



application development specialists

## Cloud and Windows Azure Introduction

*What is Cloud Computing, what is Windows Azure and what business value can they deliver?*

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# Introduction to cloud computing

## What is cloud computing?

Cloud computing is a very popular phrase that is used extensively, yet a lot of people struggle to be able to define what it is<sup>1</sup>. According to Gartner:

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Cloud is a style of computing where scalable and elastic IT-related capabilities are provided as a service to external customers using Internet technologies.<sup>2</sup>

This is a very deliberate choice of words and can be broken down further by looking at the five attributes of cloud computing as identified by Gartner<sup>3</sup>:

- **Service-Based:** The implementation and backend technologies of the service are abstracted away to allow the service to be considered ready to use off the shelf. Correspondingly, the way the service is described should be in terms of service levels and business outcomes, rather than technology.
- **Scalable and Elastic:** The capacity of the service can be quickly and easily increased or decreased by the consumer on demand.
- **Shared:** The resources used to deliver the service are shared transparently amongst the consumers of the service to provide the economies of scale necessary to facilitate the scalability and elasticity.
- **Metered by use:** The usage of a service is tracked and applied to a payment model to allow for payment based on service usage (e.g. hours, amount of data, number of transactions, etc.) rather than equipment cost.
- **Uses Internet Technologies:** The service is delivered using Internet formats / protocols etc. e.g. URLs, TCP/IP, HTTP, REST, etc.

A good analogy is to think of cloud computing being to the provision of computing as metered electricity is to the provision of electricity i.e. it turns computing into a utility.

## Service models of cloud computing

There are three main service methods of cloud computing that have been identified (although many other ones are created all the time<sup>4</sup>):<sup>5</sup>

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<sup>1</sup> Cloud Computing: Today's Four Favourite Flavours Explained, CIO, [http://www.cio.com/article/598918/Cloud\\_Computing\\_Today\\_s\\_Four\\_Favorite\\_Flavors\\_Explained](http://www.cio.com/article/598918/Cloud_Computing_Today_s_Four_Favorite_Flavors_Explained)

<sup>2</sup> Cloud Computing Key Initiative Overview, Gartner, [http://www.gartner.com/it/initiatives/pdf/KeyInitiativeOverview\\_CloudComputing.pdf](http://www.gartner.com/it/initiatives/pdf/KeyInitiativeOverview_CloudComputing.pdf)

<sup>3</sup> Gartner Highlights Five Attributes of Cloud Computing, Gartner, <http://www.gartner.com/it/page.jsp?id=1035013>

- **Software as a Service (SaaS):** Provision of software application using cloud computing; examples include Salesforce CRM, Microsoft Office 365, Xero Accounting Software and Basecamp project management<sup>6</sup>.
- **Platform as a Service (PaaS):** Provision of a development and deployment environment for creating software applications using cloud computing; examples include Google App Engine, Force.com, Microsoft Windows Azure and Heroku<sup>7</sup>.
- **Infrastructure as a Service (IaaS):** Provision of computation, storage and/or networking using cloud computing; examples include GoGrid, ZettaGrid, Amazon Web Services and Rackspace<sup>8</sup>.

## Business benefits of cloud computing

The attributes of cloud computing as identified by Gartner also turn out to be business benefits:

- **Service-Based:** Rather than paying for technology, you are paying in terms of business outcomes (e.g. how many invoices do you want to generate or how many customers do you want to serve); this means you can make decisions at a business level and IT don't have to justify expenses at a technology level.
- **Scalable and elastic:** No matter what kind of load pattern you experience (e.g. predictable vs unpredictable, bursts of activity vs long periods of activity, etc.) cloud computing allows your usage to scale according to your needs without having underutilised hardware or needing lead time to buy more hardware.
- **Shared:** The expensive capital costs will be spread across a number of customers and as such, the cost of the service should be reasonable.
- **Metered by use:** You only pay for what you use.
- **Uses Internet technologies:** Allows for some levels of interoperability and/or consistency across vendors due to well-defined standards for Internet technologies.

There are also some specific business benefits depending on the model of computing that is being delivered by cloud computing as described in the following sections.

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<sup>4</sup> The cloud services explosion, Network World, <http://www.networkworld.com/supp/2012/enterprise4/081312-ecs-cloud-services-261195.html>

<sup>5</sup> Brief Summary of IaaS, PaaS, SaaS, Cloud Computing Journal, <http://cloudcomputing.sys-con.com/node/2218739>

<sup>6</sup> <http://www.salesforce.com>, <http://www.microsoft.com/en-au/office365/online-software.aspx>, <http://www.xero.com/>, <http://basecamp.com/>

<sup>7</sup> <https://developers.google.com/appengine/>, <http://www.force.com/>, <https://www.windowsazure.com/en-us/>, <http://www.heroku.com/>

<sup>8</sup> <http://www.gogrid.com/>, <https://www.zettagrid.com/>, <http://aws.amazon.com/>, <http://www.rackspace.com/>

## Software Delivery

If you deliver a service to your customers that can be delivered via software, then there are a number of benefits for adopting a SaaS approach over the more traditional “shrink-wrapped” approaches. The same benefits apply, but in the converse, if you are able to leverage SaaS solutions to help run your business.

- **Mobile:** Provides centralised storage of information allowing the software to be used easily across multiple devices: “anywhere anytime”.
- **Up-to-date:** Allows the user to automatically use the latest version of the software without complicated update processes.
- **Continuous revenue stream:** Allows for the ability to move customers to a subscription payment model, rather than the more traditional one-off payment model (whereby users will often not pay again for quite a number of years and will end up with out of date software)
- **Quick-to-market:** You can start out with a basic product offering and start generating revenue as you add new features over time rather than having a huge lead time.
- **Incorporate user feedback:** Because you are quick-to-market, you can use feedback from your initial user base to shape the feature set of your application; this has a two-fold pay-off:
  - You keep your users engaged and give them buy-in to keep using your product
  - You put in place features that your users actually want rather than guessing
- **Wide reach:** By deploying your software via the Internet you immediately have a potential global user base.

It should be noted that many of these particular advantages can also be leveraged by simply deploying your application as a web-based application on an on-premise or hosted web farm. The distinction between this and providing your service as a SaaS offering lies in the definition previously outlined. Namely, that you are offering the service to a number of customers in a scalable manner with a usage-based payment model. This may well mean that you need to in turn leverage a cloud computing infrastructure / platform to deploy your software and allow it to scale as your user base grows. This would also allow you to have sustainable running costs that can be factored into your payment model.

## Computation and Storage Consumption

There are quite a number of additional benefits if you are using IaaS or PaaS offerings for your storage / computation or application platform<sup>91011</sup>.

- **Business flexibility and agility:** There is no lead time required to set up infrastructure and the cloud services can be grown with your business or dropped if you change direction<sup>12</sup>.

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<sup>9</sup> The Transformative Benefits of Cloud Computing, Sungard,

[http://www.sungardas.com/Documents/TransformativeBenefitsCloud\\_WPS-051.pdf](http://www.sungardas.com/Documents/TransformativeBenefitsCloud_WPS-051.pdf)

<sup>10</sup> Cloud Computing: The Risks, Benefits, and Success Factors, Cloud Computing Journal,  
<http://cloudcomputing.sys-con.com/node/1924251>

<sup>11</sup> Cloud Computing Security Considerations, Australian Department of Defence,  
[http://www.dsd.gov.au/publications/Cloud\\_Computing\\_Security\\_Considerations.pdf](http://www.dsd.gov.au/publications/Cloud_Computing_Security_Considerations.pdf)

- **Operational costing model:** You can move from a CAPEX to an OPEX costing model for your computing infrastructure<sup>13</sup>.
- **Potential lower costs:** You don't have to have an upfront capital outlay for infrastructure and you only pay for what you use – not the maximum possible amount of computing power / storage you *might* need.
- **Lower support overhead:** You don't have to manage the infrastructure – it's managed for you; depending on what kind of service you purchase you might not have to manage the operating system or application infrastructure either
- **Scalable:** The scalability benefit has already been mentioned above, but the kind of data storage scalability and low costs that are achievable with some of the cloud platforms deserve another mention<sup>14</sup>.
- **Transformative:** Cloud computing allows you to focus on how you want to run your business rather than how to run the technology that helps you run your business; this is subtle, but it can help you think laterally about new business models and scenarios that can end up being transformative<sup>15</sup>.
- **Risk-free Experimentation:** The ability to quickly spin-up hardware of any spec you desire is very useful for experimenting with server configurations for applications that you might want to run without having to outlay money for an unknown amount of computing power; it also allows you to quickly spin-up test environments if you are trialling / comparing different applications.
- **Enterprise-grade:** The hardware and/or software used in cloud computing platforms may be enterprise-grade, which is a bonus for non-enterprise customers.
- **Business Continuity and Disaster Recovery:** The inherent nature of scalable computation and storage is that it is also redundant and robust; this, in combination with the high Service-Level Agreements (SLAs) that normally accompany cloud platforms, means that using cloud computing as a BC and/or DR strategy has a lot of merit.

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<sup>12</sup> Cloud Computing: Two Kinds of Agility, CIO,

[http://www.cio.com/article/599626/Cloud\\_Computing\\_Two\\_Kinds\\_of\\_Agility](http://www.cio.com/article/599626/Cloud_Computing_Two_Kinds_of_Agility)

<sup>13</sup> How to Break Down the OpEx vs. CapEx Cloud Computing Debate, CIO,

[http://www.cio.com/article/700432/How\\_to\\_Break\\_Down\\_the\\_OpEx\\_vs.\\_CapEx\\_Cloud\\_Computing\\_Debate](http://www.cio.com/article/700432/How_to_Break_Down_the_OpEx_vs._CapEx_Cloud_Computing_Debate)

<sup>14</sup> Examples include Amazon S3 Storage (<http://aws.amazon.com/s3/#pricing>) and Microsoft Windows Azure Blob Storage (<https://www.windowsazure.com/en-us/pricing/details/#storage>)

<sup>15</sup> 60% of Companies See Cloud As a Transformational Technology, CIO,

[http://www.cio.com/article/605417/60\\_of\\_Companies\\_See\\_Cloud\\_As\\_a\\_Transformational\\_Technology](http://www.cio.com/article/605417/60_of_Companies_See_Cloud_As_a_Transformational_Technology)

<sup>16</sup> Cloud Computing Calls for Rebuilding Enterprise IT, CIO,

[http://www.cio.com/article/702585/Cloud\\_Computing\\_Calls\\_for\\_Rebuilding\\_Enterprise\\_IT](http://www.cio.com/article/702585/Cloud_Computing_Calls_for_Rebuilding_Enterprise_IT)

- **Reduced carbon footprint:** Some cloud vendors are ensuring that their data centres are as efficient as possible and thus have a reduced carbon footprint.
- **DDoS protection:** Some of the bigger cloud vendors provide (some level of) Distributed Denial of Service protection with their platform offering, which is typically expensive to procure independently.

## What to watch out for

While there are many benefits of cloud computing, as with all decisions, it is important to keep in mind the potential negatives:<sup>1718</sup>

- **Cloud washing:** Some vendors will jump on the cloud bandwagon by rebranding an old product with the cloud “buzzword” without actually changing it<sup>19</sup>.
- **Lock-in:** Because cloud computing is still relatively immature, standards are still being formed and there are varying levels of portability across cloud vendors; thus, vendor lock-in can be a reality so it’s important to choose a provider you trust and consider the cost implications and difficulty of an exit strategy should it be needed (just like you would when making an on-premise vendor decision)<sup>2021</sup>,
- **Privacy and data sovereignty:** It is important to do your due diligence in understanding the legal implications of using externally hosted services, particularly if they are hosted overseas; it should also be noted that there is a lot of misinformation in regards to this hotly debated topic and if you are unsure, then you should get legal advice<sup>222324</sup>.
- **Security:** Another hotly debated topic is security of cloud computing. Ultimately it comes down to choosing a provider you trust and being mindful about what data you are storing where; it’s

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<sup>17</sup> Cloud Computing’s Pros and Cons: IEEE CIO Weighs In, CIO Insight, <http://www.cioinsight.com/c/a/Expert-Voices/Cloud-Computings-Pros-and-Cons-794756/>

<sup>18</sup> Cloud Computing Security Considerations, Australian Department of Defence, [http://www.dsd.gov.au/publications/Cloud\\_Computing\\_Security\\_Considerations.pdf](http://www.dsd.gov.au/publications/Cloud_Computing_Security_Considerations.pdf)

<sup>19</sup> How to Identify Cloud Washing, Seeking Alpha, <http://seekingalpha.com/article/313916-how-to-identify-cloud-washing>

<sup>20</sup> Cloud Computing’s Vendor Lock-In Problem, Forbes, <http://www.forbes.com/sites/joemckendrick/2011/11/20/cloud-computings-vendor-lock-in-problem-why-the-industry-is-taking-a-step-backwards/>

<sup>21</sup> Cloud and the Clichéd Vendor Lock-in, Cloud Computing Journal, <http://cloudcomputing.sys-con.com/node/2308460>

<sup>22</sup> Is it legal to send your data overseas?, Sydney Morning Herald, <http://www.smh.com.au/it-pro/cloud/is-it-legal-to-send-your-data-overseas-20111011-1lic0.html>

<sup>23</sup> US beats Australia in data-protection laws: Microsoft, ZDNet, <http://www.zdnet.com/au/us-beats-australia-in-data-protection-laws-microsoft-7000004184/>

<sup>24</sup> Legal Issues in the Cloud, CIO, <http://www.cio.com.au/article/382624/legal-issues-cloud-part-1/>

worth noting that the bigger providers will have data centres with state of the art security that you couldn't hope to achieve with an on-premise datacentre<sup>25</sup>.

- **Compliance:** You might be obligated to ensure that your services comply with various industry standards or you might feel more comfortable if your cloud computing provider complies with various industry standards<sup>26</sup>.
- **Dependency:** If you are moving away from a self-managed on-premise datacentre then by engaging externally managed services there is an implicit loss of control and dependency on the vendor you engage; it's important to consider the agreement you are signing, the SLA the service comes with and what your exit strategy is if the vendor goes out of business or you decide to move providers (or back to on-premise)

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<sup>25</sup> Regarding Cloud Security and Data Sovereignty, Enabling Digital Society,  
<http://blogs.msdn.com/b/rockyh/archive/2012/01/31/regarding-cloud-security-and-data-sovereignty.aspx>

<sup>26</sup> Some cloud providers will publish their compliance accreditations such as Microsoft Windows Azure  
<https://www.windowsazure.com/en-us/support/trust-center/compliance/> and Amazon Web Services  
<http://aws.amazon.com/security/#certifications>

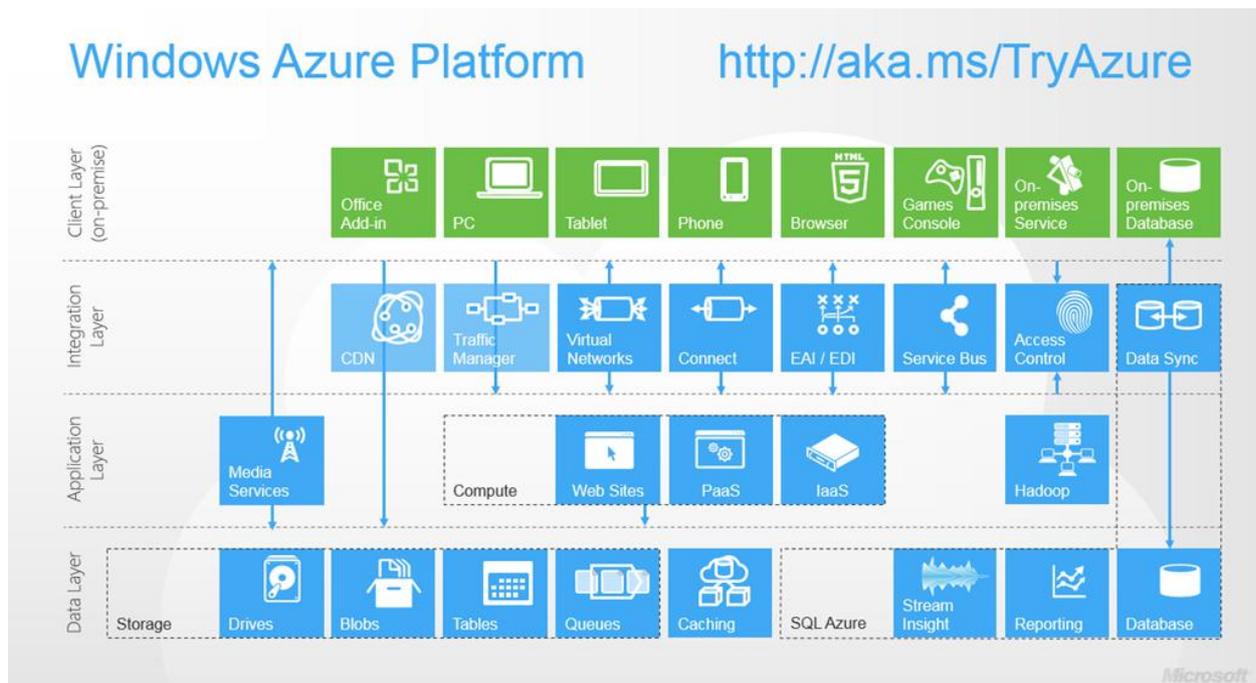
# Introduction to Windows Azure

## What is Windows Azure?

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Windows Azure is an Internet-scale computing and services platform hosted in Microsoft data centers.<sup>27</sup>

Windows Azure is Microsoft’s cloud computing platform and offers a wide-array of services across the IaaS and PaaS spectrum. The following image gives a good graphical overview of the wide variety of ever-increasing services that make up the Azure platform<sup>28</sup>:



The following are the main points to notice about the diagram:

- Azure provides a number of data services that you can use to store data in different formats and this gives you the flexibility to develop your applications in whatever way is convenient
- The data storage services available range from (close to) traditional MSSQL storage and reporting to the Azure-specific storage APIs to provide high-scale, cost effective storage of non-relational data, binary data, virtual hard drives, queue messages and cached data.
- On top of the data layer is the application layer, which provides a range of services that you can use to build applications in Azure.

<sup>27</sup> Windows Azure, Microsoft, <http://msdn.microsoft.com/en-us/library/windowsazure/dd163896.aspx>

<sup>28</sup> Updated Windows Azure Reference Architecture, Clint Edmonson, <http://www.notsotrivial.net/blog/post/2012/09/10/Updated-Windows-Azure-Reference-Architecture.aspx>

- This ranges from a service to allow the upload, reformatting, storage and streaming of video content to a “big data” data store to PaaS and IaaS services that support a wide-variety of Microsoft and non-Microsoft development environments.
- There is also a large range of add-on services that allow you to create hybrid cloud applications by connecting your Azure applications to your on-premise VPN, syncing data to and from on-premise databases, communicating bi-directionally using a service bus and federating your authentication.
- There is an authentication service that allows you to use claims-based authentication and / or a hosted Active Directory server.
- There is a content delivery network so you can serve out your content all over the world in an optimised manner.
- There is also Traffic Manager, which essentially acts as a DNS service and allows for geographical fail-over and geographical load-balancing / latency optimisation.
- The list goes on; for more information consult the Windows Azure website at <https://www.windowsazure.com/en-us/home/features/overview/>

## Importance of Windows Azure to Microsoft

It is hard to deny that Windows Azure plays a very important role in the strategic plan of Microsoft<sup>29303132333435363738</sup>.

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<sup>29</sup> Microsoft's Ballmer: 'For the cloud, we're all in', Network World, <http://www.networkworld.com/news/2010/030410-microsoft-ballmer-cloud.html>

<sup>30</sup> Microsoft Says to Spend 90% of R&D on Cloud Strategy, Bloomberg, <http://www.bloomberg.com/news/2011-04-06/microsoft-s-courtois-says-to-spend-90-of-r-d-on-cloud-strategy.html>

<sup>31</sup> Windows Azure Appliances are still in Microsoft's plans, ZDNet, <http://www.zdnet.com/blog/microsoft/windows-azure-appliances-are-still-in-microsofts-plans/9429>

<sup>32</sup> Microsoft Commits Multibillion-Dollar Partner Investments, Microsoft, <http://www.microsoft.com/en-us/news/press/2011/jul11/07-13MSWPCDAY3PR.aspx>

<sup>33</sup> Microsoft Steps Up Cloud Expansion Plans, Data Centre Knowledge, <http://www.datacenterknowledge.com/archives/2011/09/23/microsoft-steps-up-cloud-expansion-plans/>

<sup>34</sup> Microsoft's Scott Gurthrie and his impact on Azure, ZDNet, <http://www.zdnet.com/blog/microsoft/microsofts-scott-gurthrie-and-his-impact-on-azure-a-six-month-report-card/11453>

<sup>35</sup> Microsoft to Expand its Dublin Data Centre, Microsoft EMEA, <http://www.microsoft.com/Presspass/emea/presscentre/pressreleases/February2012/23-02DublinDataCentre.aspx>

<sup>36</sup> Microsoft to bring new Azure cloud services to Windows Server, ZDNet, <http://www.zdnet.com/microsoft-to-bring-new-azure-cloud-services-to-windows-server-700000620/>

- Microsoft has invested billions of dollars into Azure, including the establishment of state-of-the-art data centres across the world.
- The number and scale of releases over the last few years since Azure was released as CTP in 2008 has been extensive.
- Key Microsoft staff are working on Azure.
- Various high-level Microsoft representatives have publicly stated a commitment to cloud computing.
- Features from Windows Azure are being back-ported to the Windows Server operating system for use in on-premise datacentres

Azure is a big part of Microsoft's future plans and all indications suggest it will remain so going forward. As a customer of Azure, this gives confidence that the Azure platform is a safe bet to invest in a long-term cloud computing strategy.

## Business benefits of Windows Azure

If you do decide to embrace cloud computing, then there are a number of compelling benefits in choosing the Windows Azure platform:

- **Trust:** Microsoft is a well-respected company with a well-established reputation in the enterprise IT space and as such there is an immediate minimum level of trust that you can place in their offering.
- **High-availability / Disaster Recovery:** The Azure platforms easily supports HA and DR strategies through a combination of high SLAs, storing multiple copies of all data stored and geographical failover via Traffic Manager, geographically-redundant storage and SQL Data Sync <sup>39404142</sup>.

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<sup>37</sup> Another Microsoft Developer Division leader moves to Windows Azure, ZDNet, <http://www.zdnet.com/another-microsoft-developer-division-leader-moves-to-windows-azure-7000004390/>

<sup>38</sup> Microsoft updates Windows Azure Web Sites, Active Directory previews, ZDNet, <http://www.zdnet.com/microsoft-updates-windows-azure-web-sites-active-directory-previews-7000004371/>

<sup>39</sup> Service Level Agreements, Microsoft, <https://www.windowsazure.com/en-us/support/legal/sla/>

<sup>40</sup> Introducing Geo-replication for Windows Azure Storage, Microsoft Windows Azure Storage Team, <http://blogs.msdn.com/b/windowsazurestorage/archive/2011/09/15/introducing-geo-replication-for-windows-azure-storage.aspx>

<sup>41</sup> Overview of Windows Azure Traffic Manager, Microsoft, <http://msdn.microsoft.com/en-us/library/windowsazure/hh744833.aspx>

<sup>42</sup> Business Continuity in Windows Azure SQL Database, Microsoft, <http://msdn.microsoft.com/en-us/library/windowsazure/hh852669.aspx>

- **Platform-as-a-Service:** Part of the Azure offering is a true PaaS offering, which is fairly unique among cloud vendors and provides distinct advantages in terms of minimising support overhead and automatically keeping OS software and security patches up to date.
- **Multi-platform support:** Windows Azure allows you to develop with .NET, NodeJS, PHP, Java and Python as a first-class citizens and any language of your choice via their SDK<sup>43,44</sup>; Azure also allows you to deploy applications onto Windows Server as well as Linux<sup>45</sup>.
- **Port existing applications:** Azure provides fairly standard Windows and Linux setups that generally allow you to easily retarget your existing applications to run on Azure with minor changes<sup>46</sup>.
- **Hybrid-application support:** There are a range of features in Windows Azure that allow for easy development of hybrid-cloud applications (where some of the application remains on-premise); the key services that allow for this are Virtual Networks<sup>47</sup>, Service Bus<sup>48</sup>, Data Sync<sup>49</sup>, and Access Control<sup>50</sup>.
- **Security:** Microsoft have made a big commitment to security as part of the Azure offering and have published various whitepapers and other information in this regard<sup>51,52</sup>.
- **Comprehensive offering:** As you can see by looking at the Azure overview diagram above, the Windows Azure platform has a comprehensive array of services and components that you can use to get up and running quickly with almost any type of application.

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<sup>43</sup> Developer Center, Microsoft, <https://www.windowsazure.com/en-us/develop/overview/>

<sup>44</sup> Bring Your Favorite Language, Microsoft, <https://www.windowsazure.com/en-us/develop/other/>

<sup>45</sup> Manage Center, Microsoft, <https://www.windowsazure.com/en-us/manage/overview/>

<sup>46</sup> The ISV Business Case For The Windows Azure Platform, Forrester, <http://www.microsoft.com/en-us/news/presskits/cloud/docs/Azure071211.pdf>

<sup>47</sup> Networking, Microsoft, <https://www.windowsazure.com/en-us/home/features/networking/>

<sup>48</sup> Windows Azure Service Bus, Microsoft, <https://www.windowsazure.com/en-us/develop/net/fundamentals/hybrid-solutions/>

<sup>49</sup> SQL Data Sync, Microsoft, <http://msdn.microsoft.com/en-us/library/windowsazure/hh456371.aspx>

<sup>50</sup> How to Authenticate Web Users with Windows Azure Access Control Service, Microsoft, <https://www.windowsazure.com/en-us/develop/net/how-to-guides/access-control/>

<sup>51</sup> Security, Microsoft, <https://www.windowsazure.com/en-us/support/trust-center/security/>

<sup>52</sup> Microsoft Windows Azure, Cloud Security Alliance, <https://cloudsecurityalliance.org/star-registrant/microsoft-windows-azure/>