS-R arcserve.lab			
	Windows7 arcserve.lab	Agentless VMware With Replication	vsphere	Details

Adding nodes in arcserve unified data protection (UDP).

servers, to more selective options for specific operating systems, file servers or application servers.

If you're working with virtual machines, you can back up VMware, Microsoft Hyper-V and Citrix XenServer. There's also an option where you take an image-based backup and convert it to either a bootable virtual machine or a disk image of a server that can be used for bare-metal restore. You can also create a synthetic backup which synthesises a full backup from previous incremental backups.

Arcserve UDP is an integrated data protection solution that is aimed at the mid-market and SMB sectors. This isn't a replacement for arcserve Backup, which will continue as a separate product for at least a few years, though the eventual plan is to amalgamate the product lines.

For the moment, if you want to use tape as your primary backup, arcserve Backup is the product to use, whereas arcserve UDP is aimed at companies wanting image-based backup to disk. The aim of arcserve UDP is to combine backup, replication, high availability and global deduplication. You control the software from a nicely designed web console, and there's a quick-start wizard for most tasks.

UDP uses the concept of a recovery point server where the backing up happens, along with deduplication and replication services. This server can have multiple data stores, and you can replicate the server to a second remote server for added safety. UDP handles virtual machines well, including the idea of a virtual standby, which uses a recovery point to create a VM. The VM is then kept up to date as data changes, and if the node does fail, UDP will automatically start the VM instead.

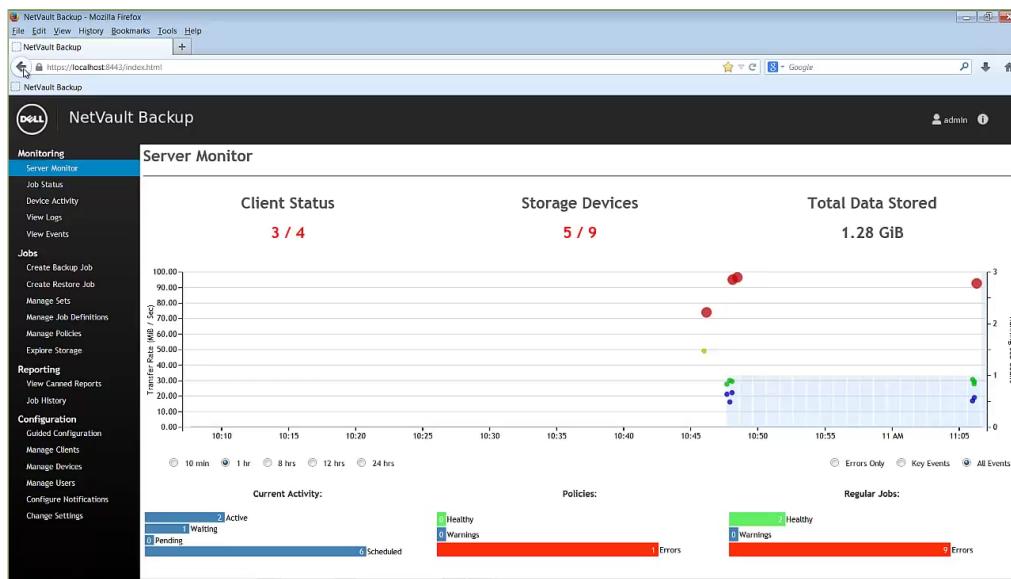
Dell NetVault Backup

NetVault Backup 10 is the first major upgrade of the software since Quest was taken over by Dell. It is available as a standalone product, or as part of the Dell Backup & Disaster Recovery Suite along with AppSure and VRanger.

The new version of NetVault has a new web user interface, and has improved database and monitoring features. NetVault's database used to be a flat file format, but this has been replaced by a multi-threaded PostgreSQL database, and NetVault Backup now carries out operations such as initial backup and secondary copy in parallel.

NetVault is a great product if you run multiple operating systems thanks to its strong cross-platform support and consistent look and feel across the different platforms. You can restore indexes and catalogues across platforms, and it is great at minimising index sizes. It has native support for more backup devices (such as tape libraries) than rival products, though the focus seems increasingly to be on hardware/software combinations with Dell hardware, such as disk backup appliances. There's also a LAN-free option so you can avoid increased network traffic by using local or SAN-attached storage devices. NetVault users praise its fast and simple device discovery, and its excellent application agents – there are plug-ins for more or less any middleware that you can think of.

The reporting options in NetVault are very customisable, and it's strong on alerting you if problems occur. The monitoring shows active jobs, policy jobs and data transfer in real-time in a single screen, with info on how the backups are running, which devices are being used and the amount of bandwidth they're using.



Server monitoring with Dell's NetVault Backup.

NetVault has good security options for regulatory compliance. You can choose which data should be encrypted for backup on a job-by-job basis, and the encryption options supported include CAST-128, AES-256 and CAST-256 encryption. You can also select which data to encrypt at the job level.

Dell VRanger

Dell VRanger is part of the Dell Backup & Disaster Recovery Suite, and like NetVault is also available separately if your environment doesn't require the other elements.

Like Veeam, Dell's VRanger Pro is aimed at situations where you want to back up virtual machines, in particular VMware virtual environments. The latest version can also be used to back up physical Windows servers, and this latest release has added support for Microsoft Hyper-V systems.

VRanger supports VMware ESX and ESXi systems, and comes in a Standard Edition that gives you data protection for small virtual environments, and a Pro edition that adds improved scalability and disaster recovery capabilities. The latest version is vSphere 5 certified, and supports vSphere 5's improved streaming and memory limits.

VRanger is agentless to make it easier to install and support. It supports deduplication and disk-to-disk backup with Dell DR

appliances, EMC Data Domain, and NetVault SmartDisk. You can take incremental backups, and the backups can be taken while the virtual machines are running. If you're backing up Windows physical servers, it sends data direct from the original servers to the backup target, so avoiding the need for a media server. If you're backing up virtual machines, this is achieved by having a virtual appliance on the machine being backed up. If you're backing up a physical server, a local agent is installed to perform the same process.

One aspect where VRanger is user friendly is in the ability to browse a catalogue of available backups to find the information you're looking for if you need to restore files or a system. You can then restore the data using a Storage Area Network Fibre Channel instead of having to load your normal network with the extra traffic.

Veeam Backup & Replication

Veeam is an increasingly popular choice for backups, having begun life as software just for

backing up VMware virtual machines. Support for Microsoft Hyper-V was added some versions ago, but this is still a product that focusses solely on the virtual environment. If you want to back up physical servers, you need a second product.

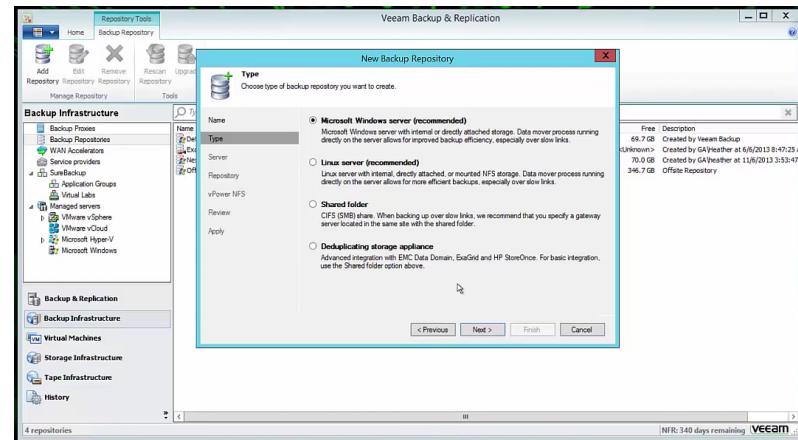
Nevertheless, within the virtual environment, Veeam works well, and it's fast, both in backing up and recovery. Veeam claims you can recover a full VM in mere minutes, and the claims are justified.

When you're creating backups, you can do so from shared storage, and you can also take incremental backups to minimise the creation time. Once you've started with a full backup, you can then choose to work with synthetic backups, where only the incremental changes are saved. Veeam overcomes one of the worries of the backup administrator by opening the backup in a virtual environment, creating a virtual machine based on the backup, starting that virtual machine and checking that it works. This means if you do need to recover the machine, it should actually work.

You can also run a virtual machine directly from the backup file, and this ability is used by Veeam when you choose to recover a machine. The VM is started from the backup so users can get to work immediately using the machine and applications on it, and you can transfer the VM while in use to your local SAN or NAS.

Veeam has some restrictions: for example, you're expected to back up entire volumes rather than single directories or groups of directories. If you want to back up a subset of a volume, you need to create a new volume containing that data. Veeam's support for Hyper-V also restricts you from backing up pass through volumes and volumes connected using iSCSI in Hyper-V.

The main take-away about Veeam is that it just works, and so long as you're OK with the virtualisation only restriction, this is a great option.



Creating a new backup repository with Veeam Backup & Replication.



Find out more

Full details for all these products are available on the Grey Matter website at www.greymatter.com/catalogue/IT. You can also call Grey Matter on 01364 654100 or email maildesk@greymatter.com if you would like to discuss your needs further.



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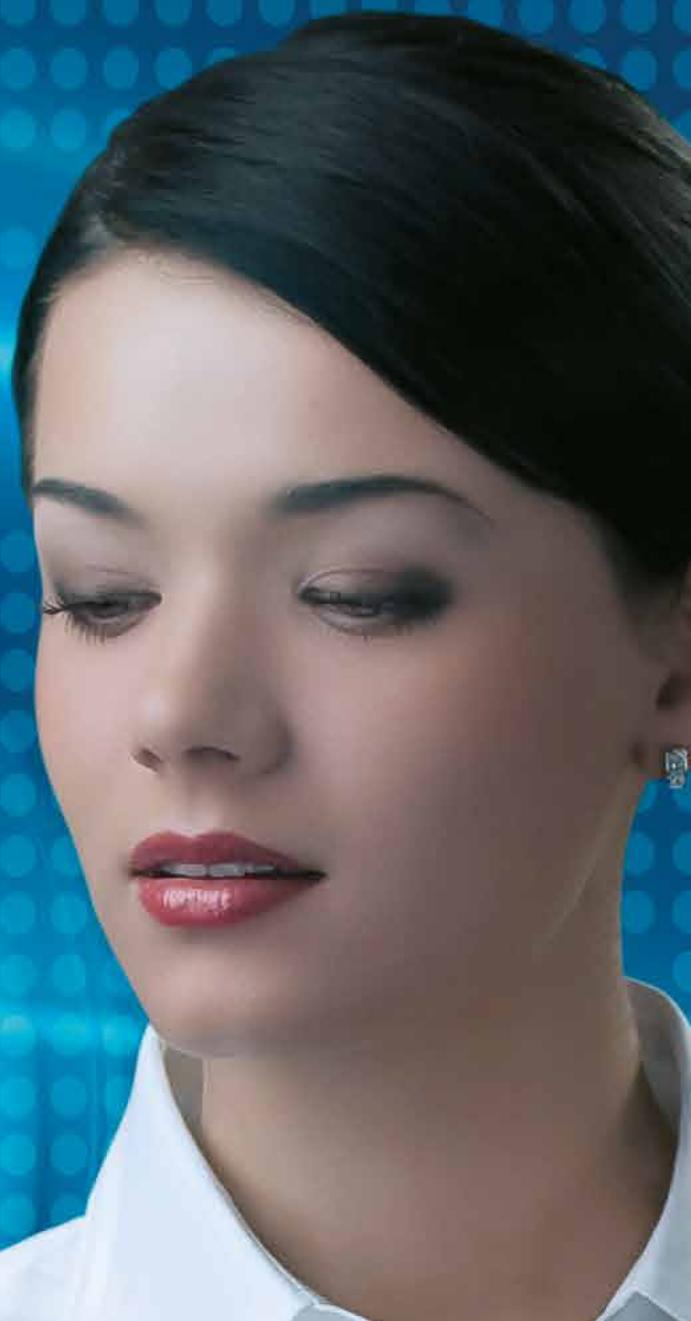
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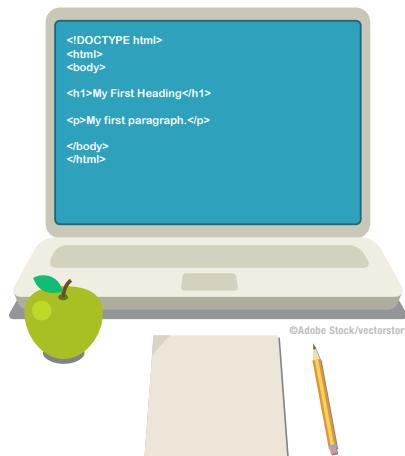




Software in Education

The teaching of technology has shifted from Excel and PowerPoint to coding and digital literacy.

Mary Branscombe explores the new curriculum.



MARY BRANSCOMBE

Mary is a freelance IT writer who's worked on both sides of the fence, from writing manuals to developing a technology area for a major online service. She was also launch editor of IT Expert magazine.

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In September 2014, the UK national curriculum changed, replacing Information Communication Technology (ICT), which focused on using packaged software rather than programming and computer science, with a new computing curriculum. Partly driven by a recent OECD report saying that using computers in education hasn't improved student achievements in reading, maths or science at all, this new curriculum concentrates on digital literacy: "Not just how to work a computer, but how a computer works and how to make it work for you," as then-education secretary Michael Gove put it earlier this year.

Starting at age five, children will learn coding, in terms of algorithms, debugging and logical reasoning, in addition to IT skills ranging from online privacy and how to evaluate the results returned by a search engine to understanding networks and data analysis. It's a far broader approach, designed to give children the digital skills they will use at work while helping them think logically, articulate problems and be creative.

"There is an opportunity here to skill up children and make sure the workforce for tomorrow has the appropriate training and mind-set, because the skills they learn today are not necessarily the things they will use tomorrow - but it's the mind-set of coding and learning those skills," points out Richard Rolfe. "We can help children develop their skills so they can work with anything in the future."

Rolfe is a former head teacher who co-founded National Coding Week, an annual session of events that he sees as a good complement to the curriculum changes, because it has the same emphasis on understanding technology more broadly. "I

teamed up with a former student to teach adults coding skills and digital literacy. The idea isn't to try and turn them into coders; we're trying to get them to understand the different opportunities and threats in the digital world."

Beyond coding

Adopting a new curriculum is always a lot of work for teachers, and there has been a lot of investment in training, with extra government funding for the British Computing Society (BCS), Microsoft and Google funding training programs and Oracle offering free membership in the Java and database-focused Oracle Academy to schools, universities and teachers. BT is funding the Barefoot Project to give teachers resources for teaching 'computational thinking' and Microsoft has worked with the BCS to found the Computing at School group to support teachers.

According to a recent survey from Raspberry Pi distributor element 14, which manufactures the micro:bit computer that will

next year be given to all Year 7 schoolchildren in the UK as part of the BBC's Make it Digital year, a third of primary teachers said they didn't feel confident they were ready to teach coding effectively, or didn't have the right equipment. Only one in five said they'd added coding to teaching subjects beyond technology, and students are only spending about 45 minutes a week coding. Despite that, pupils are enthusiastic, with over 85 percent of teachers saying their students are responding positively to learning coding.

"Schools which are blessed with teachers that have both skills and interest in the topic seem to have embraced the change, whilst those that don't seem to be struggling, essentially in primary schools where bringing in such a specialised resource can prove to be a real challenge," notes Dave Coplin, whose title of chief envisioning officer at Microsoft UK involves considering the future of how we use technology.

But Coplin is also seeing the idea of

The BBC will distribute the micro:bit computer to all Year 7 children in the UK next year



element 14

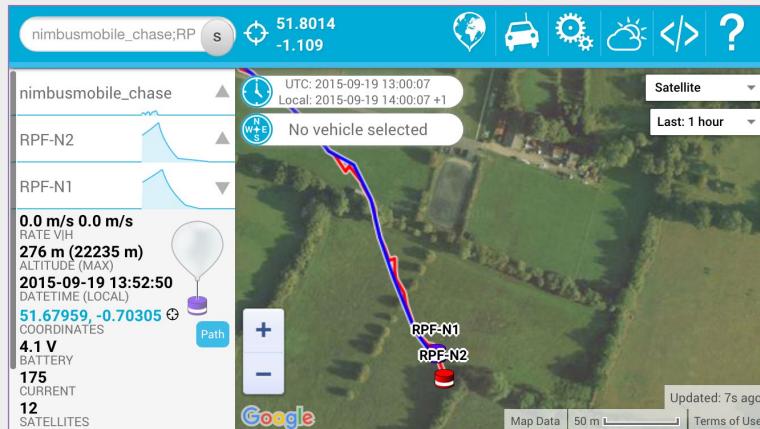
Raspberry Pi's in space

Action cameras like GoPro have made it easier to attach cameras to weather balloons to do high-altitude photography, but a Raspberry Pi is lighter, doesn't have lens distortion, and you can hook up an altitude sensor and a tracker so you know where the balloon is going to come down.

High altitude ballooning is a great school project. Children get excited about the idea of sending something to the edge of space: "It goes up 30,000 metres!" enthuses David Moss, Head of Computing at Stoke College in Suffolk, who is in the middle of setting up 15 Raspberry Pi's for the school, some of which will be going up in a balloon as part of the Raspberry Pi Foundation's Skycademy program.

The balloon project is also relevant to multiple subjects. "It's hugely cross curricular," Moss points out. "We're dealing with the science of the balloons: there's a lot of maths involved to work out the height, the trajectory going up, the trajectory going down, and where it will land. There's obviously geography involved. There's French if it goes too far, or marine biology if it lands in the sea, or dendrology if it ends up in a tree!"

Moss is so impressed that he's replacing many of the Windows PCs the pupils currently use with Raspberry Pi's: "It's a phenomenal piece of kit. It's got Minecraft. It's fully programmable in Python, so persuading children to program in Python is easy. Want to build a city? Use Python to build it and debug it. They really enjoy it. Children have used computers for so long that they're blasé about them, but the Pi is a breath of fresh air."



A Raspberry Pi doesn't just take photos as it goes up in the balloon – it also sends back tracking information so you can retrieve it.

general digital literacy reach people. "I'm beginning to sense a shift from pure computer science to a broader awareness, understanding and even love of what technology can enable in everyone's future, be they coders or not. Although the push for 'computer science' is at the heart of all this, people are realising that understanding how computers work, even at just a high level, is as important to the future of our children as learning to read and write."

That changing view is coming in part from a whole range of coding initiatives, in the UK and elsewhere, with the new curriculum and National Coding Week being just two examples. "The UK was the first country to make coding compulsory," Rolfe notes, but Germany, Australia and Singapore are doing the same. There are programs such as Code.org's Hour of Code and Decoded's Code in a Day, organisations like Apps for Good and Young Rewired State creating communities of coders and makers,

volunteer services like Founders and Coders, boot camps for coding, online courses like Codecademy, the Code Club and CoderDojo networks of after-school clubs, and sponsored events like Google's Summer of Code, Microsoft's YouthSpark program (which includes DigiGirlz Days aimed specifically at girls) and Microsoft's worldwide Imagine Cup competition. The BBC is running a Make it Digital tour, partly to get children and teachers excited about the micro:bit computer, but also to showcase how wide the digital world is, from robotics to weather forecasting.

Some of this activity is in response to the demand from the industry for skilled workers, but there have also been grass roots movements to make coding and development more accessible, along with the rise of the 'maker' movement and tiny, cheap computers like Raspberry Pi and the Arduino.

In 2011, teacher Alan O'Donohoe helped

start the Raspberry Jam community of Raspberry Pi enthusiasts after two girls in his school won a national coding competition, but still didn't think that coding was something 13 year old girls could do. "I resolved to try to do what I could to make it seem as normal and acceptable as possible for a 13 year old girl to indulge in really geeky computing activities, like programming a Raspberry Pi computer," explains O'Donohoe. He was delighted to see a girl show up to a recent meeting with a Raspberry Pi project she'd built: "it just seemed so perfectly normal and acceptable that a 13 year old might want to spend her summer holidays working on such a project."

The next step, according to Nic Hughes, primary teacher and ICT co-ordinator at Latymer Prep, is bringing this kind of hardware out of the clubs and into schools, where teachers will be dealing with larger groups of children and a range of interest and ability levels. "Minecraft programming and physical computing with LEDs and buzzers: this all needs to be in the curriculum, not just in a club. Let's play around with this in our clubs, then bring it into the curriculum so it has an impact on all kids, not just the really eager ones."

Tiny computers

If you grew up in the 1970s or 1980s, you almost certainly had a home computer that came with a simple programming language built in, usually BASIC. Even if you only wanted to play games, you were as likely to find yourself typing in a code listing as going out and buying a game. Games consoles may have brought technology to many more families, but in some ways we lost a generation of young coders to them, especially as programming tools became more sophisticated.

The rise of the web and the increasing power of JavaScript has been one avenue for making coding more accessible to people. Researchers at Microsoft who couldn't find good tools to teach their own children programming came up with Kodu, a visual programming tool that they built initially to run on Xbox and to work with the game controller. It's now available on Windows, and you can even use the micro:bit as an interactive controller. Much like Minecraft, Kodu is about building 3D worlds, but underneath you're doing full object-oriented programming, and indeed the programming system in Microsoft's Project Spark game-building service is based on Kodu. Both Kodu and Project Spark is available free, along with the other coding tools for students like TouchDevelop and SmallBasic, on Microsoft's Imagine Access site.

TouchDevelop is also the programming

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tool for the micro:bit. Because it works in any browser, students can write code on their phone, tablet or computer and use it to control the LEDs, the programmable buttons, the accelerometer, magnetometer, and the five input and output connections which you can connect up to sensors, motors, robots and other devices.

The micro:bit has been delayed until early 2016 by power supply problems. However getting them into every school will make the hardware hacking movement that started with Arduino, Raspberry Pi and Intel's Galileo computers mainstream. Schoolchildren won't just be writing code, they'll be playing with the Internet of Things.

As Rolfe points out, these small, barebones computers, that come without even a case, are both cheap and exciting when compared to sitting children down in front of a desktop keyboard: "If you say to someone, 'do you want to learn programming? Well, you have to buy this £400 computer and there's a big handbook to work your way through and then there are some exams at the end,' that will appeal to a certain group of people, but it's a small group. The fact that these devices look nice, they look intriguing, they're small, they are well-priced, they are accessible, they're available in the high street; that pulls people in because they seem less intimidating than big devices and complex computer science courses."

Raspberry Pi and Arduino projects have been showing up in schools for a while. Kids have built everything from weather stations to

seems a little intimidating, then simpler systems make an excellent introduction. The new CodeBug is a smaller board that costs just £12.50 and is designed for teaching the basics of programming and electronics. It looks like an insect: the legs are touch sensitive and the ears are switches, and children can program it using a drag and drop environment in a browser, and then download code that controls the LED screen and connected modules.

Modular littleBits snap together with magnets and are colour-coded for simplicity, so power modules are blue; inputs, such as buttons, switches and sensors, are pink; outputs, which could include lights, audio and moving parts, are green; and orange wires connect external Arduino modules. It's like building with Lego blocks that actually do something. There are littleBits kits with multiple modules and accessories, like the Smart Home kit for internet-connecting existing devices, and the Korg Synth Kit for building modular synthesizers, as well as larger sets of modules designed to equip a whole classroom.

"If you can link programming to music and other things, you open up a whole world of different possibilities that will engage people," Rolfe points out. "It's not about learning skills of

programming because in themselves they're almost pointless: what we should be trying to do is to use the programming to create solutions to problems."

He's keen to see digital literacy as part of all subjects in school, rather than something that's taught in isolation, and Coplin agrees: "I think the push for computer

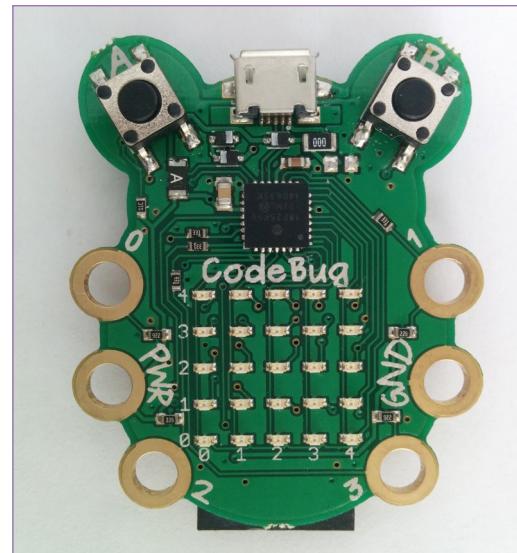
science is absolutely the catalyst for this change, but in itself, it is not the totality of the change we face. The need to solve the 'computer science in schools' problem has driven an awareness in teachers, parents and children alike that technology is the bedrock of our future, but I think schools - and parents - need to do more to connect the dots and help their children use technology to help them achieve more in anything they have an interest in."



Building a robot with littleBits magnetic components.

electricity monitors to pet feeders to automated pill dispensers, extending them with Shields (Arduino) or Raspberry Pi HATs (Hardware Attached on Top). Then there are kits like the Fuze, which put a Raspberry Pi in a case and keyboard, ready to hook up to a screen and start coding in a version of BASIC. Designed for schools, these kits come with support for teachers which includes lesson plans.

If soldering and assembling hardware



The programmable CodeBug looks a bit like a bug and is easy to program in a web browser.

Technology should be something that transcends learning topics, and not a lesson in its own right."

Take maths lessons, where a large part of the curriculum is teaching techniques that computers have made irrelevant: "We need to stop teaching calculating and start teaching maths," claims Conrad Wolfram. Conrad is co-founder of Wolfram Research with his brother Stephen, and together with other mathematicians are pushing governments to shift to computer-based maths education.

Coplin argues that bringing coding into schools as a fundamental skill is a huge opportunity for reaping the benefits of technology more widely, and it's part of what education is all about: "Technology should be considered a gift for everyone, and as such should be one of the ultimate levellers of society. It shouldn't matter what vocation you choose, your life will be enriched if you have access to the basic skills that enable technology to make a positive difference in your lives."

Whether it's a Raspberry Pi hooked up to a weather balloon, building your own musical instrument, or writing a mobile app, the new coding is about teaching children and adults that technology can make the world better.



Find out more

You can find out more on the Grey Matter website at www.greymatter.com/hc/academic. If you'd like to discuss any of these initiatives further, call Grey Matter on **01364 654100** or email maildesk@greymatter.com.



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Inside Data

Graham Keitch finds out what Oracle's Platform as a Service offers.

By its very nature the Cloud is an enterprise environment, offering a distributed, service orientated architecture which places uncompromising demands on availability and security. As a provider of enterprise grade software, Oracle offers an almost unrivalled portfolio of technologies for such an environment. However it appears they've been holding back in the race for domination in readiness for the next phase in the Cloud's evolution.

For many IT departments, the Cloud is delivering benefits but failing to meet expectations, and there's a good reason for this. If you merely port your on-premises systems to the cloud then you risk creating yet another layer of complexity and overheads. Furthermore, legacy systems require modernisation to handle the complex data types and multi-platform client-side technologies used by today's businesses. This expectation and technology

though. Most of the tools and services required for business process modernisation sit above the IaaS layer and instead belong to the next tier, namely Platform as a Service (PaaS). This is where Oracle's strength lies as they already have well tested enterprise grade tools for this. These include developer tools, databases, applications, middleware and other services. Oracle's open multi-platform technologies such as Java and, more recently, support for OpenStack, facilitates migration between on-premise and Cloud without the need for code rewrites, something Oracle claims help dispel vendor lock-in fears. Subscription parameters, for example, are determined by licensing metrics. Services such as Database and Java are generally consumed and costed per user per month and are therefore unmetered, whereas most other PaaS offerings are metered, rather like 'pay as you go' mobile. You create a metered pool of funds which you can then top up as your 'burn rate' eats into it.

NoSQL database services probably sit at the top of most people's expectations of a typical PaaS solution. Oracle does indeed address Big Data requirements but there are a whole raft of other important things that business process

modernisation requires, such as data aggregation, document management and analytics. From a developer's perspective these are common shared tasks that can be handled by connecting applications to the appropriate platform service. This becomes more relevant when systems are distributed and make use of containerised components. It may also be helpful if some of these services, such as Business Intelligence (BI), could be fired up by business staff. This isn't applicable for all platform services but I suspect this will be a trend going forward.

Application development is a good place to start if you want to understand Oracle PaaS in more depth, especially (though not exclusively) if you're working with J2EE, Mobile, JavaScript, REST and other light applications. Oracle's WebLogic Server is the technology behind



Oracle's Java Cloud Service with optional Coherence in-memory data grid functionality. It provides tools for developers with source control, API management and an Application Composer. Many of today's projects involve connecting mobile iOS, Android and HTML5 clients to back end systems. Oracle Mobile Cloud Service provides the tools and frameworks for this via REST/JSON APIs and a common API catalogue. Analytics is included too. Other PaaS developer services include Oracle Java SE Cloud (a sort of JDaaS) and Oracle Application Builder Cloud Service aimed at business users who need simplified connectivity to REST enabled data sources.

Business Intelligence requirements are covered by a number of services. Oracle BI Cloud Service is central to these with many features aimed at supporting mobile BI. The Oracle BI Mobile app provides secure access to all the usual dashboard, analytical and reporting functions. Data sets from multiple locations can be imported and combined using the web-based File Loader. Oracle Database Schema Service and Database Cloud Service complement this by providing access to Oracle Database, its associated PL/SQL development environment and user friendly Oracle Application Express. Document management is another common theme within IT that can be handled by Oracle Documents Cloud Service for secure document access, synchronisation and sharing from any location and multiple platforms. Coupled with Oracle Integration Service and Oracle Process Cloud Service, this can provide monitoring and analytical insight to aid process improvement and productivity.



shortfall points to hybrid architectures being the norm for the foreseeable future. Transportable and distributed computing units based on Oracle's open standards provide maximum flexibility for both hybrid and modernisation projects.

Oracle's Infrastructure as a Service (IaaS) provides the usual compute and storage facilities, and opens new doors for its users. For example, you can move between database editions as the need dictates. This allows you to consume the cheaper Standard Edition when the workload is less intense, and spin-up Enterprise Edition with Options, or Oracle's powerful in-memory database appliance, at peak times. Development projects could also become more economic as they can be based on the cheaper edition.

Infrastructure is only part of the story

Find out more



Graham Keitch is the database pre-sales specialist at Grey Matter and has worked in IT for over 25 years. For further information and advice about database licensing, call him or one of his colleagues on **01364 654100**, or email him at grahamk@greymatter.com.



Straight talking

Tim Anderson finds Microsoft's Office frozen in time, and microservices not all they are cracked up to be.

□ Microsoft released Office 2016 in September. At first glance this is business as usual: we have had new Office releases every three years or so for over a decade, and this edition follows on from Office 2013, Office 2010, Office 2007 and Office 2003. However this time it's a little different.

Office is important to developers for several reasons. One is that it remains, for the most part, the business standard, despite the efforts of the Document Foundation (the group behind Libre Office) and others to promote free alternatives and the ODF (OpenDocument Format) standard. This makes it important to developers who find themselves integrating applications with Office that generate documents for Word or Excel, or creating add-ins that implement custom features.

Office is also significant as a kind of statement of direction from Microsoft. Influential Windows design elements often appear first in Office, such as the Outlook 2003 sidebar, or the Office 2007 ribbon toolbars which are now seen in many applications including Windows Explorer (though they are still not universally popular). Office 2013 was in Microsoft's 'Metro' design era and got all-caps menus and a content-first design, accounting for its washed-out appearance. Another example is the company's championing of XML, which shows up in Office most notably in the Office Open XML file formats also introduced in 2007, but also in products like Office InfoPath, introduced in 2003 and now deprecated.

The direction Microsoft is taking with Office 2016 is instructive. There is so little new that Microsoft, in its publicly posted marketing list of What's New, was in some cases reduced to referring to features that are new "if you upgrade from Office 2010", or in other words, not new at all. Other items apply only if you use Office 365, such as Outlook 2016 Groups and the Clutter folder for low-priority messages, or

only work with Office 365 or OneDrive, such as real-time co-authoring in Word.

The biggest change most users will see in Office 2016 is the return to lower case menus and a more colourful ribbon as Microsoft retreats from the Metro design concept. Yes, Excel has some nice new chart types and an improved PivotTable, tablet users get an ink-to-math Equation editor, and there is a "Tell me what you want to do" command search feature in some applications, but these are hardly major innovations.

If you enable the Developer ribbon in Word, for example, you will see a ribbon identical to that in Office 2013, save for the

introduction of an Add-ins button that takes you to the Office Store, which is not itself new. Click the Visual Basic button and you are right back in the Visual Basic 6.0 era, and will have to remember everything you have forgotten about using the Set statement to assign object references, and when you should or should not use parentheses around arguments passed to functions.

The Office applications are mature of course, but it would be wrong to state that they are not capable of improvement. There is cruft in these old applications, and there are changes users would like to see, such as better handling of paragraph styles in Word, or usability

Microservice tradeoffs

"SOA [Service Oriented Architecture] gives way to Micro Services Everywhere" states an anonymous paper from Apigee, a US company specialising in API management and predictive analytics. The reasons it gives include difficulty in scaling "heavyweight application server architectures", such as those built on WebSphere or WebLogic, and locating complex applications in a single container as creating a central point of failure.

Microservices describes an architectural style where applications are decomposed into multiple services that are independently deployed. This approach is often used in conjunction with containerisation, using tools such as Docker, so that they are isolated and the risk of dependency issues is minimised.

An API company has obvious reasons to promote a style that suits its own services, but the fact that it does so shows the extent to which microservices have become one of today's buzzwords (along with DevOps and containers) for developers in tune with the latest techniques.

The benefits are real, according to Martin Fowler at development company ThoughtWorks, but he also warns of the risks in his article 'Microservice trade-offs'. Microservices are ideal for large teams, since a small group of developers can focus on one piece of the application with considerable freedom in how it is implemented, so it can be optimised for its particular purpose.

But a moment's thought reveals the drawbacks of this approach. It is not really simpler than a single application since you have merely exchanged the complexity of managing components in a single code base with the complexity of a distributed system. "Distributed systems are harder to program, since remote calls are slow and are always at risk of failure," says Fowler.

This may seem surprising, given that ThoughtWorks has been something of a champion for microservices in the past, but it is common sense. Fowler's summary is that "Microservices impose a cost on productivity that can only be made up for in more complex systems. So if you can manage your system's complexity with a monolithic architecture then you shouldn't be using microservices."

That does not mean microservices are bad. However what it does mean is that only a subset of applications and organisations will benefit: a timely reminder that blindly following fashion in software development is never a good thing.

improvements in Outlook and fixes for formatting issues in its email editor, which is in constant use by millions, to mention two examples.

As for Visual Basic for Applications, the developer perspective on this is mixed. Of course Microsoft has VSTO (Visual Studio Tools for Office) which lets you develop in VB.NET or C#, though because VBA is built on COM and runs within the application it tends to perform better than VSTO which relies heavily on COM interop. Excel developers report that the open source Excel-DNA project performs better than VSTO. However the chances of Microsoft putting effort into improving the Office developer story on Windows now look slim as it focuses on Apps for Office, which is about integrating web applications with Office, rather than extending the local application.

There is a positive side to having Office and VBA to some extent frozen in time, which is that custom solutions built on these technologies should continue to work. Microsoft's support system means that because VBA is part of the current version of Office, it will be supported long into the future, despite being built on code from the Nineties.

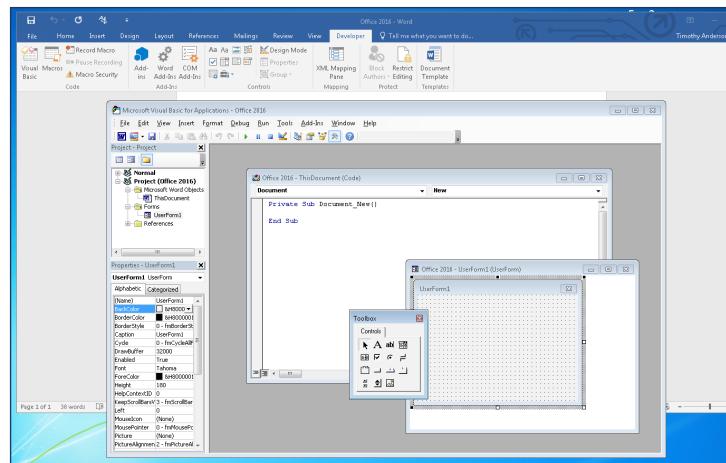
The arrival of a new version of Office with

only light changes does not mean that the Office team has been idle. On the contrary, it has delivered a large number of new products over the last couple of years, of which the highlight must be Office for iPad, released in March 2014 and regularly updated since. It was followed by versions for iPhone and Android, as well as Office Mobile for Windows 10 and Windows Mobile 10). In addition, Office 2016 for the Mac appeared in July 2015, and is closer to its Windows counterpart than Office 2011, though the implementation of VBA remains inferior.

Microsoft's investment in Office 365, and the increasing number of Office 2016 features that depend on it, is also relevant. Although Office 2016 looks increasingly like legacy as a developer platform, that is not true of Office 365 and the closely related Azure Active Directory, used by all Office 365 logins and available for developers to use in their own applications.

The problem with developing a solution based on

desktop Office 2016 is that it will only ever run on Windows and perhaps (with some effort) on Mac, whereas building on Office 365 and creating cloud-based productivity solutions can be used from any platform. Microsoft itself appears to be focusing on that for its future, so for developers integrating with Office the message seems to be either to adapt to a cloud-based, cross-platform solution built around Office 365, or live with the current tools in Office 2016.



Microsoft's shiny new Office remains, in some ways, frozen in time.

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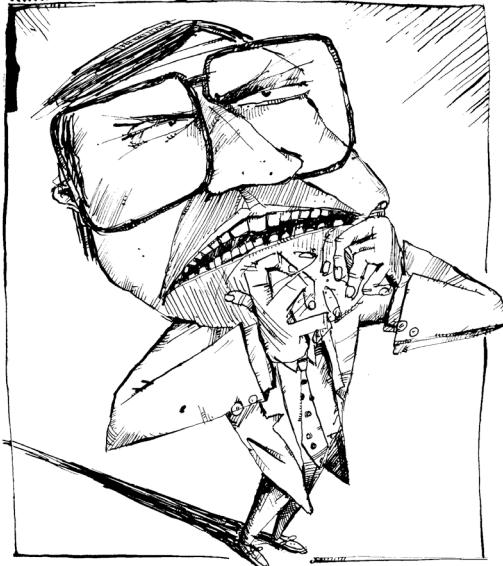


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So Microsoft has finally pulled its head out of its [expletive removed] and decided it's time to get real. You might baulk at that description. But it is as clear as I can be when I think that the Beast Of Redmond has decided what it is going to do, and how it is going to do it. Of course, the big unknown is whether the customer base will agree and go along with the plan. But with no plan, there are no customers anyway.

Indeed, I would go as far as to say that this is the first time that Microsoft has had a coherent user/desktop/mobile/app/developer plan for the thick end of 15 years. Which co-incidentally is around the time when Gates gave up, no doubt frustrated by his inability to spend quality time with every single product group and to keep all their plans in his head at once as Microsoft ballooned in size and complexity. And when Gates gave up, he walked and installed his trusted sidekick Ballmer in place.

"This is a confident Microsoft, a Microsoft that now knows where it's going and how it is going to get there"

I know that it's easy to be right after the event, but I still strongly believe that Ballmer was the wrong guy for the job. The efforts made to keep Microsoft in one piece were probably a bad idea, and he lorded over more than a decade of mismanagement. The only reason the Good Ship Microsoft kept sailing is because of momentum. Windows 2000 with Active Directory had just come out, and it solved real customer needs in the SMB and corporate

...and another thing

Jon Honeyball is actually quite impressed by what Microsoft had to say at its New York Windows 10 devices event.

space. This pushed Windows even more firmly to the desktop, and in their eyes a home user was just a pro user without a data centre.

Almost everything else they touched caused pain: the money poured into Xbox; the inability to keep Microsoft Research under control and to bring near and mid-term solutions to the foreground. Nothing Apple did with iPhone was magical, it was simply the bringing together of the right emerging technologies at the right time. Microsoft was wholly incapable of doing that then, and it is only now that it can move forward.

Why? Because Ballmer and his cohorts have gone, and Nadella is sweeping through the buildings, bringing a clarity, humility and enthusiasm to the place which was wholly lacking under Ballmer's reign. I'm sure others will claim that Ballmer's time was a high point, that he did all the right things. For myself, I cannot follow that line. There are way too many craters in the road recently travelled for that view to have any traction with me.

So, to the announcements. This is a confident Microsoft, a Microsoft that now knows where it's going and how it is going to get there. A Microsoft that has focus, and when Microsoft gets focus, it can be deadly. Just look at what it has done with virtualisation, for example. For the first few years it was like a drowning cat. Then it got its ideas together, all the ducks in a row, and the Hyper-V strategy has been a killer. Not enough to uproot VMware from everywhere, but good enough for most people most of the time.

And it has finally decided to do that with its desktop OS and development strategy. Up until now I have paid scant regard to the Windows Phone business. Back in the days of Windows CE, its phones were interesting if somewhat gawky products that relied too much on a toothpick. But they were ahead of their time. iPhone and Android pulled the rug out quite comprehensively and Microsoft's

answer under Ballmer was to flail around like a drowning fish. Windows Phone 8 and its variants were simply not enough, and the hardware was weak. Then Microsoft bought Nokia and all the partners walked away. Now in the Nadella era, it has finally decided why Windows on a phone is a good idea.

It's not for software lock-in. It's not to stop customers using iOS and Android, by ensuring Office would only be on Windows phones. That nonsense stopped dead in its tracks when Ballmer was shown the door. Now I can run Microsoft Office, in some form or another, on my iPhone, my iPad, my Android phone, my Android tablet, and on my Windows tablet. And now on my Windows phone as well.

Software magic

But that's not enough. No, with Windows 10 Mobile (or whatever it ends up being called) I can plug in an interface box, and connect to that a desktop monitor, keyboard mouse and Ethernet cable. All of a sudden I have a full-featured phone on my desk and full screen Windows apps running on my desktop screen, independently of the phone which is still fully operational.

Suddenly the software magic behind 'Continuum' makes sense, and suddenly I see a way in which I could be simply carrying around a phone which I hot dock into a workstation framework both at home and at work, and my world travels with me. After all, a modern smartphone is more than capable of holding its own in terms of CPU and storage power against a workstation of a few years ago, and is probably light years ahead in terms of GPU capability. So why not use this as an engine for a simultaneous desktop experience?

If the business world agrees, this could become the killer Bring Your Own Device solution and the ultimate portable device for those on the move. Of course, the proof is in the pudding – just how well does a Nokia Lumia run

a relatively full-featured Windows desktop on a 27-inch screen? Does it judder and fall apart at the seams when you make a phone call at the same time? How hot will it get when the CPU is pushed hard? All of these issues will need answers, but the underlying concepts are sound enough to make the effort worthwhile.

And this explains the work Microsoft has been doing with developers to help make self-resizing intelligent apps that allow the UI to move into different places and adapt to the size of the screen. What works on a 5-inch phone screen is not what you want on a 27-inch desktop, and what works well with touch on a phone isn't the same as a mouse-centric desktop either. But the new world order of building 'Metro' apps brings all these questions to the foreground, and the new Windows 10 phones with their docking capabilities are the platform on which answers will be sought. For the first time in a very long time, I am actually enthused about Windows Phone.

The refresh of the Surface range into the Surface Pro 4 was entirely expected, including the use of the latest Intel chipsets. So nothing really new there. However the Surface Book does open Microsoft to new areas. After all, the high-end Windows laptop market is somewhat

of a nuclear wasteland these days. The price of Windows laptop devices has continued to plummet, and there is really no margin left in them. Even the manufacturers of higher-end products like Samsung have withdrawn from the marketplace,

although it is very hard to know how much of their pain was actually self-inflicted.

It could be argued that Microsoft has had no alternative but to do Surface Book, to try to establish that there still is a high-end laptop market for Windows 10, and that a well-considered and designed item could fulfil the roles of both laptop and tablet when required, in a way that the Surface Pro 4 cannot, despite its other strengths.

This two-tier approach, with the Lumia phones at the bottom, is certainly intriguing. However it wouldn't have been a Microsoft event without some other bits and pieces, of

Safe Harbour

It was many years ago when Editor Nicholson and I first got our teeth into the web of lies, misinformation and sheer wishful thinking that surrounded Safe Harbour and other such fantasies peddled by the global American-based software and cloud services vendors. My favourite was the claim that my data held in the Microsoft Dublin datacentre would not be open to an attack by the US Government via the Patriot Act, a claim which was finally refuted to my face by the highest level of Microsoft executive one evening in a bar in Redmond, who told me, "Of course we would hand it over, we would have no choice." The latest bombastic privacy concerns from Microsoft are all well and good, but my heart leapt when I heard that the European Supreme Court had decided that Safe Harbour wasn't worth the paper it was written on. One small step in the right direction – hopefully TTIP won't be six in the wrong.

course. The VR system appears to be getting better and better, although clear answers about the field of view in the real headset are still not easy to come by. The price is, however – some \$3,000 for the HoloLens prototypes in the Spring of 2016, which is expensive enough to deter the dabbler and even the schools marketplace, and leave things to the hard core developers. That's fine for a first wave, but first wave needs to become a much wider second wave as quickly as possible, otherwise it ends up looking like a niche product that no-one ever actually used, and history is littered with too many such corpses already.

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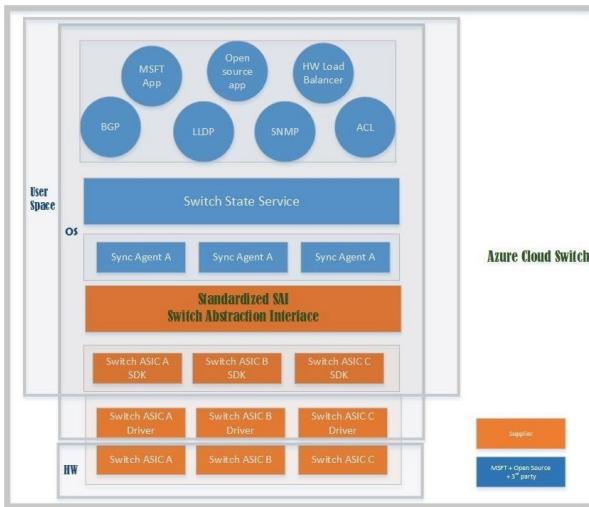
Short cuts

Paul Stephens takes a sideways look at the world of IT.

Irresistible

Top of the 'irresistible' pile this issue was the story headlined 'Microsoft builds Operating System based on Linux'. Sadly this didn't turn out to be a red-hot revelation about the kernel in Windows 11, but instead an item about the New Microsoft being a rather good citizen in the arcane world of datacentre switching systems, not only saying "let's face it everyone, Linux is the best choice for a job like this" but also donating a hardware abstraction layer to the Open Compute Project (founded by, of all people, Facebook).

We clearly live in interesting times: not that long ago we'd have thought that Microsoft building an OS on Linux was about as likely as Volkswagen fitting hastily-outsourced Hyundai diesel engines to its Golfs, but now the former has happened and, given recent events, we wouldn't bet against the latter being announced by Christmas. Linux, of course, has a special place in Microsoft history as the bête noir of former CEO Steve Ballmer, who described it as "communism", a label he didn't intend as a compliment. Although Steve did grit his teeth long enough to allow Linux to be hosted on the Azure platform, there's no way he'd ever have allowed the Red Menace to underpin anything with 'Microsoft' and 'Operating System' in its description, even if it had been camouflaged under the innocuously non-Windowish title of 'Azure Cloud Switch'.



This kind of thing would never have been allowed in Steve Ballmer's day.

Call us swivel-eyed conspiracy theorists (*If you insist – Ed*), but here at Short Cuts we can't help seeing the fingerprints of new CEO Satya Nadella all over this, as a golden opportunity to slam the door firmly shut on the Ballmer era presented itself. We can (feverishly) imagine the conversation over at Microsoft's Azure Networking team HQ:

"So Satya, we need a bespoke OS for our Azure switches. The good news is that the new scalable Win 10 is a shoe-in for the job, and using it

would reinforce Windows' credentials in the embedded market, so everyone wins."

"No, build it on Linux. Here's a cover-mount DVD from 'Linux Fanzine' magazine with a distro from some startup in Albuquerque – rip the kernel out of that and we'll deal with the legal stuff later. Then someone get me Steve Ballmer's direct line at the LA Clippers – and Linux Fanzine's email address."

Poor Steve would be spinning in his grave if he had one, but he hasn't (we're glad to say), so the Clippers' sin bin will have to do. And remember – you heard it first here at Short Cuts!

Organised chaos

It's good to see that some of the organised chaos of the Ballmer era still survives at Microsoft, despite the new regime's ruthless attempts to replace it with sensible cooperative strategies and other faddish ideas. For a good while now the company has been promoting its cloud-delivered Office 365 suite as the best way to make sure you're always going to be up to date with the latest Office features and applications, but with the launch of Office 2016 this summer, things didn't quite work out that way.

First to get Office 2016 – in boxes rather than from the cloud – were users of Mac OS X, which was something of a slap in the face to all those who'd stuck loyally with Windows through thick and, er, Vista and 8.0. The first Windows customers to experience 2016's new features were those who bought boxed copies in late September, something of a slap in the face to people who'd subscribed to Office 365 on the promise of having first dibs at new Office features. And when the 365 download floodgates finally opened they turned out to be more of a rusty tap, with customers willing to wait for Microsoft to auto-update them told that they could still be waiting early next year (giving a literal, if unwelcome, meaning to the term 'Office 2016').

To compensate, Microsoft has told its Office 365 customers that it is 'shifting the cadence' of 365 updates so that in future they won't have to wait for new Office editions at all, as new features will be released to them on a monthly basis. From some vendors that could be taken as meaning 'we're giving up beta testing', but from New Microsoft we're sure it doesn't.



Steve Ballmer may have a new career as owner of the Los Angeles Clippers basketball team, but at least some of his spirit lives on at Microsoft.



Let's hope it doesn't come to this for Office 365 customers.

- The Spirit of Ballmer also survives over at the Visual Studio team, who recently announced a free Community edition of VS 2015 designed to appeal to community project developers, then immediately announced a free source code editor (VS Code, a fork of GitHub's Electron) designed to appeal to community project developers even more. Top work, as is the continued availability of Visual Studio Online, which despite its name isn't actually a version of Visual Studio, but instead a cloud-based edition of Team Foundation Server. Mad Dog would be proud.



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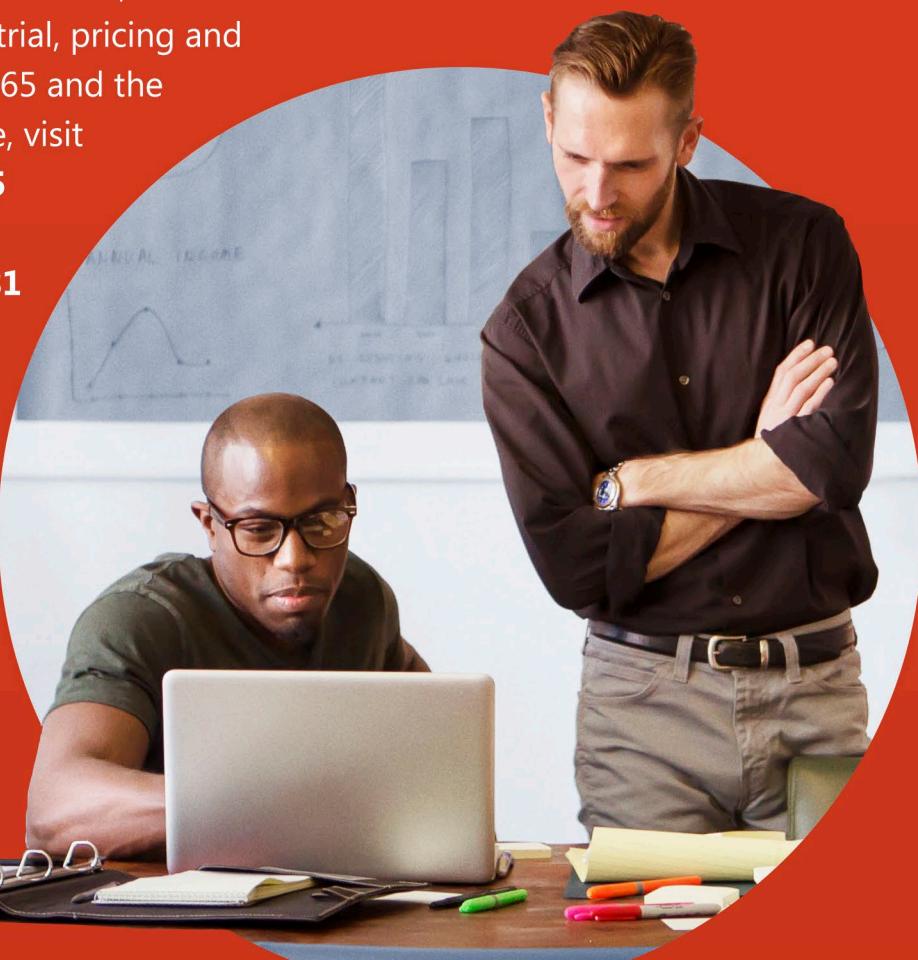
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