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SQL Server 2014

Microsoft's flagship database offers new ways to access and analyse your data, wherever it may be stored

Managing the classroom

Software for schools and colleges

Tooled up

Visual Studio 2013 plug-ins for faster coding



NETOP See page 8
for details
GIVEAWAY

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Welcome

Editorial

Editor: Matt Nicholson
Technical Editors: Sean Wilson, Paul Edwards
News Editor: Paul Stephens
Publisher: Andrew King
Contributors: Tim Anderson, Simon Bisson, Mary Branscombe, Jon Honeyball, Graham Keitch, Paul Stephens, Simon Williams
Design and layout: Jason Stanley
Illustration: Sholto Walker
Web Design: Jason Stanley

Advertising & Circulation

Marketing: Anna Roach, Emma Cottle, Ash Khagam
Tel: 01364 654100
Email: marketing@hardcopymag.com

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Grey Matter Limited
Prigg Meadow,
Ashburton,
Devon, TQ13 7DF, UK
marketing@hardcopymag.com

grey matter
software know how

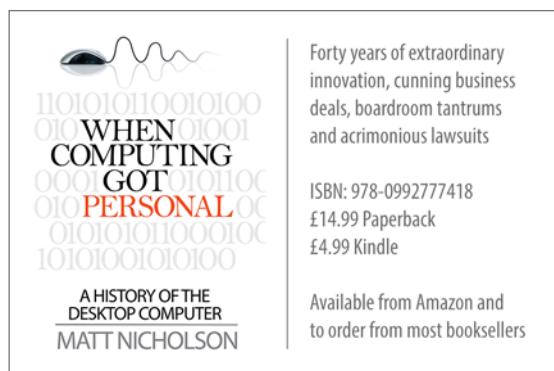
When we look back at the first few decades of the 21st century, in a couple of decades from now, what will be our take on the Internet? Like most people, I have always assumed that it will continue to grow, getting faster and more ubiquitous as technologies develop, and burgeoning with endpoints as the Internet of Things comes online, but essentially the same as now. However recently I have begun wondering whether the view might be somewhat different: that instead we will look back with fondness at an era when the Internet blossomed, before falling apart, an inevitable victim of the machinations of governments and corporations.

The Internet was recently described by Vladimir Putin as a "CIA project", and he does have a point. It did indeed originate in a US government funded project to link organisations involved in the Cold War and the Space Race. However those organisations included the Stanford Research Institute, the University of Utah, MIT and Harvard, where the students who went on to create many of the technologies we now take for granted were given unprecedented levels of funding to research almost anything they wanted.

Military communications moved to MILNET in 1983, and then in the late 1980s, once what remained had developed into something capable of handling the traffic, the process of "commercialising and privatising" began. What we now call the Internet was officially opened for "private and business use" in 1992, and the first websites appeared shortly after. Thanks to the original investment of US taxpayers' money, and the relatively enlightened manner in which it was handed over to the private sector, we now have a network that spans the globe and has in general been driven by a desire to create a level and secure playing field for everyone.

However that network is now under threat. Snowden's revelations reveal that not only the National Security Agency but intelligence agencies around the world have been 'hacking the Internet' with gay abandon, often with the cooperation of the companies that run it. As *The Economist* stated in its article 'The Snowden effect' (24 Jan 2014), "the big consequence ... will be that countries and companies will erect borders of sorts in cyberspace." Then there is the Federal Communication Commission which is looking to allow broadband companies to charge companies for higher speed connections, so creating a multi-tier Internet that gives priority to big business. And finally there's the shadowy Trans-Pacific Partnership which has designs on our freedom of speech and right to privacy. These are complex issues which makes it difficult to raise awareness, but unless we do, we won't know what we stood to lose until it's already gone.

Matt Nicholson, Editor, *HardCopy*



WHEN COMPUTING GOT PERSONAL
A HISTORY OF THE DESKTOP COMPUTER
MATT NICHOLSON

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

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Software News

Kaspersky launches safe browser for Windows Phone

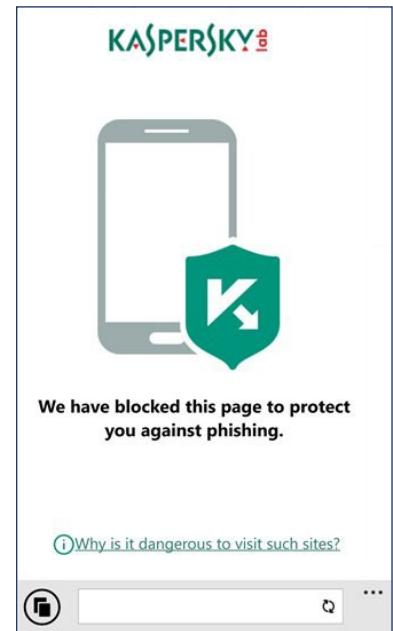
Kaspersky • www.greymatter.com/publisher/kaspersky-lab-uk

 Moscow-based security specialist Kaspersky Lab has added to its growing mobile app portfolio with the release of Kaspersky Safe Browser for Windows Phone, a web browser featuring real-time phishing protection and content filtering. Back in the data centre Kaspersky has upgraded its Security for Linux Mail Center offering, adding new filtering and threat detection techniques plus full integration with the company's Security Center cross-network management console.

Kaspersky Safe Browser runs on Windows Phone 8.0 and later, and uses real-time information from the cloud-based Kaspersky Security Network to identify and block new phishing sites and other threats. Meanwhile parental controls allow blocking of sites by categories such as pornography, violence and social networking, with Kaspersky suggesting that it should be added to Kid's Corner, the

special safe children's area on Windows Phone devices. The new browser follows a version for iOS released last October, and the company is rumoured to have a Windows Phone version of its comprehensive Internet Security for Android suite currently in certification.

Maintenance Pack 1 for Kaspersky's Linux Mail Security package includes integration with the Kaspersky Security Network, improving the detection of spam and phishing links. New URL analysis techniques provide further protection, especially where legitimate senders have been recently compromised. Meanwhile a new mail filtering option allows blocking or limiting of mass mailings even from legitimate sources not flagged as spam. Kaspersky Security for Linux Mail Server is now visible from the company's Security Center central administration console, while existing web console and command-line interfaces are still supported.



Embarcadero brings C++ to Android

Embarcadero • www.greymatter.com/hc/Embarcadero/

 Tools vendor Embarcadero has released RAD Studio XE6, a new version of its multi-language, write-once-compile-for-many development suite which it claims is the first to offer C++ development across Windows, Macintosh, Android and iOS platforms. The suite also includes help for Windows VCL developers moving to mobile and from Windows XP, as well as improved cloud

connectivity and in-app purchase support.

In a separate move, Embarcadero has launched Appmethod, a Firemonkey-only (non-VCL) version of RAD Studio for developers targeting mobile without legacy considerations.

RAD Studio XE6 comes hot on the heels of last spring's XE4 and autumn's XE5 (see Hard Copy issue 61), adding the promised cross-platform C++ app compilation to its existing Delphi capabilities. Embarcadero includes Android 4.4 (KitKat) and wearable devices such as Google Glass and on its list of deployment targets.

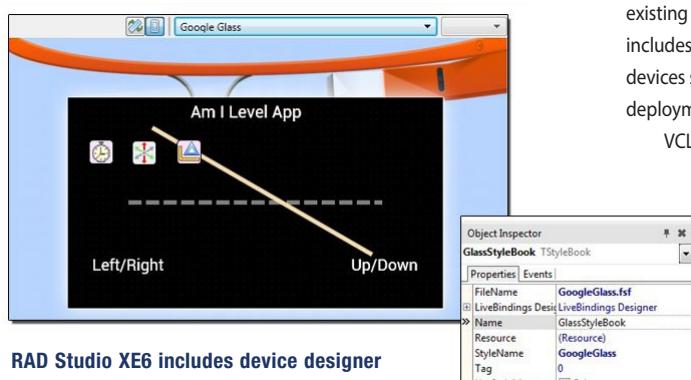
VCL developers wondering how to port to mobile are helped by new App Tethering components which allow 'companion' apps on mobiles to interact remotely with existing Windows applications, while Delphi VCL apps running on Windows Tablets get device sensor components including GPS and

accelerometer. New VCL components also allow developers to give Win XP apps a Win 7/8.1 look and feel with multi-windowing and taskbar interaction, as well as delivering 64-bit versions of 32-bit apps.

RAD Studio XE6 includes components for integration with BaaS (Backend-as-a-Service) providers Kinvey.com and Parse.com, including push notifications, storage and user authentication.

Also new are features for in-app purchase and advertising on iOS and Android, with support for ad networks including Google AdMod and Apple IAd.

- Shortly before the RAD Studio XE6 launch, Embarcadero announced Appmethod, a tools suite aimed at developers who are focussed on mobile and don't need support for VCL. Using the RAD Studio IDE and compilers, it's available on subscription only, and currently supports Delphi only for cross-platform development, although C++ is promised soon.



RAD Studio XE6 includes device designer templates for Google Glass apps.

Intel adds Windows hosting for System Studio 2014

Intel • www.greymatter.com/Intel/

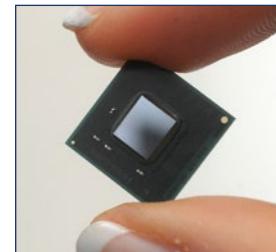
 A year ago Intel launched System Studio 2013, a Linux-based compiler-and-tools suite for developing embedded systems which added support for Intel's Core and Xenon processors to the company's previous focus on Atom chips. Now it's released System Studio 2014, with new features including Windows versions of the tools, new target platforms including the Yocto Project and Intel's Tizen joint-venture OS, and new target hardware including Intel's Quark low-power "Internet of Things" (IoT) processor.

Intel System Studio 2014 includes C++ Compilers for embedded Linux and Android

(both version 14.0), Integrated Performance Primitives 8.1, Math Kernel Library 11.1, the VTune Amplifier 2014 performance analyzer and Inspector 2014 memory/thread analyzer, GNU and JTAG debuggers and SVEN event tracer. Target OS coverage is improved with support for Intel's Wind River Linux 4.0 to 6.0, the Yocto Project 1.5 embedded Linux system builder, Android 4.0 to 4.4 and Tizen 1.0, the version of the Intel/Samsung joint venture mobile OS aimed at In-Vehicle Infotainment applications.

New processor support includes the latest Intel Atom E3000 and Z3000 (Bay Trail) and

C2000 (Avoton) chips, fourth generation Core (Haswell) and the 32-bit, energy efficient Quark X1000 (Clanton) System on a Chip aimed at wearables and other ultra-portable applications. Other new features include automated Eclipse integration, improved OpenEmbedded compatibility, btrace support in the GNU debugger, Android NDK R9 integration and new signal processing features in the Performance Primitives library. The Windows versions of the tools require Windows 7 or later.



Intel's low-energy Quark X1000 System on a Chip.

Acronis targets VARs with Backup as a Service

Acronis • www.greymatter.com/hc/Acronis/

 Massachusetts-based data security vendor Acronis has launched Backup as a Service, a cloud-based, multi-platform backup and disaster recovery system aimed at service providers and value added resellers who want to integrate backup capabilities into their cloud and Infrastructure as a Service (IaaS) offerings. Key features include flexible storage, physical/virtual server support, co-branding options and a pay-as-you-go business model with no upfront commitments.

Acronis Backup as a Service is managed

from a web-based control panel which allows end users to define departments and backup management roles. Backups can be made to Acronis Cloud or to service providers' own storage, and the system can be white-labelled or co-branded. Costs are based entirely on usage, with no minimum revenue or licence period commitments. The Service is based on Acronis's AnyData and Backup Advanced cross-platform technologies, and supports Windows and Linux plus VMWare and Hyper-V hypervisors. Technical training and marketing

support for service providers is available from Acronis.

"Our usage-based service eliminates upfront investments," said Rene Oldenbeuving, Acronis's general manager of Cloud business. "Costs only increase when revenue increases, giving service providers a competitive solution that puts them on equal footing with the biggest cloud businesses. Add in our proven image technology and you have one of the only file-based recovery and bare metal recovery offerings in a single cloud solution."

CA launches "first management cloud for mobility"

CA Technologies • www.greymatter.com/hc/CA/

 Hot on the heels of selling its ERwin data modelling package to Embarcadero (see overleaf), New York-based CA Technologies has shifted its focus firmly to mobile with the launch of Management Cloud for Mobility, a portfolio of three cloud-delivered suites covering mobile device management, mobile application development and the emerging Internet of Things.

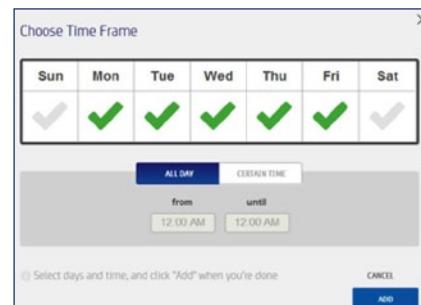
CA's Enterprise Mobility Management suite uses the company's Smart Containerization technology to secure mobile devices, applications and data, with features including access control policies, file synchronisation and secure access to enterprise data repositories and email systems. The system also supports

geofencing and timefencing, remote app locking and wiping, risk monitoring and remote control of apps.

The Mobile DevOps suite aims to accelerate the delivery of custom mobile apps. CA Layer 7 API Portal simplifies the publication of secure remote APIs for use by in-house and external applications, while CA Layer 7 Mobile Access Gateway provides authentication and datacenter protection. CA LISA Test for Mobile provides an "exhaustive" list of user scenarios for web and mobile app testing, while CA Lisa Service Virtualisation provides simulated mobile app environments.

CA describes its Enterprise IoT (Internet of Things) Suite as coming "in the near future".

saying that it will "enable enterprises to deploy Internet-connected devices and eventually manage and secure billions of machine-to-machine (M2M) interactions." CA is offering flexible purchase options for the various Management Cloud for Mobility components.

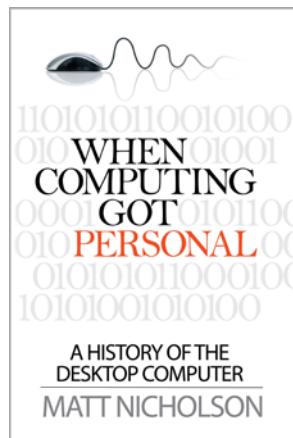


News in brief

The greatest story ever told!

Ever wondered who really invented the GUI, or how mainframe giant IBM set the standard for personal computers, or how Steve Jobs managed to turn Apple into the world's most profitable company? The answers to these and many more questions are all in a new book by *HardCopy* editor Matt Nicholson.

It's no dry textbook. Instead Matt tells a story, starting in the early 1970s and populated by visionaries, geeks, hard-nosed businesspeople and the occasional wheeler-dealer, as they do battle armed with technology that's doubling in capacity every couple of years. *When Computing Got Personal* is available from Amazon or to order from most booksellers. Recommended price £14.99 in paperback or £4.99 on Kindle, ISBN 978-0992777418.



Embarcadero buys CA Erwin data modelling package

Development tools vendor Embarcadero has purchased the CA Erwin data modelling tool from CA Technologies. CA Erwin traces its roots back to the late 1980s and is widely regarded as the leading data modelling system. Its installation alongside Embarcadero's own ER/Studio package will make data modelling the largest part of the company's business. Meanwhile CA (formerly Computer Associates) will concentrate on core markets including IT Business Management and Security across mainframe, distributed, cloud and mobile.

Grey Matter on the road

In February, Grey Matter ran a highly successful Visual Studio event at Microsoft UK's offices in Reading, while the end of March saw GM

partnered with Microsoft, Intel, Flexera and Embarcadero for DevWeek 2014 in London. Closer to home in Exeter, Grey Matter supported SQL Saturday, a two-day (it actually started on Friday) event of over 30 training sessions



organised by the South West chapter of the Professional Association for SQL Server (PASS).

Grey Matter will be at the 2014 Device Developer's Conference in Bristol and Cambridge between 20 May and 5 June, and at DDD South West, a free one day technical event organised by developers for developers in Bristol on 17 May.

GFI Cloud helps you patch things up

GFI has updated its award-winning GFI Cloud security suite, with enhanced performance monitoring and extra patch management features. Administrators can now monitor CPU utilisation, memory and

Competition Winner

The winner of issue 62's competition prize, a Samsung Chromebook Wifi courtesy of Grey Matter, is Andy Hodgson. Well done, Andy!

disk performance, and use more powerful reporting tools including policy violation alerts. The service's patch management system now supports 20 additional third-party applications, including the US National Vulnerability Database's 12 most vulnerable applications in 2013. Aimed at SMEs, GFI Cloud is managed using a web-based console.

Microsoft gets Personal with new Office 365 subscription

Microsoft has launched Office 365 Personal, a new subscription to its cloud-based productivity suite that allows use on a single computer (PC or Mac) plus a single tablet (Windows or iPad). The new package slots in below the five-user Office 365 Home Premium offering, which is renamed Office 365 Home. Both products include 60 minutes of free international Skype calls per month and 20 GB of additional OneDrive storage.

Oracle boost for Windows Azure and Hyper-V

Under a new Enterprise Partnership between Oracle and Microsoft, Oracle software is now available on Microsoft's Windows Azure cloud platform, and officially certified and supported on Windows Hyper-V virtualisation. Oracle Database (11g and 12c), Oracle WebLogic Server and Java (JDK 6 and 7) can either be installed on Windows Azure using customers' own Oracle licences, or bought as licence-included virtual images from Microsoft, with Oracle support available in both cases. Oracle Linux is also now officially supported on Azure and Hyper-V.

SAP goes super-size with world's largest data warehouse

Business software giant SAP has taken big data to the extreme by building the world's largest data warehouse. The 12.1 PetaByte (12,390 terabytes) installation was built using SAP's HANA in-memory computing platform and IQ relational database, running on HP DL580 servers under Red Hat Enterprise Linux. To ensure its credentials are beyond doubt, the system has been independently audited and officially recognised by *The Guinness Book of Records*.

PRTG scoops multiple honours at Network Computing Awards

This year's Network Computing Awards in London proved to be a good night for network management specialists Paessler AG, who scooped two awards plus a runner up position. Its PRTG monitor suite was voted not only Network Management Product of the Year but also Product of the Year overall, beating industry giants Dell and IBM in the process. PRTG also came second in the 'Testing and Monitoring Product of the Year' category.

Conduisiv makes acceleration easy to manage

Conduisiv Technologies has released V-locity 5, a version of its disk I/O acceleration package aimed at physical and virtual servers and sporting a new management console with asset management and reporting built in. The Windows-based, software-only system uses cacheing and write optimisation to achieve performance gains from 50 to 300 percent or more. A simplified installation system can deploy to multiple servers in just five clicks, and reporting includes email alerts based on customised application performance profiles.

Now Available

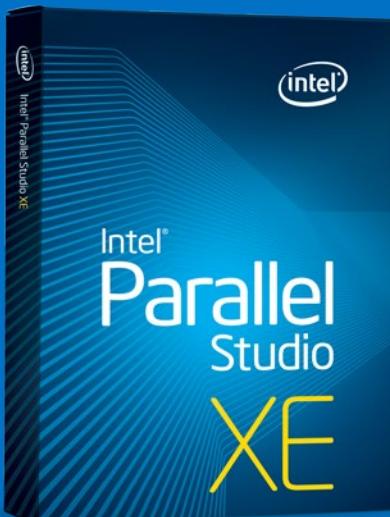
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The Intel Volume Licencing Programme is available with Intel Parallel Studio XE and Intel Cluster Studio XE for new and existing customers.

For more information on the Intel Volume Licensing Program and to find out about pricing please call 01364 654100.



Access a free 30 day trial of Intel Parallel Studio XE and start experiencing the next-generation of software development tools – visit: www.greymatter.com/hc/intel-trial

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The Intel Volume Licensing Program is only available for agreements over \$15,000 or payments of \$5,000 per year.

WIN a 32GB iPad Mini WiFi from Netop!

One of the strengths of Netop's classroom management software is its ability to work with the Apple iPad, so our prize is particularly appropriate. This 32GB iPad Mini WiFi comes with a 7.9-inch Retina display driven by the new 64-bit A7 processor, and plenty of apps whether you're at work, at play or in the classroom.

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

Netop iPad Mini Competition
Grey Matter Ltd
Prigg Meadow
Ashburton
Devon TQ13 7DF

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



entry form

issue 63
 iPad Mini WiFi

Question: Which of the following is NOT a feature of Netop Vision 8?

- A: Remote shutdown and wake-up
- B: Showcase a student's screen
- C: Remote student alarm clock

Answer:

Your details

Name _____

Company _____

Address _____

_____ Postcode _____

Telephone _____

Email _____

- I would like to receive *HardCopy* magazine.
- Please send me information on products or services that I might find useful (note that we keep your information private and will not sell or rent your data for marketing purposes)

Are you working for an educational organisation?

- Yes
- No

If yes, what is the name of the organisation?

How many laptops and computers are there in your organisation?

Do you currently use any remote classroom computer control software?

- Yes
- No

If yes, what software do you use?

TERMS AND CONDITIONS OF ENTRY

1. No purchase necessary for entry to this competition.
2. The prize is one 32GB iPad Mini WiFi (colour may vary from that shown). There is no cash alternative.
3. Completed entries must be received by Friday 25 July 2014.
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. Winner will be announced on Monday 28 July 2014 and notified by email or telephone.
8. The judges' decision is 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. Netop and 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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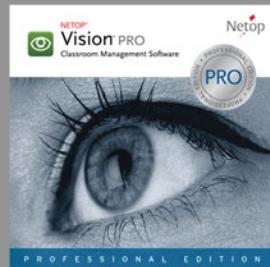


Vision Pro combines powerful classroom management features with tools for blended learning and flipped classrooms that improve educational outcomes in today's digital learning environments.

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Create assessments anywhere, run quizzes during class time, or assign tests outside of the classroom. The Vision Pro Learning Centre provides automatic scoring, and compiles results data in easy-to-use reports. Easily accessible from the Vision Pro navigation bar, no installation required.

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Share your PC screen with student iPads and tablets.





SQL Server 2014

Tim Anderson checks out the latest version of Microsoft's flagship database.

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, vnunet.com, IT Expert and ITJOBLOG, as well as his own popular blog at www.itwriting.com.

SQL Server is Microsoft's flagship database product and has been a key part of the company's platform for over 20 years. It comes in multiple editions ranging from a free Express edition, limited to 1GB RAM and 10GB maximum database size, up to the Enterprise edition which is limited only by the operating system and supports a wide range of features for scalability, high availability, management, integration, data analysis and reporting. The language of SQL Server is Transact-SQL (T-SQL), and on the programmability side there is support for .NET stored procedures. There is also PowerPivot for Excel for modelling and analysing data.

SQL Server has always been a robust and fast relational database engine, and Microsoft has carefully evolved the product to scale to today's high data volumes and business analysis requirements. The new version has two areas of particular focus. One is a huge new feature, namely in-memory OLTP, which can speed up queries by a factor of 30 in certain scenarios. Real-world examples tend to give less spectacular but still worthwhile speed improvements. The other important feature is its extensive integration with Microsoft's cloud platform, Azure.

In-Memory OLTP

Codenamed 'Hekaton', in-memory OLTP (On-line Transaction Processing) is more than just SQL Server with its data all held in memory. It is better to think of it as a new in-memory database engine that supports a substantial subset of T-SQL, and has the ability to compile stored procedures to native code for a further performance gain.

The reason Microsoft needed to create a new database engine is that such techniques require a different approach. A disk-based engine copies data from disk into memory, does something with it, and then saves it back to disk. By contrast, the Hekaton engine knows that all its data is already in memory and can be accessed directly. The engine is optimised to

use new algorithms that no longer need to take disk reads and locks into account. Indexes are also in-memory and can be hash indexes rather than the usual B-trees. Optimistic concurrency means that waits and locks are minimised.

In-memory tables still comply with ACID (Atomicity, Consistency, Isolation, Durability) unless you specify non-durable tables. Non-durable tables are useful for certain scenarios, such as real-time reporting where you might not need to store the data permanently. Otherwise, the in-memory engine returns data to disk in the form of a transaction log and checkpoint streams, which between them enable recovery in the event of a problem such as unexpected loss of power.

You can mix in-memory and disk-based tables in a single database, and query across them. The main requirement is that you add a memory-optimised filegroup to the database. Once you've done that you can create tables WITH (MEMORY_OPTIMIZED=ON). If you want a non-durable table, you can add DURABILITY=SCHEMA_ONLY.

There are a few downsides to in-memory tables. One is that they have to fit in memory. Microsoft suggests having twice as much memory as the size of your data. If memory runs out, there is no failover to disk;

transactions simply stop working. You can use the SQL Server Resource Governor to assign and control the amount of memory a database can use.

In addition, the total size of all durable tables must not exceed 250GB, and Microsoft states that systems should have no more than 4 processor sockets and 60 cores for optimal performance.

Another issue is that only a subset of T-SQL is supported for in-memory tables. Most existing stored procedures will need some porting effort, as will tables that you move to in-memory. For example, IDENTITY columns are only partially supported, FOREIGN KEY, CHECK and UNIQUE constraints are not supported, ALTER INDEX does not work, SELECT INTO is not supported, and so on. Microsoft has a list of problem keywords and suggested workarounds at [http://msdn.microsoft.com/en-us/library/dn246937\(v=sql.120\).aspx](http://msdn.microsoft.com/en-us/library/dn246937(v=sql.120).aspx).

Finally, in-memory OLTP is only supported in the Enterprise or Developer editions of SQL Server. This makes the new features in SQL Server 2014 rather thin in the other editions.

Despite these limitations, the potential speed increase from in-memory OLTP is such that users will be able to live with some issues in this first release.

The screenshot shows the Azure portal interface for creating a new storage account. On the left, a sidebar lists options like Storage, DB, SQL Database, etc. In the center, a 'NEW' section shows icons for Storage, HDInsight, Cache, and Recovery Services. To the right, a 'QUICK CREATE' panel is open, containing fields for URL (set to 'sqlserver2014'), Location/Affinity Group (set to 'North Europe'), Subscription (set to 'Windows Azure MSDN - Visual Studio Ultimate'), and Replication (set to 'Geo-Redundant'). At the bottom right of the panel is a 'CREATE STORAGE ACCOUNT' button with a checkmark.

Creating an Azure storage account for a SQL Server database.



Integration with Azure

A key feature of SQL Server 2014 is its integration with Microsoft Azure. There are several ways you can do this.

One, which sounds odd at first, is the ability to create and attach a database whose files reside on Azure blob storage. You can do this using SQL Server either running on-premise or from an Azure virtual machine (VM), although it is more the latter scenario that Microsoft has in mind, since attaching SQL Server files over the Internet gives poor latency. That said, smart caching means that performance can be tolerable, and let you easily transfer data in or out of Microsoft's cloud.

Used in the context of SQL Server running on Azure VMs, blob storage does have advantages. This approach avoids Azure additional disks, and uses the virtual network driver directly to access the database files, increasing the available IOPS (I/O Per Second). It is also easy to detach database files from one SQL Server instance and attach them to another, enabling high availability, which is particularly useful since failover clusters are not supported by Azure VMs.

There are some limitations too. In-Memory OLTP is not supported, FileStream (data which resides in external files rather than in the database files) is not supported, and Azure blob storage cannot use geo-replication. The maximum size of a single file in blob storage is 1TB, though you can use as many blobs as you need.

You implement SQL Server data files in Azure by generating a key string called a Shared Access Signature, which gives limited access to Azure storage, and storing this in the SQL Server credential manager. Once done, you can simply use the URL of the blob storage as the filename for database files in T-SQL. There is also an option to encrypt the database for security using Transparent Data Encryption (TDE).

SQL Server 2014 also has new support for instances running on Azure VMs, without the use of blob storage. A Deploy SQL Server Database to Windows Azure VM wizard walks you through the steps and will even create a new VM. There are some preparatory steps, such as setting up an Azure management certificate or downloading a publish profile and opening the necessary management port on Azure.

Backup to Azure is a feature introduced in SQL Server 2012, but now enhanced. Using Backup to Azure, you can backup or restore using Azure blob storage. The main requirement is simply an Azure blob storage account. You can use T-SQL, or select 'Back up to URL' in the Management Studio Back Up Database wizard.

A related feature is Managed Backup. This is

SQL Server licensing options

There are six editions of SQL Server, each of which can be licensed in various ways.

The first licensing model is server plus CAL, where you buy a license for each server installation and a Client Access License (CAL) for each user or device accessing the installation. One CAL covers multiple SQL Server editions up to the version of the CAL, so a 2014 CAL allows you to access SQL Server 2012 or 2008, but not vice versa.

Alternatively, you can license SQL Server per CPU core. You buy a license for each core in the server, with each physical processor considered to have a minimum of 4 cores. No CALs are required. SQL Server Enterprise Edition can only be licensed per core.

Installing SQL Server on a virtual machine brings more options. You can license with server plus CAL (for editions which support this), or you can license per core, based on the number of virtual cores, again with a minimum of four per VM. Alternatively, you can fully license the host server or server farm with Enterprise Edition core licenses and Software Assurance (SA), in which case you can run unlimited VMs with SQL Server. This last option is the best for a private cloud.

For more complex scenarios, contact a licensing specialist such as Grey Matter for advice.

SQL Server Enterprise is the premier edition with many exclusive high availability and scalability features, including always on availability groups, mirrored backups, hot add memory and CPU, table and index partitioning, resource governor, and the hot new in-memory OLTP. You also need the Enterprise edition for high performance adapters for Oracle, Teradata, SAP and others, high performance transforms such as fuzzy grouping and lookup transformations, and data warehousing features including xVelocity memory optimised columnstores.

Enterprise has a maximum database size of 524 Petabytes (equivalent to 524,000 Terabytes). Memory and compute capacity is defined as "operating system maximum". Licensing is per core only.

The **Business Intelligence** edition is designed for data analysis and reporting, and has some features for which you need either this or the Enterprise edition. These include full Reporting Services, Master Data Services, Data Quality Services, Tabular BI Semantic Model features, PowerPivot for SharePoint, Data mining features such as cross validation, advanced data mining configuration and tuning, parallel model processing and sequence prediction.

This edition is limited to 128GB memory per database engine instance, and the lesser of 4 CPU sockets or 16 cores, but there are no other compute limits. Licensing is Server plus CAL only.

The **Standard** edition is designed for general purpose use with the same core engine and T-SQL language, and many of the same management tools as Enterprise. It has Failover Cluster support for 2 nodes only, replication support, full programmability, Multidimensional BI Semantic Model, basic data mining tools and basic reporting services.

The Standard edition is limited to 64GB memory per database engine instance and the lesser of 4 sockets or 16 cores. Licensing is either per core, or server plus CAL.

The **Web** edition is designed for third party service providers hosting web applications. It has the same compute and RAM limits as the Standard edition, and similar features though with some restrictions, such as subscriber-only replication, and no BI or Data mining support. Licensing is only available through a Services Provider License Agreement (SPLA).

The free **Express** edition is for small-scale applications and websites, and is limited to a database size of 10GB, 1GB RAM per database engine instance, and the lesser of 1 socket or 4 cores. The Express edition with Advanced Services includes full text and semantic search, SQL Server Data Tools and basic Reporting Services.

SQL Server Developer Edition has the same features as the Enterprise edition, but is licensed only for development use. Licensing is per-developer. There is also ISV Royalty Licensing For ISVs and SIs building unified solutions on SQL Server.

a service accessed from SQL Server Management Studio, and is aimed at small businesses needing a simple solution for off-site backup. Managed Backup is built into SQL Server 2014 using stored procedures and also relies on the SQL Server Agent. Presuming you have set up an Azure blob storage account, you can run the wizard and simply specify a retention period (default 30 days) in order to have the service backup all databases to Azure. There is also an encryption option.

The documentation states that "The type of backups scheduled and the backup frequency is determined based on the workload of the database." Looking in more detail, this include a full database backup at least weekly, and a transaction log backup every two hours, or more often if the database is particularly active.

You can monitor managed backup by running queries using specified stored procedures, and by enabling Database Mail and configuring email notifications. If you set it up using T-SQL you can configure Managed Backup per-database, rather than to backup up all databases.

Managed Backup works for both on-premise SQL Server and instances running in Azure virtual machines, but it is particularly recommended for Azure virtual machines since latency is low.

Clustered Columnstore Indexes

Microsoft introduced columnstore indexes in SQL Server 2012. Columnstore indexes are in-memory indexes that are oriented column-wise, which is more efficient for

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Choosing the right Edition

	Standard	Business Intelligence	Enterprise	Developer	MSDN
Target Users	General purpose database applications, same core SQL Server engine.	Data analysts, business users needing advanced reports.	Advanced applications, larger businesses, private cloud.	Application developers.	Application developers using SQL Server with Microsoft tools and resources.
Unique features	Management tools, full programmability, basic data mining tools, basic reporting services, Failover Cluster support for 2 nodes only.	Full Reporting Services, Data Quality Services, PowerPivot for SharePoint, Data mining.	No memory or CPU limits, In-memory OLTP, always-on availability, data warehousing, full partitioning support and more.	All the features of Enterprise Edition but licensed for test and development only.	Download any edition of SQL Server for test and development.
Considerations	Some compute and memory limits. no in-memory OLTP.	Must be licensed Server+Cal. Some compute and memory limits.	Only choice for commercial user of full-featured SQL Server.	MSDN may be better value if you need other Microsoft resources. No commercial use.	Developer access to all SQL Server editions comes with all Visual Studio with MSDN subscriptions, and with MSDN Platforms.

selecting only a few columns from a table. They are best suited for queries which scan the full table, typically for data warehouse applications, rather than queries which fetch only a small subset of data. In the right application, they can boost performance by up to ten times. Another advantage of column-wise indexes is better data compression, since values in each column tend to be similar.

The columnstore indexes in SQL Server 2012 are non-clustered and cannot be updated, other than by completely rebuilding the index. Non-clustered columnstore indexes can be combined with other indexes, and can be configured to index a subset of the columns in the table.

New in SQL Server 2014 Enterprise edition is the clustered columnstore index. This is an

updateable index that is also the primary storage method for the table. It must index all columns and cannot be combined with any other index. Like the nonclustered columnstore index, it is an in-memory technology capable of excellent data warehouse performance.

Another way of looking at this is to view a clustered columnstore index as a specialist in-memory table type suited for data warehouse queries and updates. You create a clustered columnstore index from an existing row-wise table, at which point the table is converted. If you then drop the index, SQL Server converts it back to a row-wise table.

Although they are updateable, clustered columnstore indexes become fragmented over time if updated, so a periodic index rebuild is recommended.

Worth upgrading?

The 'What's new' list for SQL Server 2014 is dominated by the in-memory OLTP feature, which can deliver remarkable performance benefits, provided that you have the Enterprise edition and a suitable application. This makes it a must-have upgrade for those who can use it, but less compelling otherwise, although improved Azure integration is also a significant benefit.

The updateable clustered columnstore index is an important data warehousing feature. Another feature worth a mention is the Buffer Pool Extension, which lets you use SSD (Solid State Drive) storage as extra memory.

The core of SQL Server is little changed in this release, and while that is no bad thing considering what a solid product it is, it does make this a minor release in the event that you are not in a position to make good use of the big new features – especially for Standard edition users for whom some new features do not apply.

None of this takes away from the excellence of the product, which has a broad and deep range of features as well as strong performance.

The screenshot shows a web interface for the 'Fabrikam Entertainment Simulator'. At the top, there's a navigation bar with links for 'what's hot', 'kinect', 'sports', 'action', 'other', and 'educational'. Below this is a section titled 'Battle Stuff' featuring a thumbnail for 'KINECT FUN LABS' and a game titled 'BATTLE STUFF'. A message indicates a purchase was completed in 0.115 seconds. To the right, there's a performance dashboard with three circular gauges: 'Order Throughput' (17x), 'Recommendation Latency' (14x), and 'Hitlist Update Latency' (60x). Each gauge includes a note about the applied in-memory OLTP technology.

In-memory OLTP, combined with native code stored procedures, can deliver remarkable performance improvements.

Find out more

More details on the Grey Matter website at www.greymatter.com. To discuss your database requirements further, call Grey Matter on 01364 654100 or email maildesk@greymatter.com.



Project management

Going beyond email – Mary Branscombe looks at tools for getting everyone doing the right thing at the right time.

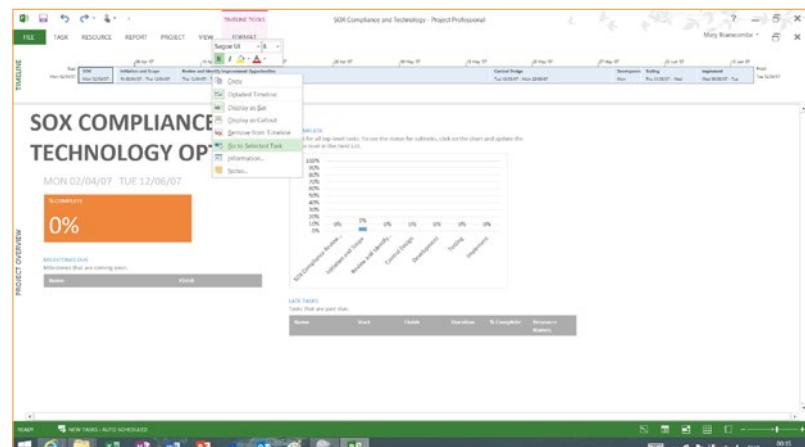
MARY BRANSCOMBE

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's also the editor of IT Expert magazine.

maryb@hardcopymag.com

Project management isn't as specialist as you might think. Almost every business needs to manage projects that have to be completed by a specific time, fit specific needs and have specific people working on them, whether that's shipping a product, moving offices or changing Internet provider. Getting such projects done on time and on budget is beyond the scope of a simple to-do list. It involves handling requirements and constraints and changing priorities, working out which competing ideas are possible and which will be the most valuable to the company, tracking how different parts of a project are going, and keeping everyone updated.

That doesn't mean you want to put full-power project management tools on everyone's desk. Not only can that be prohibitively expensive, but you don't want to make an executive who only needs to monitor progress on a number of projects wade through



The uncluttered interface of Project 2013 includes an at-a-glance project overview.

an interface designed for juggling details. Instead you want a system that lets you communicate the costs, goals and progress of a project, and the availability of the people involved to everyone who needs to be up to date.

But those who are running projects do need to work with detailed calendars; they do need to assign resources and manage conflicts, measure progress and track what's changed, see multiple projects and consolidate them if necessary, and possibly manage a whole portfolio of projects in a co-ordinated way. They also need to be able to give managers their schedules, get the latest costs for the finance team, and give their bosses the strategic overview, and that means being able to check whether everything is on track and on budget – and if not, why not.

Meanwhile, those working on projects need to see their allotted tasks, fill in timesheets and flag up problems, both before and after they happen, preferably without leaving the tools they're actually working with. Executives and strategic planners need a portfolio view

where they can see costs, constraints and potential results across multiple projects, allowing them to set priorities at a higher level and have that cascade down to specific projects and workers. And all of this needs to be done not necessarily in the same tools, but in a set of tools that work together seamlessly and give you the features you need, rather than swamp you with everything that's possible.

Furthermore, with the increasing drive for mobility and collaboration between partners, suppliers and customers, you need to look at cross-platform tools and may want to consider a cloud-hosted system that can make it easier to get everyone connected.

Oracle Primavera P6

At the high end are large-scale portfolio management packages such as Oracle Primavera P6, which has optional modules for risk analysis and contract management and can integrate with Oracle enterprise applications, including cost control apps and enterprise document management. There's also an API for customisation, and if you want more than the

Oracle's Primavera P6 has a complex interface for setting up projects, but the iOS apps for users are somewhat simpler.



integrated reporting you can add the Primavera P6 Reporting Database to export information to your existing business intelligence tools.

Although Primavera P6 Enterprise Project Portfolio Management 8.3 runs on premise, it's a Java server and (unlike older versions of the software before Oracle bought it), you work with it through a web interface rather than desktop applications. There is a free Primavera Team Member app for iOS and Android to let users to view and update schedules, plus a web view optimised for use on tablets where you can also delegate tasks.

Mindjet ProjectDirector

At the opposite extreme, Mindjet has a version of its mind mapping software called ProjectDirector that lets you draw projects as connected maps of tasks on virtual whiteboards, linking in files stored on cloud services such as Box or OneDrive. You can still allocate tasks and see calendars and a 'health view' showing if the project is on track, but this is a much more free-form way to input projects.

ProjectDirector builds on the project management tools already in MindManager, which lets you import Word documents or drag emails, tasks and contacts in from Outlook (via MindManager Server) to build a project plan. You can also import from Microsoft Project to get a new way of looking at your project, or export the plan you make in MindManager to Project when it's time for formal project management.

Microsoft Project 2013

Microsoft Project Professional 2013 is the latest version of the best-known and longest surviving project management tool, available as desktop software and as a cloud service that integrates with a wide range of other Microsoft tools. There are also multiple viewers and third-party tools that work with the Project file format.

Project 2013 shares the uncluttered interface of other Office 2013 products, and although there are plenty of new features, the emphasis is on collaboration through integration with other Microsoft tools, and through the cloud. You get the choice of using just the desktop client (if you have only a couple of users), letting multiple Project users collaborate through SharePoint, running Project Server to give you web access as well, or paying monthly for the Project Online version. This runs on Office 365 and comes with your choice of web-only access or standard and professional versions of the Project application, which you can stream on demand to PCs that you're using temporarily.

The new Project Overview makes it easy to

Choosing a Solution

Product	Cloud support	Strong points	Target users
Microsoft Project 2013	Project Professional 2013 is available through Office 365 as Project Pro	Full-power project management with strong built-in reporting tools that go from fast overview to full detail	SME & Enterprise
Microsoft Project Server 2013	Available as Project Online on Office 365, with project or portfolio management options. On-premise version includes Project Web App	Friendly SharePoint interface. Goes beyond sharing projects to full collaboration. Strong integration with other Microsoft tools from Lync to Power BI	Midrange, enterprise
Seavus Project Viewer	Integrates with Project Online. Share projects on GoogleDrive and OneDrive	Budget option for viewing and simple updates. Strong compatibility	SME
MindManager	MindManager Server installs on Sharepoint, or you can use the simpler Mindjet Connect cloud service. ProjectDirector has cloud integration for importing files	A very visual way of working that includes resource estimation and Gantt charts	SME
Oracle Primavera P6	No, but web interface	Scales up to the largest and most complex projects	Enterprise
Team Foundation Server	No, but web access shows key information and lets you access code	Code repository with collaboration tools, including Azure, that integrate with many Microsoft products	Midrange, enterprise
Visual Studio Online	Basic and Professional subscriptions available	Code repository and collaboration tools in the cloud. Integrates with Visual Studio, Eclipse, Xcode, MSDN subscribers can join projects without charge	SME, enterprise

check the state of a project, while the new reports for dashboards, resources, costs and tasks in progress give inexperienced users the most useful toolset, without having to drop out to Excel or Visio as was necessary with previous versions. There's even a project to teach you how to run projects, if you're starting one from the standard templates. Visualising events is much easier too: instead of only being able to highlight the critical path, you can now colour-code different levels of importance, so you can see at a glance all the tasks that are OK to slip, for example.

You might still want to drop into Excel, though. For example, you can use Excel's Power Pivot and Power Query to make burn-down charts showing how much you have left to do before project end date. Project also integrates with Lync, so you can check whether a participant is free to talk, then send a text

message or make a VoIP call straight from Project. However the most important integration is with SharePoint.

The Project Web App that comes with Project Server and the Project Online service looks remarkably like SharePoint – which is not surprising as that's what it's built on. The latest version of SharePoint itself also has basic project management features built in. As well as the familiar SharePoint tasks, team sites include timelines showing how those tasks fit together in a schedule.

And you can blur the lines between SharePoint and Project even further. If something you've been managing as a SharePoint task list starts to get too complicated and you need more control, you can use Project Web App to turn it into a full project. You can create a workflow in Visio or SharePoint Designer to choose how you want



The screenshot shows the Project Center interface in Project Online. At the top, there's a ribbon with tabs like 'New', 'Open', 'Add SharePoint Site', 'Build Team', 'Resource Plan', 'Check In My Projects', 'Zoom In', 'Zoom Out', 'Scroll to Project', 'View Filter', 'Outline', 'Group By', 'Type', 'Data', 'Timeline', 'Share', 'Export to Excel', 'Print', 'Subprojects', 'Time with Date', 'Change', 'Add Project', 'Add Tasks', 'Print', 'Show/Hide', and 'Project Type'. Below the ribbon, there's a sidebar with links for 'Projects', 'Approvals', 'Tasks', 'Resources', 'Strategy', 'Driver Library', 'Driver Prioritization', 'Portfolio Analyses', and 'Reports'. The main area displays a Gantt chart with tasks like 'Health Assessment Reporting Tool' (3/12 - 3/15), 'General Ledger (GL) currency update' (1/12 - 8/13), 'Payroll System Upgrade' (7/24 - 2/21), 'Apparel ERP Upgrade' (1/29 - 3/30), and 'Merger and Acquisition Deal Room' (3/28 - 4/19). Below the Gantt chart is a table with columns: Project Name, Project Department, Owner, Total Cost, Total Benefits, ROI, and a grid of dates from 6/9/2013 to 6/16/2013. The table shows two main categories: 'Type: Infrastructure & Deployment' and 'Type: Marketing Campaign'. The 'Infrastructure & Deployment' section includes 'Apparel ERP Upgrade' (Finance, Pavel Bansky, \$3,681,338.00, \$8,091,997.00, 5.16) and 'General Ledger (GL) currency update' (IT, Denis Denehne, \$664,118.00, \$2,220,997.00, 2.34). The 'Marketing Campaign' section includes 'Lync 2013 Enterprise Deployment' (IT, Pavel Bansky, \$1,000,000.00, \$1,350,000.00, 0.35), 'Payroll System Upgrade' (IT, Sara Davis, \$997,220.00, \$1,351,000.00, 0.35), 'Acquisition Target Analysis' (Sales & Marketing, Alex Darrow, \$860,000.00, \$1,800,000.00, 1.09), 'Catalog Publishing' (Sales & Marketing, Denis Denehne, \$435,000.00, \$1,430,000.00, 2.29), 'Content Filtering Design and Implement' (Finance, Pavel Bansky, \$839,348.00, \$3,265,005.00, 2.89), 'Customer service feedback portal' (Sales & Marketing, Bonnie Kearney, \$910,000.00, \$3,290,000.00, 2.62), and 'E-commerce to Manager' (Sales & Marketing, Robyn Cowart, \$834,000.00, \$4,315,000.00, 0.43).

The Project Web App interface in Project Online is similar to the desktop Project interface, but simplified.

approvals to work, rather than having to do it in Project. But you can still look at the project as if it were a SharePoint site, and you can use information from Project to create business intelligence reports using the Office 365 Power BI service.

That means a business manager can outline the stages of a project and set the project rules. The project manager can then take over without having to recreate it all, and the business manager can still keep an eye on how things are going.

A decade ago, project management software was the preserve of the experts. Now, with its web interface and a more straightforward set of reporting tools, Project 2013 has become a general-purpose business tool. If you're running it all in house you can let people work in SharePoint or Project as they prefer, while in the cloud, being able to mix and match subscriptions for basic features and full portfolio management on Project Online lets you keep the costs down, as well as giving users the appropriate tools. There's even a new Project Lite subscription for users who only need to create and assign tasks, fill in time sheets and see schedules.

More and more of those users will be on mobile devices. Microsoft doesn't yet have a Project client for iOS or Android, or even for viewing projects on a Windows 8 tablet. However, if you have Project Server or Project

Online, you can use the Project Web App in any browser to create projects, view and update tasks, approvals, project summaries and calendars, and view reports.

Because Project Server and Project Online are now so closely integrated with SharePoint, the SharePoint app model works, so you can write your own add-ins or get third-party

Project apps from the Office Store (and you can run that as a controlled company catalogue so you're in control of licensing costs).

The Project ecosystem

There are also many third-party apps that give you views of your project, sometimes with basic editing capabilities. For example Seavus Project Viewer is available in the Windows Store, and on volume licensing from Grey Matter, as well as for Windows, Mac and Android devices, and there's a free view-only web version. Seavus doesn't have all the features of Project but it lets users view projects, including charts and tables, and edit their own tasks. You get a similar ribbon interface, and you can open projects from older versions right up to Project 2013 and Project Online, and then share them through SharePoint, Google Drive or OneDrive. You can even share projects directly with other Seavus users without having a server.

The rich ecosystem that's grown up around Microsoft Project, and the popularity of the Project file format, means that you can use a mix of Microsoft and third-party products to give different users the tools they need to participate in projects.

Managing software projects

Microsoft Visual Studio is increasingly including tools to help with software project management, primarily through integration with Team Foundation Server (TFS) and Visual Studio Online.

Visual Studio 2013 introduced the team room feature. This is a permanent chat room where programmers in different locations can leave each other questions. It also added CodeLens, a 'heads-up display' of information about your code. Update 2 comes with a new version called the Incoming Changes Indicator that shows you changes happening in other branches of the codebase, without you having to leave your code.

If you want to co-ordinate a team more closely, TFS gives you a source code repository, using either Team Foundation Version Control or Git, so you can audit changes. It includes tools for collaboration in Team Explorer, ranging from team rooms to marking work items with tags and creating charts that show how your backlog is split between bugs and new features. It also supports Agile techniques like Kanban boards and burndown charts. TFS has a Web Access view that lets you see source code, backlogs, builds, tests, team rooms and other useful information, without having to launch Visual Studio itself.

You can connect TFS to Project so you get much more accurate estimates for the development stage of a project. TFS integrates with Project Server workflows, so if a manager sets the duration for a task and the developer changes that in TFS, the new time propagates back to the Project Server approval workflow.

Having the durations and completion dates coming direct from the live system means project planning can be much more accurate, and it's easier to see straight away when things are getting off schedule. You can also use TFS for collaboration with managers and the business teams. If you're under pressure to deliver more than you can actually fit in, you can expose your backlog and start a discussion about what's achievable.

The cloud version of TFS is Visual Studio Online. The basic Visual Studio Online plan includes Visual Studio Express, while the professional plan gives you a monthly subscription to Visual Studio Professional. Visual Studio Online is particularly good value if several of your developers have MSDN subscriptions for Visual Studio, as they can join Visual Studio Online projects without paying an extra monthly fee.



Find out more

Full details for all these products are available on the Grey Matter website at www.greymatter.com. 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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Tooled up

You can code better and faster by adding plug-ins to Visual Studio. Simon Bisson looks at some of the tooling for .NET and C++ coders.

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

Microsoft's Visual Studio IDE is not just a proprietary tool for building .NET and native code on Windows and Windows Phone. It's an extensible platform that lets you add support for new languages, for delivering apps to additional platforms, and for managing cloud services. This is down to its Visual Studio Industry Partner (VSIP) programme which gives third parties access to the Visual Studio IDE, allowing them to integrate their own tools and features into Visual Studio.

With VSIP extensions you can be building Ruby on Rails apps, driving Azure, and working with a source control platform while delivering a UI on an iPad, all from the same familiar IDE. So why not use extensions to improve the way you code? There's plenty of scope here: tools to help you make your programs more secure, tools to help you refactor and rework your code, tools to help you deliver applications that take advantage of the multi-core, multi-processor

world we live in.

There's an ever growing array of VSIP partners and extension developers, and it's likely to grow as Microsoft continues to open source key Visual Studio elements through its .NET Foundation. That includes its new Roslyn compiler, which opens up the internals of the compiler to tools, giving you new and better ways to visualise changes to code, and the ability to quickly test and debug sections of code as you write them.

Tooling for .NET

The release of Roslyn at BUILD 2014 marked something of a resurgence in the fortunes of .NET, which had languished as Microsoft pushed development of WinRT applications for Windows 8. But now WinRT and .NET apps can work together, and there's even the option of delivering native .NET code. At last the future for .NET is clear. And it's not just Windows that's

benefiting; Microsoft's relationship with cross-platform .NET vendor Xamarin is going from strength to strength, letting you build .NET apps that run on iOS and Android, as well as Windows.

Microsoft's own .NET tooling is powerful, but not perfect. So how can we go about making Visual Studio better for .NET developers? One option is JetBrains' ReSharper, which works to improve your code across the whole range of .NET languages and associated technologies.

One of the more important features of ReSharper is its on-the-fly code quality analysis. It'll monitor the code you're writing, whether it's for a XAML C# application or an ASP.NET web app with CSS and client-side JavaScript, letting you know if your code contains errors or can be improved using any of ReSharper's other capabilities. You're not limited to just the code you're writing either, as ReSharper is aware of the files that make up a project, and the structure of the code in those files. You can jump to any place in your code at any time, and track specific variables, functions and types throughout your code.

If ReSharper spots an error in your code it warns you, and at the same time provides quick-fixes that can help solve problems before they affect your application. Its helpers go a lot further, with a whole range of add-ons. Some extend Visual Studio's IntelliSense code completion tools, while others handle code transformations and importing namespaces – or simply keeping your code tidy and making sure you have access to the right documentation.

Keeping code tidy isn't just about making it more readable – though that helps when you're handing code over to co-workers or to test and production. It's also about handling coding standards when working as part of a team, and making sure that you don't clutter up

A screenshot of the JustCode Errors tool interface. The main window shows an HTML file with syntax highlighting and error markers. A tooltip for a missing closing bracket error is displayed. Below the editor, tabs for Design, Split, Source, and several navigation icons are visible. At the bottom, a toolbar shows 'JustCode Errors' with '3 Errors' and '183 Warnings' buttons, and a search bar. A detailed table below lists the errors found in 'HTMLPage1.htm':

Description	File
HTML: Missing '>'	HTMLPage1.htm
HTML: Missing '>'	HTMLPage1.htm

Telerik's JustCode identifies a missing bracket.



Intel Parallel Studio XE 2013

Most development support extensions for Visual Studio are platform agnostic, in that they can be used with Intel, AMD, and even ARM processors. That's not the case with the latest release of Intel's Parallel Studio, as it's most definitely targeted at Intel's own silicon, with the intent of helping you build code that can take full advantage of all the features offered by the current generation of multi-socket, multi-core motherboards. If you're building large scale mathematical modelling or simulation apps, you're going to need a tool to help you fine tune your code to get the absolute best from your silicon. It's also cross-platform, so you can use it to build apps for Windows or for Linux.

Parallel Studio includes not just diagnostic and language tools. There's also three new compilers: one for C++, one for C and one for Fortran. There's no compiler support for .NET languages, which run through a JIT compiler (though there is some C# support in Parallel Studio's analysis tooling). Instead the compilers and language features in Intel's tools are targeted at native code, with libraries that aim to help you get the most from multi-threaded applications.

The most important part of the suite is Advisor XE, a threading prototyping tool. You can use this to analyse your code and determine where you'll get the most performance boost from parallelism, and to highlight where you might get thread synchronisation issues.

Intel's libraries make writing parallel code easier. This is especially the case for its core Threaded Building Blocks library, which in conjunction with graph-based design tools simplifies the process of implementing key parallel-programming algorithms. While you can always write your own parallel libraries, using proven industry standard tools makes a lot of sense, especially when they're designed to work well across multiple processors and multiple cores. Threaded Building Blocks come with tools for working with shared memory and for handling scheduling, allowing code performance to scale as you add cores and memory.

You can get additional performance from your parallel apps with another Parallel Studio module, VTune Amplifier. This analyses your code, profiling a range of languages with parallel constructs, including C, C++, C#, Fortran and Java. It will even work with assembly language. VTune Amplifier collects GPU as well as CPU data, and will help you sort and visualise its results. There's also the option of working outside the IDE to automate tests, and to collect data from remote servers.

Finding problems in parallel code can be an issue, as it can be hard to replicate the conditions which cause a crash. Intel's Parallel Studio includes tools for finding threading errors, in the shape of Inspector XE. Used in conjunction with existing compilers and debugging tools, you can isolate intermittent and non-deterministic errors, as well as monitoring the system heap. Used with Intel's compilers you also get support for static analysis and pointer checkers, which can help ensure application security.

Intel Parallel Studio is a powerful tool, and one that's well worth considering if you're building large and complex parallel processing applications. While you might not yet use it for consumer apps, it's worth considering for cloud services, and for large and complex mathematical modelling and simulation apps – so ideal if you're building code for oil exploration or for Formula 1 teams.

an application with unused code.

ReSharper is probably best known for its refactoring tools. These automate the process of identifying sections of code that can be refactored – identifying methods that can be shared, or elements that can be split into smaller methods. The result is code that's easier to maintain and easier to extend, especially if it's refactored to take advantage of common design patterns. ReSharper's built-in unit testing tools ensure that refactored code maintains functionality, keeping applications running while you rejuvenate your legacy code.

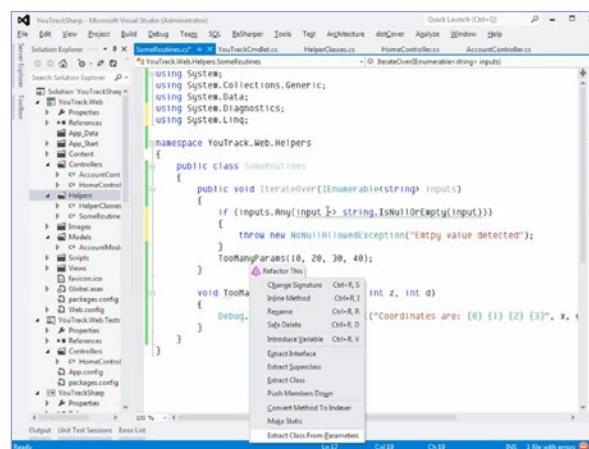
Telerik is probably best known for its UI tools, but it also offers a range of tooling to help you write code. Its JustCode Visual Studio

extension is a suite of tools that aid with various common coding problems. The result is a powerful tool with one aim: to make you a better coder, and save you time. You'll find it useful if you work on different test machines, but want a consistent development environment wherever you are: settings are stored in the cloud and applied to all your JustCode installs.

One of JustCode's key features is the ability to quickly navigate around your code. With many projects now targeting multiple platforms (something that's going to become more common with the arrival of Windows Universal Apps), there's a need to quickly get to the right symbol and to the right error. You can also jump

straight to the implementations of an interface, or to the type of an expression, so you can ensure you're using them consistently.

Coding standards are an important part of making sure application development is consistent throughout an organisation. Telerik's tools help enforce those standards, with the ability to ensure formatting is consistent through all your and your colleagues' files. It doesn't just handle spacing and line indentation; it also manages just how code constructs are ordered, as well as automating the creation of Using directives in your code.



A helpful suggestion from JetBrains ReSharper

JustCode helps you customise the Visual Studio environment. It can colour-code code elements that aren't managed by IntelliSense's colourings, making them clearer and easier to spot amongst hundreds or thousands of lines of code. It'll even close braces for you automatically, so you don't have to go back and check to find just where you left out a set, and giving your code a chance to compile first time! JustCode's formatting tools will also automatically format your code when you close a set of braces.

Making code easy to read and understand is a perennial problem, especially if you've been working on an app for some time. How about getting rid of unused code? JustCode will highlight unused sections of code, allowing you to quickly remove dead code that only makes your code unreadable. Similarly it identifies types that are missing, and prompts you to add the appropriate Using statement. It'll even help rename files so names match types they contain, making it much easier to go right to the file that contains the class you want to edit, or share with another project.

There's also integration with other Telerik tools, including the JustTrace profiling framework. Using JustTrace in conjunction with JustCode's unit tests means you can make app performance part of your test cycle; after all,



```

Assert.IsTrue(new Realm("http://localhost:33532/dab").IsSane);
Assert.IsTrue(new Realm("http://www.myopenid.com").IsSane);

Assert.IsFalse(new Realm("http://" + ".com").IsSane);
Assert.IsFalse(new Realm("http://" + ".co.uk").IsSane);

[Test]
public void WithinRealmTests()
{
    Run Tests
    Debug Tests
}

```

NCover's tools help you create effective tests.

slow code that passes unit tests will still need reworking to pass user acceptance!

PostSharp takes a different approach to helping you write code, guiding you in working with Aspect Oriented Programming and automating certain key design patterns. It's a technique that helps identify common code elements that can be shared across different applications. Such common code elements or 'crosscuts' are called 'aspects'. Taking crosscuts and embedding them in aspects makes it easier to write business logic that is clearer and easier to understand, with much of the repetition handed over to aspects.

You do need to change the way you think about code to use PostSharp, but it's a beneficial change. Once installed it works alongside the Visual Studio .NET compiler to handle the deployment and compilation of aspects, including obfuscating aspect code in applications that you plan on sharing. There's support for automating certain key aspect patterns, for example aspects that handle exceptions. Aspects are implemented as attributes on a method, with the associated code applied on compilation. That way you get the benefits of the code, without having to write it.

One advantage of Aspect Oriented Programming is the ability to declaratively apply aspects to a range of methods with a compiler directive. This lets you use aspects in your code without having to modify existing code; an approach that makes PostSharp an

ideal tool for adding instrumentation and exception handling to applications. Other common code that can be implemented as aspects include role-based security, ensuring only the right user gets access to specific functions and data.

NCover's tools add code coverage to Visual Studio. Understanding what code has been tested, and more

importantly, what code hasn't, is an important part of ensuring code quality. If you can see the code that isn't being tested, then you're in a position to write better tests. Using NCover Bolt from inside Visual Studio lets you launch tests without leaving your code, with a graphical view of all the possible paths that can be taken. You can use this to define new tests, or ensure that you've set up the appropriate starting conditions for your test so that all your code is tested. You can also change the order in which tests run, ensuring that tests which have failed are the ones that run first.

Tooled up for C++

While Visual Studio is often viewed solely as a .NET development environment, Microsoft's C++ compiler remains a key part of the package, delivering native code to Windows and Windows Phone. C++ is compiled directly to machine code, so it's important to have good code from the start. That's where Gimpel's FlexeLint and PC-lint come in, adding tooling to Visual Studio for handling static analysis.

Building on the familiar UNIX lint tools, Gimpel's family of Windows Lint applications go further than the syntax checking tools built into

Visual Studio. Designed to analyse all the files in your code, including C modules, the tools deliver messages that indicate the quality of your code, highlighting errors as well as displaying informational messages.

While PC-lint is for Windows and DOS only, FlexeLint is for cross platform developers, and runs on most common flavours of UNIX. It's distributed as source code and you need to integrate it with Visual Studio yourself. PC-lint doesn't just support Microsoft's C++ compilers; it'll also work with gcc.

Once installed, PC-lint will handle the checking of variable initialisations, types checking, and the semantics of your code. There's even the option of creating your own semantic rules, as well as finding unused macros, types, classes and the like in your code; giving you cleaner, easier to read code without confusing non-functional sections.

While you can run PC-lint from inside Visual Studio yourself, a range of third-party tools helps integrate PC-lint more effectively. Cleanscape's C++ Lint wraps PC-lint and gives you a graphical user interface, with hyperlinks to code editors, as well as automated integration with Visual Studio and access to the familiar PC-lint command line. Similarly Riverblade's Visual Lint and LintProject automate static analysis of your code in Visual Studio, with LintProject able to work against Visual Studio solution files.

Visual Studio remains the premiere Windows development environment. But it can always be improved. These extensions and add-ons offer deep integration and a range of features that can be combined to help you write better, more readable code. It also helps you create code that's easier to test, and can be proved to have been tested. If you're working on a large project with a team of developers, it's well worth considering make them part of your standard installation: it'll make your life a lot easier.

```

[NotifyPropertyChanged]
public class Person : INotifyPropertyChanged
{
    private string firstName;
    private string lastName;

    public event PropertyChangedEventHandler PropertyChanged;
    protected virtual void OnPropertyChanged(string propertyName)
    {
        if (this.PropertyChanged != null)
        {
            this.PropertyChanged(this,
                new PropertyChangedEventArgs(propertyName));
        }
    }

    public string FirstName
    {
        get { return this.firstName; }
        set
        {
            if (this.firstName != value)
            {
                this.firstName = value;
                this.OnPropertyChanged("FirstName");
                this.OnPropertyChanged("FullName");
            }
        }
    }
}

```

PostSharp makes use of Aspect Oriented Programming techniques.



Find out more

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Managing the classroom

Educational software is not just for the pupils – it can help schools and colleges manage the whole teaching process. Simon Williams investigates.



SIMON WILLIAMS

Simon has been a technology journalist for over 25 years, writing for many leading magazines and websites. He also writes and performs poetry and runs monthly open mic sessions in pubs.

simonw@hardcopymag.com

There are plenty of ways in which software can help with the learning process. The most obvious is as an e-learning tool, but there are also educational copies of business software for training, administration applications to smooth timetabling and project management, security software to ensure compliance with data protection legislation and guard against malware, and assistive technology for students with physical or learning disabilities. And much is extremely cost-effective, thanks to special licensing options available to educational establishments.

Business software

Training in the basics of office software – word processing, spreadsheet, database and Internet use – is a core skill for most young people going into employment. Providing industry-standard applications to learn on is essential in most secondary level institutions and training colleges.

With the rapidly changing ways in which

people use office software, the most efficient ways of equipping a classroom can easily involve several platforms. Although desktop machines may still be the most suitable for IT labs, laptops and tablets can be more convenient in the general classroom.

Microsoft offers several different ways in which you can obtain Office for educational use. In particular the company is pushing its online solution Office 365 and the subscription model is the way it wants us to pay for software going forward.

There are three Education Plans on offer, namely Office 365 Education A2, A3 and A4. These each offer web versions of Word, Excel, PowerPoint and OneNote, with A2 being free of charge. They also include spam and malware protection, 50GB of email storage and 25GB of online storage on OneDrive for each person.

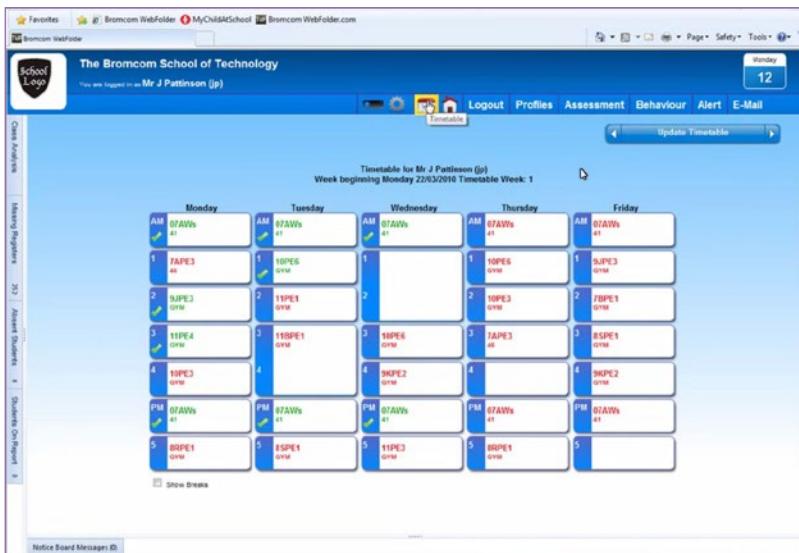
These plans include web conferencing, 24/7 phone support and office app support on Windows phones. The A3 and A4 versions extend this coverage to iPhone and Android phones, include 99.9 percent guaranteed

uptime, and add desktop versions of the eight main office applications on up to five machines per person. The A4 version adds PC-based voice phone calls.

It's not just Microsoft which is heading into subscription software. Adobe has the Education Enterprise Agreement (EEA) which offers the complete suite on a subscription basis to primary and secondary schools. For colleges and universities there is the Enterprise Term License Agreement (ETLA). There are also schemes tailored for bodies responsible for multiple schools, such as local education authorities.

Creative Cloud is a massive resource, comprising nearly 30 applications and services including industry standards such as Acrobat Pro, Photoshop, Illustrator, InDesign for page layout, Dreamweaver for web design, and Premier for video editing. Applications are available for both Windows and Mac platforms and you can mix and match, depending on your mix of devices.

There is also Creative Cloud for education,



The screenshot shows a weekly timetable for Mr J Pattinson (jp) from Monday 22/3/2010 to Friday 26/3/2010. The timetable is organized by day (Monday to Friday) and time (AM and PM). Each slot contains a subject code and a room number. A sidebar on the left provides links to 'Class Attendance', 'Marking Periods', 'Subject Planning', 'Syllabus', 'Subject Planning', and 'Notice Board'. A 'Show Breaks' button is located at the bottom left of the main grid.

Monday		Tuesday		Wednesday		Thursday		Friday	
AM 07AWBs 41									
1 TAEPE3 Gym	1 10PE3 Gym	1		1 10PE3 Gym					
2 SUPE3 Gym	2 11PE1 Gym	2		2 10PE3 Gym					
3 11PE4 Gym	3 11PE1 Gym	3		3 10PE6 Gym	3 10PE3 Gym	3 10PE3 Gym	3 10PE1 Gym	3 10PE1 Gym	
4 10PE3 Gym		4		4 9KPE2 Gym					
PM 07AWs 41									
5 8SPE1 Gym	5 8SPE1 Gym	5 11PE3 Gym	5 10PE3 Gym						

Computerising many of the most regularly used administrative documents, Teacher's WebFolder streamlines everything from roll call to assessment.

which now offers the whole suite in smaller quantities suitable for classroom deployment or even named individuals.

If you are not concerned with web design then there is Corel's License for Learning which provides CorelDraw, Paint Shop Pro and Painter. CorelDraw is still a very powerful vector graphics editor, while Paint Shop Pro has many similar features to Adobe Photoshop, and Painter is a natural media drawing tool for budding electronic artists.

There are plenty of other desktop applications that can make working with Office and Adobe products in a learning environment more convenient. These range from SmartDraw, which produces quick and easy diagrams of all kinds, and ABBYY OCR, which converts printed documents to editable electronic ones, to MathMagic the equation editor, and Parallels, which enables Windows to be run on a Mac. With such tools the full workflow of a typical office or design studio can be easily simulated in the classroom.

Administration tools

Running a modern school or college requires the support of quality administration software. There are many areas where applications can help, but we'll look at two of them here to give an idea of what's available.

Monitoring student progress, in academic terms as a result of tests and exams, behavioural incidents, both good and bad, and attendance via the use of registers are requirements throughout the education system. BromCom's Teacher's WebFolder is an interface which can be used to access live data from systems such as Capita SIMS, installed across one or more educational establishments. It enables

attendance registers to be taken electronically and replaces the need for paper registers to be physically carried between classrooms and admin office. Teachers can access historical attendance data within the classroom to assess changes in attendance patterns, and it promotes good timekeeping with features such as pupil photo display during the taking of the register.

The attainment and achievement module does a similar thing for test results and gives immediate access to the pupil's past history to help assess any changes in attainment patterns. Behavioural details can also be kept live, and with an intuitive interface, complete with appropriate password safeguards, make it easy

for teachers and administrative staff to gain quick access to all this information.

Work on new projects within schools often involves brainstorming sessions for staff.

Software such as Mindjet's MindManager helps visualise ideas related to a core project. For those who haven't used mind mapping software, it enables thoughts to be organised in relation to others, so that you gradually build up a map of the things that need to be done to achieve a particular goal.

In higher education, MindManager can also be useful as an organisational tool for students. Anybody involved in research, having to make use of a series of disparate sources and to organise them into a logical whole to support an essay or paper, will find it extremely useful. Some students have claimed that using MindManager to organise research can improve speed of access to information by a factor of as much as four when compared to holding the same information in a multi-sheet spreadsheet. The very process of mapping the information can also create the paper's structure, reducing the need for separate outlining software when approaching the writing.

These are just two of the large category of administrative tools suitable for education. Others include to-do lists, referencing tools and desktop classroom management.

E-learning

There are many places in which conventional 'front of class' whiteboard teaching may not be the best medium. For distance learning and for distributed lessons to a classroom of tablets, it may be better to have a recorded teaching

Office 365 at Sandymoor School

 Sandymore School in Runcorn, Cheshire is a secondary Free School that currently has 110 students in Foundation 1 and Foundation 2. The school was set up with the intention of putting a lot of the day-to-day classwork into the Cloud. To this end, Office 365 is the main platform for course work. As Principle Andrew Green-Howard says, "The reason I'm so excited about Office 365 is that we can take everything we do in school and where absolutely possible, put it in the Cloud."

The school has 50 Surface RT tablets which form the core of their student computing devices, although they also have a policy of system "agnosticism" so students can use their own, if appropriate. The Office applications are based in the Cloud so they can be accessed through a browser on Mac or Android platforms, just as well as from a PC.

This policy of 'anywhere computing' benefits the staff as well as the students. Green-Howard sites the process of getting comments on a document:

"Doing it the old way, I'd create a document then email it to three people to ask for comments. They'd all work on it and I couldn't until it came back. Working on a shared version in OneDrive means everyone can see the changes."

The students are enthusiastic too, and there's a keen group who helped set up the system and offer 'tech support' to staff. James says, "Sometimes, if I want to change something, I can just edit it on my phone." Aaron adds, "If you're stuck with homework, you can email them and they will usually email you back during the same weekend."

As a new school, Sandymore has benefitted from the ability to create a teaching environment from the ground up. Office 365 and its associated infrastructure has enabled a new way of implementing a comprehensive learning environment.

For more information, see <http://bit.ly/1iwhxud>.



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session, so that individual help can be offered to those with particular needs. There are a number of tools for creating electronic lectures, such as TechSmith's Camtasia Relay, Adobe Captivate and iSpring Presenter.

Camtasia Relay grew out of Camtasia Studio, one of the top-selling screen recording utilities. As well as being able to record actions on-screen, which is useful in ICT and computer training, it also enables live video recording and can combine the two in various ways to, for example, show a procedure on-screen with a tutor talking it through in an inset.

Recorded videos can be hosted on a school or college server and accessed from any device with suitable permissions. Teachers and lecturers can build in quizzes at the end of a recorded session, to evaluate the level of understanding individual students have attained. These results can be exported for tabulation and graphing in applications such as Microsoft Excel.

Netop Vision is a desktop and classroom manager which enables teachers to monitor and assist a complete class of students, each working on his or her own PC or device. The teacher's computer screen shows thumbnails of all the student screens, and at any time the teacher can select a thumbnail to display full screen exactly what the student is seeing on his or her screen.

The teacher can chat to a single student or to a group, and can take control of any screen remotely to help a student complete a given task. Messages can also be sent by students to ask for specific help.

Teachers who have used Netop Vision say it is an improvement over walking round the class and hovering over a student's shoulder. The students become more self-reliant, only

referring back to the 'help desk' provided by the teacher when really necessary. They are more inclined to experiment and find their own solutions to minor problems that they might encounter.

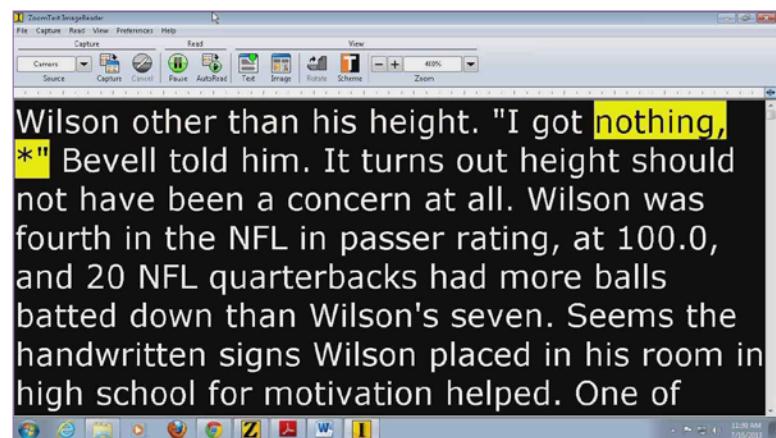
Although suited best to ICT sessions, Netop Vision can be used to monitor any class using computer assistance. For example, a class undertaking Internet research to complete an assignment in any subject can benefit from the whole-group monitoring and assistance provided by the management software.

Netop Vision Pro also includes Learning Center, a cloud-based tool that is particularly useful for 'blended learning'. This is an education system formalised some ten years ago that allows students to take some control over not only the pace and direction of delivery, but also when and where content is delivered, so blending the face-to-face classroom with web-based solutions. Vision Pro Learning Center helps with delivery and assessment under such conditions.

Alternative teaching aids include the music notation software Avid Sibelius, and Keep I.T. Easy Flowol, a small but feature-rich application for making flowcharts.

Assistive technology

Students with learning difficulties such as dyslexia, or those who suffer from a visual impairment, can often be helped with the



Virtually anybody who has trouble reading a computer screen will benefit from the large text and improved pointers available through ZoomTextExpress.

appropriate software fitted to their computer or tablet device. Applications such as Ginger, which provides a contextual grammar checker as well as a spell checker and text-to-speech facilities, can help people needing extra support in English.

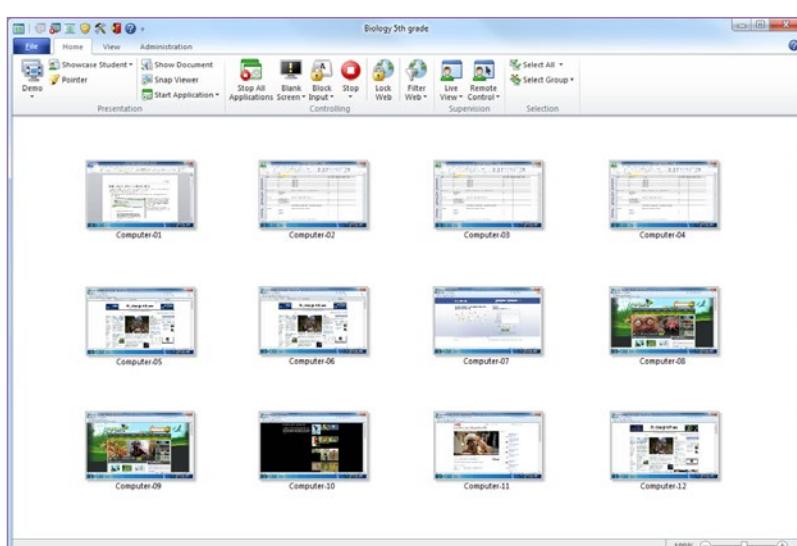
Addressing dyslexia, literacy difficulties and English as a second language, Text Help Read and Write Gold offers a text-to-speech screenshot reader, phonetic spell checker, speech recognition and a picture dictionary, so that students can locate words through images. The software can also tint out areas of the screen, so the phrase being read is effectively highlighted on the page.

Physical disabilities, such as visual impairment, can also be helped through software. Apart from the assistance available within Windows – such as the text magnifier and Narrator for basic text-to-speech – there are third-party applications available that can take things further.

AI Squared's ZoomText Express also magnifies text, like Windows, except that it anti-aliases the fonts, so that they look as sharp at double size as they do at normal magnification. Additionally, the program can tint backgrounds to applications to cut down screen glare, or reverse pages to white on black. It can also enlarge pointers and cursors to make them easier to find.

Audio Notetaker from Sonocent can help both visually impaired and normal-sighted students with note taking. The software uses the microphones built into many laptops and tablets and enables students to annotate what they hear, so key parts of a lecture can be labelled.

After the lecture, any recorded passages can be extracted, or reordered as best suits the individual student. Images and other text can be added to help illustrate points from a lecture, too.



Giving full control of multiple computers in an e-learning classroom, Netop Vision helps teachers to monitor and help students on an individual basis.



Careful choice of assistive software can help students with difficulties integrate into mainstream learning environments.

Data protection

Securing student data is both vital and required by best Data Protection practice. One of the easiest ways to do this is to encrypt it. DESlock+ uses 256-bit encryption on all hard drives within a system, and also on removable devices such as recordable DVDs and USB drives. The encryption runs as the computer starts up, so insuring against intruders trying to boot from an independent operating system.

The program also encrypts email for anybody using Outlook and is linked to a Cloud service so that, in the event of a local encryption server failure, access to data is still maintained until the hardware is fixed. Another popular encryption solution for schools,

colleges and universities is Becrypt DISK Protect. This provides both full disk encryption and pre-boot authentication, and is claimed to be up to the standards required by NATO and the Ministry of Defence.

Additionally, of course, it's important to protect not only the servers and networks in any educational system but also the computers used by students from malware attack. This is particularly important if students are allowed to bring their own devices to school and use them in the classroom.

There's a surprisingly large number of Internet Security suites that can be employed to protect these systems, but names like AVG, F-Secure and Kaspersky rank high in the results from organisations like AV-Test. These labs spend their time testing the efficacy of software in detecting and eradicating viruses and other malware.

The networks installed within educational establishments, particularly larger colleges and universities, is every bit as complex as those found in business, and arguably subject to even more stress. Paessler PRTG Network Monitor is a popular tool for monitoring the performance of a network and identifying problem areas before anything actually crashes. It comes with

real-time dashboards to monitor status and performance, and can alert administrative staff in a number of ways including by email and SMS text message. There is also Impero which combines the network management features of PRTG with the classroom management features of Netop Vision.

Also important is data backup which, in all but the smallest of schools, needs to go beyond the capabilities of the tools provided with the operating system. There are a wide range of solutions available, many of which can work with cloud-based services, so providing a further layer of security.

Those particularly suited to educational environments include BackupAssist, which offers special Education and Not-For-Profit licences, and Symantec Backup Exec through its Academic Program. CA ARCserve Backup offers component-based licensing, so you only pay for what you need, and has a Government Licensing Program (GLP) that covers academic institutions. Finally, Veeam Backup is available in a number of versions, including Veeam Backup Essentials for smaller organisations, at reduced rates to qualifying educational establishments and to students and teaching staff.



Find out more

Further details of all the products mentioned can be found on the Grey Matter website at www.greymatter.com. You can also call Grey Matter on 01364 654100 or email maildesk@greymatter.com for specialist advice.

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Inside Data

Graham Keitch takes us through the new features on offer from Oracle Database 12c.

IT projects don't always allow you to start with a clean sheet, and this is especially true where database technologies are involved. More often than not, you will be working with the data infrastructure which underpins the company's existing systems, and for which expertise is already in place. A lot of today's modernisation projects are being driven

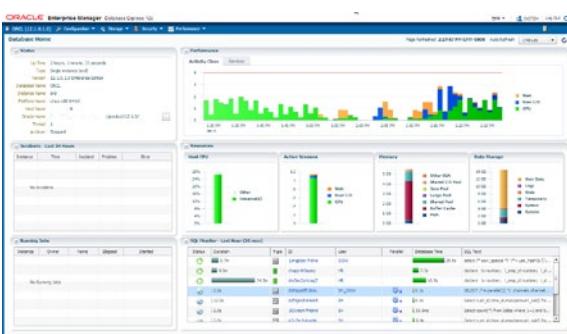
needs of the most demanding database environments. The most pressing issues for both IT and the business relate to manageability, performance and security. There is a growing need to minimise the complexities and costs associated with handling ever increasing volumes of data. A single major new feature of 12c Enterprise Edition goes a long way towards tackling nearly all of these requirements. This is the multi-tenant support which I covered in issue 61 (Winter 2013).

The multi-tenant architecture allows you to plug multiple databases into a single container database which handles all the memory and background processes. The DBA only needs to

deal with the single container instance for upgrades, patching, monitoring, tuning and other administrative tasks. At present, only the Enterprise Edition offers full support for multi-tenant with the ability to host up to 252 pluggable databases. This is the architecture of the cloud and is quite likely to be increasingly adopted for on-premise and hybrid systems too as an 'in-database' virtualisation solution.

Security should no longer be a project afterthought. It is a key part of most project specifications and Oracle continues to innovate with new security features. Data Redaction allows you to obscure data using a policy that specifies who may view sensitive information. Other security enhancements include the ability to specify which program units may invoke a procedure, and to attach invoker rights. For the most advanced security requirements, Oracle provides Advanced Security, Label Security, Data Masking and other Options that address auditing and role based access to data.

Turning to performance, multi-tenant allows you to allocate a percentage of CPU power to each pluggable database. Oracle shared objects such as PL/SQL can be shared across all the pluggable databases using object



EM Express for managing Oracle Database 12c.

by a business requirement to exploit new mobile technologies and reach across multiple platforms including the cloud. It is important to ensure your data framework can grow to support these new technologies and scale in terms of capacity and performance. In recent years, databases have evolved to support the Internet, business intelligence, data warehousing, complex data types such as spatial, unstructured data, and now the cloud.

Software and hardware upgrades or a migration may become an important part of the project if the incumbent database is unable to deliver in its current state. To help address this, Oracle Database maintains code compatibility across all editions, from the free XE version through to the top-end Enterprise Edition, which makes it easier to scale when the need arises. Oracle has also been a consistent industry leader when it comes to technology innovations and enabling users to adopt such innovations with minimal code reworking.

The latest Oracle Database 12c was released in July 2013 and continues this tradition. Most of the key new features relate to the Enterprise Edition for which a number of add-on options are available to handle the



stubs. This can also be thought of as a type of 'in-database' virtualisation of resources – in this case shareable code.

Increasing quantities of data puts pressure on storage and the costs associated with it. The Advanced Compression Option tracks usage at row and segment levels to produce a Heat Map that shows database hotspots. Automatic data compression and other optimisation tasks make use of Heat Maps to improve performance.

Partitioning tables into smaller chunks also helps optimise storage and improve speed. Less active partitions and those containing historic data can be offloaded onto cheaper and slower disks, reserving high performance kit for frequently accessed and important data. Smaller partitions also allow queries to execute faster and are beneficial for loading data, backup, recovery and other such tasks. The Partitioning Option is available for the Enterprise Edition.

Other new features include Basic Flashback Data Archive in all editions. Optimisation for Flashback Data Archive requires the Enterprise Edition and Advanced Compression option. Transaction Guard ensures a known outcome for every transaction despite outages that would otherwise cause work to be lost without the user knowing something was wrong.

There have been enhancements for Big Data and analytics too, including SQL Pattern Matching which allows you to find patterns in subsequent rows of the result set using regular expressions. SQL has been enhanced and there is better integration with PL/SQL and JDBC. XMLDB now provides improved compatibility with other Oracle technologies such as Dataguard and GoldenGate.



Find out more



Graham Keitch is the database pre-sales specialist at Grey Matter and has been working in IT for 30 years. For further information and advice on Oracle Database, call him or one of his colleagues on **01364 654129**, or email him at grahamk@greymatter.com.



Straight talking

Tim Anderson puzzles out the future of Windows, and why XAML development in Visual Studio falls short.

□ Businesses today are still buying Windows 7, judging by the number of PCs and laptops I see advertised as "Windows 8 with Windows 7 downgrade pre-installed" or equivalent. That is hardly a good omen for Microsoft's bold touch-friendly reinvention of Windows, and a shame considering that, whatever you think of the tiled 'Metro' user interface and Start screen, Windows 8 improves on Windows 7 in the core operating system, and is highly compatible on the desktop side. But given the poor take-up for Windows 8 'Modern' apps, what is Microsoft's future strategy on the client side?

That question was largely answered by two recent events: the annual Build developer conference, and the launch of Microsoft Office for iPad a few days earlier. The arrival of Office on Apple's tablet signals that Microsoft is serious about supporting non-Windows clients in its wider mission to run cloud services. The significance of Office for iPad is not just that it exists. The high quality of the suite, which fits smoothly into iOS rather than looking like a port, shows that Microsoft's engineers can do excellent work beyond Windows. Office for Android is promised, and an improved web version will even make its way into Google's Chrome Web Store.

These developments indicate that Microsoft has some sort of game plan for a post-PC world. But what of Windows itself? At first glance, the company appears to be in a conciliatory mood when it comes to Windows 8 complainers. Attendees were shown the latest Windows 8 update, which integrates the taskbar across both Modern and desktop environments, and then a glimpse of a future free update which will restore a desktop Start menu alongside a new ability to run Store apps in a desktop window.

Is this the end of Metro? On one level, it does make Windows 8 more like Windows 7, so you can frame it as a kind of retreat. Look

deeper though, and it is apparent that Microsoft is not going back on its plan to persuade developers to target Store rather than desktop apps. Another way of looking at the forthcoming changes is that, from the user's perspective, a Store app can look like a desktop app, as in started from the taskbar or Start menu, and running in a window. No longer will users be pushed into a different environment merely to run a Modern app.

There are also changes to the sandbox in which Modern apps run. If an app is side-loaded – that is, installed via PowerShell or a company portal, rather than from the public Store – then it can be configured to interact

with desktop applications and libraries via two new features. One, called Network Loopback, lets Modern apps call web services on the local machine. These web services might query a local or remote database and return results to the Store app, for example. The other, called Brokered Windows Runtime Components, allows Store apps to load desktop libraries specifically coded for that purpose. Both these feature are available now, via the new Windows 8.1 Update. They are reserved for side-loaded apps to ensure they do not compromise the security of general users installing Store apps.

At Build, Microsoft also introduced Universal Apps. These are implemented with a

The pleasure and the pain of XAML

In my copious spare time (ha!) I have been developing a Windows Store app. I picked XAML and C# over HTML and JavaScript, despite hints that the latter is an easier approach, mainly because I prefer the C# language (and more so after learning at Build of interesting new features like true native code compilation).

The exercise of developing a Store application of even moderate complexity soon reveals both the power and the awkwardness of putting together a user interface in XAML. In XAML, any user interface element can be customised and transformed, and I found myself learning how to change a ListView from a scrolling vertical list to a fixed horizontal panel, through the magic of Styles and Templates.

The snag is the challenge of puzzling out the XAML. This isn't helped by Visual Studio and Blend's habit of generating large amounts of code which you then have to wade through to find what you want to change. In my case, the simple task of disabling the check mark that appears when you click an item in a ListView requires steps beginning with right-click and Edit Additional Templates, to find the hitherto hidden attribute SelectionCheckmarkVisualEnabled.

I had a conversation with a XAML speaker and expert at Build. He advised me never to change anything using the visual designer in Visual Studio, since it generates height and width attributes which mess up auto-scaling. He prefers to live in the code view, so get used to lots of angle brackets.

It is not the easiest environment to learn, especially given additional tasks like behaving nicely in split views, or when the user changes from horizontal to portrait, to say nothing of dealing with Suspend and Resume in a transparent and user-friendly manner.

Microsoft has made several attempts to create simpler development environments, such as Project Siena which is an app-building app, and the online App Studio, which now supports Windows 8 as well as Windows Phone, but these tend to be over-simplified to the extent that developers cannot accomplish what they want.

My preference would be for an improved development environment within Visual Studio itself. The tools for the C# language are now wonderfully productive, but those for XAML fall short. If Microsoft is serious about making the Windows Runtime the target of choice for developers, a better development experience in its premier tool, rather than a proliferation of alternatives, would assist the transition.

new Visual Studio 2013 project type which lets you add multiple targets to a Store app. The main additional target is Windows Phone 8.1, now in preview, though adding a target for Xbox One was also demonstrated. A Universal App has three projects in a single Visual Studio solution, one for Windows Phone, one for Windows 8, and a third which is shared. If you create or move code into the shared project, it is merged into both of the other projects when compiled. This means you can share most of the code in a multi-target application (including user interface code if you wish), but still keep target-specific code when needed.

Underlying the Universal App is a near-complete implementation of the Windows Runtime, the engine underneath Windows Store Apps, for Windows Phone. This means greater compatibility between the two platforms, though the old Silverlight platform for Windows Phone is still supported.

Another significant demonstration at Build was Microsoft Office implemented as a Store app. Attendees saw an early build of PowerPoint, with a look and feel more like that of PowerPoint for iOS than Windows, but with a fuller set of features. The new Office (which looks at least a year away) will run both on

Windows Phone and Windows 8; in other words, it is a Universal App.

The arrival of Office as a Store app is significant for several reasons. First, it means that Microsoft itself is implementing a large and complex app in the new environment (using C++ and XAML, we were told), which means that the internal teams will have a strong incentive to improve the performance and

"Microsoft remains a long way behind iOS and Andriod in mobile"

reliability of the platform. Second, it will bring true touch-friendly productivity to Office for the first time (as opposed to the nod towards touch users found in Office 2013). Third, it removes the main reason for the inclusion of the desktop in Windows RT, the ARM-based version of Windows 8.

It is reasonable to speculate that a future equivalent to Windows RT may actually run the Windows Phone OS. Users will still get Modern apps and Office, but the unpopular ARM-based Windows 8 may not exist in future.

Putting this together, it seems that rather than diluting its focus on Modern apps, Microsoft is emphasising it, despite the slow

start for the Windows 8 Store.

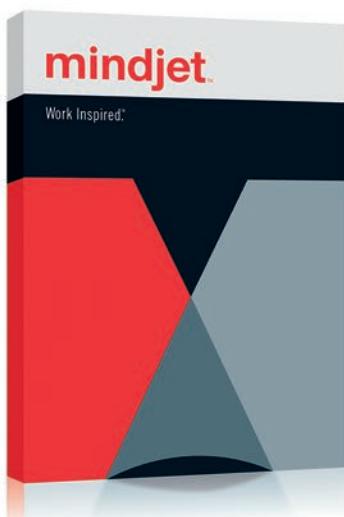
There is one large problem with Microsoft's strategy. Businesses, as noted above, are still choosing Windows 7, which cannot run Store apps, making it unlikely that we will see immediate huge growth in custom Modern app development. This is why the company's efforts to make Windows 8 more appealing to desktop users are also critical, since it has to win them over in order to establish the newer platform.

Another issue is that, although the new Universal App project makes it easy to port a Store app to Windows Phone, it does little to assist developers in porting existing Windows Phone apps based on Silverlight.

Microsoft remains a long way behind iOS and Android in mobile: hence its dual strategy of first, trying to fix Windows 8; and second, offering strong support for its cloud services on those other client platforms.

Perhaps the most popular session at Build, outside the keynotes, was Miguel de Icaza (the original developer of Mono, open source .NET) explaining how to code for iOS and Android using C#. Like Microsoft, even core Windows platform developers are getting the message that they can no longer live in a Windows-only world.

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The latest version, Mindjet v14 for Windows is available from Grey Matter.



...and another thing

Jon Honeyball doesn't appreciate Microsoft's efforts to make him use Microsoft's cloud.

Has Microsoft found its mojo? That's the big question spinning around the industry, in the wake of the departure by Bad Boy Ballmer. It's hard to find anyone who has a bad thing to say about the newcomer, and it is not helped by a number of product releases and changes which have arrived just after Steve went. It would be overly simplistic to suggest that these were all on hold waiting for Steve to walk out for the final time. Things simply don't move that quickly, especially in Microsoft land, where things go slowly, and often seemingly backwards.

On the one hand, I am pleased with the changes – more aggressive pricing on the Azure family, finally releasing Office for iPad, making noises about Office for Android, and so forth. All of these are things you would want to see in a company that, finally, has a clear vision of where it wants to go, and an understanding of what compromises it needs to make to get there. Clearly it cannot force Windows, and Windows apps, down everyone's throats moving forward. And these changes do follow that script, and point the way forward to a rosy future.

For myself, I veer between hope and despair. Yes, it's good that Microsoft is finally bringing out Office apps to other platforms. But have you looked at OneNote for Mac? It is truly disgusting when compared to its equally free Windows version. It's not that it is lacking in a few features: it has been hung drawn and quartered. And then gutted. And put through a mincer. It is laughably bad when you sync any sort of advanced OneNote data from Windows

into this thing. So much is simply not there, leaving barely more than the skeleton of a file reader with a few basic editing functions thrown in. Yes, it is free – and that's all it deserves to be.

Office for iPad looks considerably more interesting at first glance. Somewhat more actually works here, and I could be convinced that a fair amount of care and attention was put into this. I accept it is free if you don't have the appropriate subscription, and in that mode it is read only. But what's this? It syncs only to OneDrive? Just hold on a cotton-pickin' second...

An emotive issue

Storage is an emotive subject. It's where we put everything. I accept that sometimes the storage metaphor gets a little blurred when we are talking about Exchange Server or SQL Server. But we accept that we need these extra layers for the additional capabilities that they bring.

solutions, coupled with the increased speed of the Internet, has been a godsend. Just four short years ago, I lived in a small village just west of Sudbury in Suffolk. My internet connectivity was an unreliable ADSL connection which topped out at about 2Mbit. So bad was it that I had three of them, and tried to juggle them to get the best from the dreadful trio.

I moved house to a village in Cambridgeshire four years ago. My ADSL speed leapt to about 18Mbit per second, and it was a revelation. And last week, Fibre To The Cabinet (FTTC) appeared, taking my speed up to around 70Mbit a second. Now I have more speed than I can actually consume – even a 4K Netflix stream consumes less than 20Mbit a second. Moving a few hundred gigabytes of data into a cloud service, in my case Dropbox, is something that is now a possibility, not something which was a wild dream.

So we take our file systems seriously.

Applications which sync data to and from our file systems are serious things too, whether they be corporate archive solutions that drive multi-headed tape libraries, or a more simplistic replicate and archive to the cloud.

We don't expect our choice of sync tool to be driven by any factors other than a choice we make based on our own priorities. I happen to like Dropbox, despite its recent appointment of an American political apparatchik. I like that it works on all of my devices, irrespective of platform, and that upgrades come across all platforms at the same time too.

I have no particular beef with OneDrive. Well, that's not quite true. Firstly, I hate the way that there is OneDrive itself, and an entirely different thing called OneDrive for Business. Ah, this is the one you must use if you have Proper Grown Up Versions of Office 365,



Microsoft Office for iPad ties you in to OneDrive, which is not so handy if you use Dropbox.

File systems are where we keep our crown jewels. It's what we archive, backup, tend carefully and fret over. It is the final bastion of our company and our personal data.

The arrival of cloud-based archive

such as my E3 accounts. OneDrive won't talk to E3 account storage, because OneDrive is designed for Small People. That's OK, I can go download OneDrive for Business. Except there is no OneDrive for Business for the Mac platform yet. Windows, yes, but not Mac. Microsoft still has no clue about cross platform synchronicity. So I can use OneDrive For Business storage from my iPad for my Office for iPad device, but I can't sync files on that device to the file system on my desktop because Microsoft hasn't bothered to write that bit just yet.

I understand why Microsoft wants to force all Office users into using OneDrive, or OneDrive for Business. It makes things much easier for them, especially when it comes to supporting such technical marvels as Office Web Applications. It's so much easier for Microsoft if the document that this server-side web app is attempting to open is on another Microsoft server. Google does the same thing with its Google Docs – try finding an easy way to open a file on OneDrive from Google Docs, and you will soon be burying your head in your hands and gently whimpering.

And that's where I hit an impasse. I don't want to have my choice of storage forced upon me by my choice of tools. I don't want to have to

use Google Drive simply to use Google Docs. Think of the utter mess you will get into if you try to use Office 365 web apps from inside a ChromeOS laptop. And it really isn't any better if I want to use the web version of Pages from Apple to reference a file that isn't in their storage space.

The truth is that in old fashioned, insecure operating systems, you can have tools which can read and write to almost anywhere in the file system. And I understand why it must be that on iOS, an app cannot write outside of its own space, and certainly cannot gain access to the storage belonging to another app. That's why we need tools which can act as gatekeepers to storage, and then hand it over in a controlled, verified way.

I don't mind companies taking a grip over our choice of apps – I understand that some people like Office, others like Google Docs, or Apple's apps. But we shouldn't be moving to a world where our choice of tools determines our choice of storage. That way lies a real mess where it is impossible to know where things are, or where you last left something.

And are we happy at the thought that, as it appears to be the case, that OneDrive For Business is actually rewriting the data within

files when it syncs them, without changing the file saved date and time stamp? I accept that OneDrive for Business is actually an active repository based on Sharepoint technology, rather than a 'simple' file sync system. But why am I being forced to accept these solutions simply because the vendor wants it that way?

There are many tough questions to be asked of companies as we move into the cloud. Some argue that these are early days, and that it will take time for things to settle down. That OneNote for Mac is a version 1 product, neatly ignoring the fact that Microsoft has been shipping Mac software for nearly 30 years.

We also need to tackle the question of "what is Excel?" What functionality level should we expect on different platforms? It is simply not going to be enough to have Windows as the flagship version moving forward. After all, by any reasonable viewpoint, an iPad today is easily as powerful as a Windows desktop running XP from a decade ago, if not more so. Features cannot be divided out to favour specific platforms. The companies that gain our trust moving forward are the ones who deliver the best experience on all platforms, at the same time. Anything less will be judged inadequate.



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Short cuts

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

Once as popular as an iPad: the Sinclair ZX Spectrum.

All our yesterdays

Misty-eyed nostalgia all round in the Short Cuts office this month as we read *HardCopy* Editor Matt Nicholson's excellent book *When Computing Got Personal: A history of the desktop computer* (see page 7).

The story begins in 1972, with Xerox scientist Alan Kay describing a hand-held, wirelessly connected device (the 'Dynabook') which was pure science fiction at the time but which bore a remarkable resemblance to the kind of large-screen smartphone that gets thrown in free with a £30 a month contract today. Clearly the period since then has been one of transition, but even if you were there at the time it's easy to underestimate just how big an influence the hobbyist/garage sector had on first-generation microcomputer architectures, the staggeringly low power and capacity (by today's standards) of those early devices, and the extent to which pure chance played a part in shaping the way things developed. Reading this book will put you straight, albeit at the cost of some sleepless nights worrying about how it might so easily have turned out.

Something that's worth the cover price on its own is a definitive account (at last) of how Apple had the nerve to sue Microsoft for nicking the idea of the GUI from them when everyone knew that Apple had nicked it from Xerox in the first place. Opinion here at Short Cuts has tended to vary from 'barefaced cheek' to 'cheek of a barefaced nature', but deep down we knew there had to be more to it than that. The book explains exactly what it was, and whose cheeks were really being bared. (You'll have to read it to find out!)

Another great mystery laid to rest is how the late Gary Kildall became the official Unluckiest Bloke of the Past 40 Years. In the late 1970s Kildall's CP/M operating system had created the single OS, multiple hardware

vendor market that IBM and Microsoft so successfully commanded in the 1980s. It could have been CP/M running on that Big Blue hardware, but Gary passed on the option, leaving him in a situation similar to those who passed on the Beatles and JK Rowling, only a good few billions dollars worse off.

As the book explains, Gary did have his reasons, not least that the IBM guys turned up with a non-disclosure agreement which said that they couldn't disclose who they were representing, while any product secrets he might disclose to them instantly became their mystery employer's property. This didn't, however, bother quick-witted young Harvard dropout Bill Gates, who didn't actually have a product to disclose at that point, but knew where he could get one. The rest, as they say, is history.

Rule Britannia

Then, of course, there were the Brits. Sadly we stayed true to form, building brilliantly elegant designs that weren't compatible with anything and were eventually swamped by cruder but strangely more effective products from our American cousins. Our most successful machine, in unit sales at least, was specified by the organisation that also brought us *Play School* (the BBC), while our highest-profile digital entrepreneur was, not to put too fine a point on it, Sir Clive Sinclair.

Sir Clive doesn't come out of it all that well (although better than he did in the BBC docu-drama

Micro Men, when comedian Alexander Armstrong played him as a half-crazed loon with a stick-on ginger beard). Builder of numerous home computing devices featuring Z80 processors and rubber keyboards (this was before he moved on to battery-powered trikes), he seems to have been obsessed with small size and low prices, but less so with whether the devices actually worked.

In the end his exasperated design chief, Chris Curry, left to form Acorn, the firm which built the BBC Micro and eventually, via a few twists and turns, became ARM, which today designs the processors which Intel would dearly (OK, desperately) love to replace in most people's smartphones and tablets. The lesson for us Brits, it seems, is "do brilliantly elegant stuff, but leave the packaging, manufacturing and marketing to someone else."

When Computing Got Personal covers a lot else besides, including the emergence (from a shadowy background) of the Internet, how Steve Jobs was sacked from Apple then came back and saved it, the rise of the open source movement and the modern day shift to mobile. Here at Short Cuts, however, we like it most because it reminds us of just how tough we had it back then. Next time we hear someone complaining that their phone only has 16GB of storage, we'll be able to tell them that in 1983 an IBM PC XT cost \$5,000 and came with a 10 MB (yes, ten megabytes) hard disk. Kids today don't know how lucky they are. (OK, your job's safe – Ed)



IBM's PC XT – a tough machine for tough times (picture: Ruben de Rijcke, CC licence).





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