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Deploying Microsoft Dynamics CRM in Microsoft Azure Virtual Machines

October 2015

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Introduction

This white paper is intended for architects and system administrators who plan to take advantage of Azure Virtual Machines to deploy Microsoft Dynamics CRM 2015.

Running Dynamics CRM in Azure Virtual Machines gives organizations greater access and control to CRM administrators, and allows offloading of the machine infrastructure that on-premises customers would otherwise have to invest in.

Customer relationships are core to every business, so it's essential that IT be able to work closely with Sales and Marketing to develop and automate internal CRM processes. Whether you plan to run Dynamics CRM 2015 with little customization or a lot, you will find that Azure Virtual Machines offers a secure, highly-scalable, cost-effective, and comprehensive web services environment for running mission-critical Windows Server workloads in the cloud.

This white paper offers reference architectures for various deployment sizes of Microsoft Dynamics CRM 2015 in Azure Virtual Machines, and guides organizations in the delivery of these complex systems.

Microsoft Dynamics CRM 2015 Technology Overview

Microsoft Dynamics CRM 2015 is designed to help organizations achieve a 360-degree view of customers, adapt quickly to changes in business processes, and achieve reliable user adoption through user interfaces that are consistent with the Microsoft Office suite of products.

Dynamics CRM 2015 is a client-server application, which is an Internet Information Services (IIS)–based web application supporting many web services interfaces. Customers access Dynamics CRM either by using a web browser, one of several clients, or Microsoft Office integrated services. In addition to Internet Explorer, the Chrome and Firefox browsers have been fully supported since Microsoft Dynamics CRM 2011 Update Rollup 12.

Dynamics CRM 2015 offers a range of deployment options, which will be discussed in this white paper.

Whether running on Azure Virtual Machines (VMs) or on-premises, Microsoft Dynamics CRM 2015 requires the same list of software components:

- Microsoft Windows Server 2012
- A Microsoft Windows Server Active Directory infrastructure
- An Internet Information Services (IIS) website
- Microsoft SQL Server 2012 or Microsoft SQL Server 2014
- Microsoft SQL Server 2012 Reporting Services or Microsoft SQL Server 2014 Reporting Services
- Microsoft Exchange Server or access to a POP3-compliant email server (optional)
- Microsoft SharePoint Server (optional, but required for document management), at least Version 2010
- Claims-based security token service (required for Internet-facing deployments)
- A supported operating system
- A supported web browser, such as a recent version of Internet Explorer or the most recent versions of Apple Safari, Google Chrome, or Mozilla Firefox
- Microsoft Office Outlook (optional).

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Microsoft Azure Infrastructure Services for the Dynamics CRM Administrator

Microsoft Azure is a cloud computing platform and infrastructure, hosted in a collection of strategically-located data centers, providing a hosting environment for a wide range of services. In general, these services can be grouped into three categories, referred to as Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS), depending primarily on the degree of flexibility and manageability each of them provides. While both SaaS and PaaS minimize administrative overhead, they impose more stringent limits on the degree to which you can customize their features and behaviors. Effectively, they might introduce extra challenges when migrating on-premises systems to the cloud. On the other hand, IaaS-based solutions facilitate lift-and-shift scenarios, making Azure, to a large extent, equivalent to a traditional data center hosting provider.

Continuous advancements in Azure capabilities and scalability make it possible to implement a variety of IaaS-based workloads, which in the past were either restricted to on-premises deployments or available as SaaS-based offerings within or outside of Azure. This applies to Dynamics CRM, and is the focus of this white paper. In particular, the introduction of Azure Premium Storage, which reached general availability on April 16, 2015, eliminated disk throughput and latency limitations that were the primary reasons for the lack of official support for Dynamics CRM hosted on Azure IaaS Virtual Machines.

Microsoft Azure "Classic" and Azure Resource Manager Virtual Machines

Microsoft Azure Resource Manager (ARM) support for IaaS recently reached general availability. This paper focuses on deploying CRM from the perspective of using the "classic" architecture of Azure Virtual Machines. However, most of the capabilities and concepts, like virtual networks, availability sets, and load balancers, apply to the new ARM model as well.

Capabilities, Networking Concepts, and Building Blocks

Implementing Dynamics CRM hosted on Azure IaaS leverages a number of cloud-based features. To understand the architectural design options we present in this white paper, it is important to become familiar with their general principles. In this section, we provide a brief overview of the basic characteristics and benefits each design option provides in the context of deploying Dynamics CRM hosted on Azure IaaS. For more details on these features, see the Additional Information section.

Azure IaaS Virtual Machines

Azure IaaS Virtual Machines constitute the core building block of every Azure IaaS solution, combining necessary computing, memory, network, and disk resources to emulate functionality of a physical computer. In general, the amount of resources allocated to a virtual machine varies depending on its size. The extent of support for vertical scaling, as well as the availability of supplemental features further enhancing virtual machine capabilities, are also determined by its tier and series. There are two tiers: basic and standard. Basic tier virtual machines are intended primarily for less demanding test and development workloads that do not require load balancing or auto-scaling. Standard tier virtual machines are divided into a letter-assorted series, including A, D, DS, and G, each intended to handle different computing needs. Basic and standard tiers are additionally subdivided into sizes designated by a numerical suffix. In particular, lower end standard A-series sizes are intended for general-purpose production scenarios, with

higher end sizes targeting compute-intensive applications, and network-optimized A8 and A9 instances providing high throughput and InfiniBand support. The D and DS series offer 60% faster CPUs, more memory, and local Solid State Drives (SSDs). You should note that, at the time of writing of this white paper, a DS series virtual machine is required to take advantage of Premium Storage. The G-series pushes resource limits even further, with faster processors, more memory, and larger local SSDs than D and DS series.

Availability Sets

Availability sets allow multiple Azure Virtual Machines to be combined into logical units to improve their resiliency. Individual IaaS VMs can be adversely affected by underlying host hardware failures and planned maintenance events that involve host updates. Effectively, they are not covered by the Azure uptime service level agreements (SLAs). This can be remediated by taking advantage of availability sets. In general, for this purpose you would use two or more virtual machines that provide identical functionality and are capable of operating as a single entity, temporarily handling increased load in case one or more of them become inaccessible. Such an approach is commonly used to group redundant virtual machines in each tier of multi-tier solutions. The ability to create an availability set is contingent on placing virtual machines in the same cloud service.

Cloud Services

Cloud services are software-based constructs serving as containers for virtual machines that share the same fully-qualified domain name in the cloudapp.net DNS namespace, along with the corresponding public, virtual IP address. Cloud services allow for creating external endpoints, making it possible to access virtual machines within them through arbitrarily chosen ports, either from the Internet or from other Azure-resident services, including IaaS Virtual Machines hosted in another cloud service.

Azure Load Balancing

Azure external and internal load balancing are frequently used in combination with availability sets. Their purpose is to distribute incoming network requests across several virtual machines that deliver identical functionality, effectively sharing the load and providing an additional degree of resiliency. External load balancing is intended for connections targeting external endpoints exposed by the cloud service hosting load-balanced virtual machines. Internal load balancing serves the equivalent role, but handles private network traffic, targeting virtual machine network ports directly, without traversing cloud service endpoints. From an architectural standpoint, a set of load-balanced virtual machines frequently constitutes an individual tier in a multi-tier solution. Each load balancing mechanism is limited to distributing traffic to virtual machines residing within the same cloud service.

Azure Traffic Manager

Azure Traffic Manager provides DNS-based load balancing and failover capabilities for endpoints representing different cloud services or websites, eliminating the single-cloud service dependency associated with Azure load balancing and internal load balancing. Traffic Manager endpoints can reside outside of Azure, including on-premises.

Azure Regional Virtual Networks

Azure regional virtual networks (VNets) facilitate creating private networks within Azure, and are necessary to establish site-to-site connectivity between Azure IaaS Virtual Machines and on-premises systems, as

well as VNet-to-VNet connectivity between Azure IaaS Virtual Machines in different Azure regions. While Azure Virtual Machines residing in the same cloud service can communicate directly with each other, such communication is not possible across virtual machines in different cloud services (without traversing external cloud service endpoints) unless these virtual machines reside within the same virtual network or interconnected virtual networks. In addition, implementing virtual networks allows for replacing Azure built-in Domain Name System (DNS) name resolution with a custom one, which is required when deploying Azure IaaS Virtual Machines hosting Active Directory Domain Controllers or domain-joined member servers.

Internal IP Addresses

Internal IP addresses, also referred to as dynamic IP addresses, or DIPs, are used for direct communication between Azure IaaS VMs within a cloud service or a virtual network. An internal IP address can be dynamic, which means each time the virtual machine is deallocated the IP is lost, or it can be statically assigned, which means the IP address does not change. You can pre-assign any of the available IP addresses within each subnet to any of the virtual machines that reside on that subnet, effectively ensuring that the IP address will remain static regardless of the state of the virtual machine. Typically, these networks use the private IP address ranges, as defined by RFC 1918 (namely 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16), although it is also possible to define virtual networks using publically-routable IP address ranges that your company owns.

Virtual IP Addresses

Virtual IP addresses (VIPs), which we mentioned earlier, are publicly accessible IP addresses assigned to the cloud service containing your virtual machines. They are used to reach specific ports of virtual machines through their endpoints, leveraging port-level Network Address Translation (NAT) between external endpoints exposed by the VIP of the cloud service, and a port associated with the internal IP address of the virtual machine within it. VIPs occupy the public IP address space owned by Microsoft. By default, the VIP is dynamic and can be lost if all of the virtual machines within the cloud service are deleted or stopped in the deallocated state. You can configure the VIP to be static (called a reserved IP) to ensure the IP address remains constant. You cannot request a specific IP address (like you can with the static internal IP address assigned to a virtual machine).

Instance Level Public IP Addresses

An instance level public IP address (PIP) can be assigned directly to a virtual machine, and provides direct external connectivity to a virtual machine within a cloud service (rather than relying on the port-level NAT). This facilitates scenarios where it is necessary to communicate through a range of dynamically allocated ports (for example, when using passive File Transfer Protocol), or where outgoing traffic from an Azure IaaS Virtual Machine to an external service must be restricted based on source IP.

Direct Server Return

Direct Server Return is a feature applicable to VIP- and DIP-based communication in scenarios that involve, respectively, public load balancing and internal load balancing. Its purpose is optimizing the efficiency of such communication by responding to incoming requests directly, bypassing the load balancer for outgoing traffic. This functionality is required when implementing SQL Server 2014 AlwaysOn Availability Groups on Azure IaaS Virtual Machines.

Access Control Lists

Access Control Lists (ACLs) can be applied to external cloud service endpoints to allow or deny incoming traffic based on the source IP address range.

Network Security Groups

Network Security Groups (NSGs) supersede the functionality of ACLs by providing the ability to control incoming traffic on a per-virtual-network subnet or individual virtual machine basis for both external (originating from the Internet) and internal (routed through Azure virtual network) traffic. This functionality is useful in scenarios where you need to restrict communication between individual virtual machines or functional tiers in multi-tier solutions. ACLs and NSGs are mutually exclusive, so you need to remove one before you apply the other.

Site-to-Site Virtual Private Network

A Site-to-Site Virtual Private Network (VPN) provides network connectivity between on-premises networks and Azure virtual networks by creating an encrypted channel over public Internet using IPSec.

VNet-to-VNet Virtual Private Network

A VNet-to-VNet VPN delivers equivalent functionality for connections between regional virtual networks in Azure. In this case, encrypted traffic is routed over Microsoft backbone networks between regional data centers. With a VNet-to-VNet connection, encryption can be disabled for higher throughput.

ExpressRoute

ExpressRoute is a higher-throughput and lower-latency option for connecting on-premises networks to Azure virtual networks, and also offers an additional level of protection by not relying on public Internet when routing traffic to Azure. In general, this can be accomplished either by provisioning a dedicated circuit to an Exchange provider with its own private link to Azure, or by purchasing an MPLS circuit that delivers Azure connectivity functioning as part of an MPLS-based wide area network.

Azure Standard Storage

Azure Standard Storage is the traditional method of facilitating persistent storage needs of Azure IaaS VMs. Persistent virtual disk files are implemented as page blobs and accessed by a virtual machine through a storage network. For standard tier virtual machines, storage performance is limited to 60 MB/s and 500 IOPS. This limit can be increased for virtual machines running Windows operating systems by attaching multiple virtual disks and combining them into simple storage spaces–based volumes, which deliver aggregated throughput. The resiliency of simple storage spaces is predicated on the redundancy built into the Azure platform, where the content of each page blob is synchronously replicated across three identical replicas. The number of disks that can be attached to a virtual machine depends on its size and, with standard storage, ranges from 1 to 32. When creating a simple storage space, you should ensure that the number of columns matches the number of disks in the underlying storage pool. This might require the use of Windows PowerShell cmdlets, which allow you to explicitly specify the number of columns, since the Windows Server Manager graphical interface caps that number at eight.

A temporary disk for an Azure IaaS Virtual Machine (mounted by default as D: drive on the Windows operating system) leverages a local disk of the underlying Hyper-V host, rather than the Azure blob storage. This minimizes storage transactional charges and network bandwidth without sacrificing I/O

performance. With the Windows operating system, the most common use of the temporary disk has traditionally been to host a paging file, although its significance has increased with the introduction of the VM series that relies on Solid State Drives (SSD)–based local storage. For example, in SQL Server 2014 deployments to Azure IaaS VMs, using the SSD-based temporary disk to implement Buffer Pool Extension is recommended.

Disk caching of Azure IaaS Virtual Machines leverages disk caching of the underlying Hyper-V host. With standard storage, caching delivers the most meaningful performance gains during the operating system boot process, which is the reason that Read-Write caching is enabled by default for operating system disks. On the other hand, disk caching should typically be set to None for data disks unless the workload is known to be safe with disk caching enabled. This recommendation, however, does not apply when local SSD storage is used, because in this case disk caching can contribute significantly to overall storage performance.

Azure Premium Storage

Azure Premium Storage allows you to further enhance performance limits of persistent virtual disks. This is accomplished by employing Solid State Drives (SSD) technology for blob storage, which delivers increased throughput, with an aggregate capable of reaching 512 MB/s and 50,000 IOPS when using the Standard_DS14 VM size with 32 data disks. Note that at the time of writing of this white paper, Azure Premium Storage is available only for the DS series of virtual machines, which are hosted on Hyper-V systems with local SSD storage. This allows you to take advantage of local disk caching, raising potential throughput beyond 100,000 IOPS.

It is important to understand that Premium Storage throughput is dependent on both VM size and the disk type, with the disk type categorized as P10, P20, or P30, where each disk type is directly associated with specific throughput and size. When architecting your solutions, be sure to take both factors into consideration. In addition, keep in mind that, unlike with standard storage, pricing is determined by the size of the allocated storage (rounded up to the nearest disk type), rather than the amount of disk space actually used. You can lower the cost by using standard storage for the operating system disk, without significant impact on system performance after the boot sequence completes, as long as the disk is only used for this purpose. Finally, note that, unlike with standard storage, the caching for data disks is set to read-only by default.

SQL Server Configuration

Because Dynamics CRM stores almost all of its configuration and data in a SQL Server database, understanding the performance implications of your disk design is vital to this configuration. Please review the information in the following white papers:

- Performance Best Practices for SQL Server in Azure Virtual Machines
- Premium Storage: High-Performance Storage for Azure Virtual Machine Workloads
- Sizes for Cloud Services
- Sizes for virtual machines

Here are some highlights:

- Be sure to use separate disks for data files, log files, and TempDB files.
- You can also use storage spaces over multiple disks to aggregate their IOPs, bandwidth, and storage space. Separate storage spaces should be used for data and log files.
- When using Premium Storage:
    - Enable read caching on disks hosting data files.

    - For log files, set read caching to None.
    - Consider enabling Buffer Pool Extensions and placing TempDB on the temporary disk.

The SQL Server AlwaysOn feature requires at least three nodes, with one acting as a quorum server. This means you will need at least three virtual machines for scenarios that require AlwaysOn.

More about Microsoft Azure Infrastructure-as-a-Service

- Microsoft Azure Virtual Machines
    - http://azure.microsoft.com/en-us/documentation/services/virtual-machines/
- Microsoft Azure Virtual Networks and Hybrid Connectivity
    - http://azure.microsoft.com/en-us/documentation/services/virtual-network/
    - http://azure.microsoft.com/en-us/documentation/services/expressroute/
    - http://azure.microsoft.com/en-us/documentation/services/vpn-gateway/
- Azure Premium Storage, now generally available
    - http://azure.microsoft.com/blog/2015/04/16/azure-premium-storage-now-generally-available-2/
- Premium Storage: High-Performance Storage for Azure Virtual Machine Workload
    - http://azure.microsoft.com/en-us/documentation/articles/storage-premium-storage-preview-portal/

Benefits of Deploying Dynamics CRM in Azure Virtual Machines

Following are some of the numerous advantages of migrating existing workloads or deploying new workloads to Azure:

- Eliminating capital expenditures and lowering operational expenditures. With Azure IaaS you are not responsible for managing the underlying physical infrastructure.
- Microsoft Azure backs the availability of virtual machines with a 99.95% service level agreement (SLA), assuming the use of availability sets with at least two instances of each VM providing matching functionality.
- Optimizing your deployment by monitoring virtual machines utilization, and if you are over (or under) provisioned, increasing the size of the virtual machine to match your needs.
- For virtual machines that are hosting stateless aspects of Dynamics CRM, such as the front-end web servers, enabling autoscale to allow virtual machines to automatically start or stop within a workload based on the load. When virtual machines are stopped (deallocated) you are not paying for the compute time, which can save a significant amount of money over time.
- Built-in load balancing for Internet-facing or internal (intranet) deployments.
- Quickly provisioning a new environment from scripts or a template for development or test, and then just as quickly delete it when no longer needed to infuse a significant amount of agility to your organization.

Planning

This section describes factors to consider when planning your Dynamics CRM installation using Microsoft Azure virtual machines.

Dynamics CRM and SQL Server

- The number of concurrent users

- The amount of data the system is required to operate with
- The number of client devices that will be communicating with the CRM system, such as CRM for Outlook Offline and mobile applications
- The number of other systems requiring integration, sharing, and updating of information in either a real-time or scheduled basis
- Application response times
- Bulk operations such as workflow automation, email marketing, website traffic, and electronic commerce
- User uptime expectations

Supporting Infrastructure

- How will inbound traffic to Microsoft CRM be managed? Microsoft Azure Virtual Machines support both internal and external load balancing. Only one form of load balancing can be used in the same cloud service.
- Will Active Directory forest be self-contained within the Azure virtual network, or will it be an extension of your on-premises Active Directory forest through a site-to-site VPN or ExpressRoute?
- How will inbound and outbound Dynamics CRM email be handled?
    - Using Office 365?
    - Using hosted Exchange (by leveraging Azure Virtual Machine deployment or a third-party hosting provider)?
    - Using the existing corporate on–premises Exchange infrastructure?
- If Microsoft SharePoint will be required for document storage, will it be hosted by the Azure Virtual Machine deployment, a third party, or Office 365?

Other Deciding Factors

- Budget
- Timeframe

Understanding these factors, combined with the reference scenarios presented in the next section, will help determine your actual configuration.

Dynamics CRM 2015 Reference Architecture and Scenarios

Microsoft provides design guidance for a variety of deployment scenarios in the Microsoft Dynamics CRM 2015 Implementation Guide.

There are three main tiers in any Dynamics CRM architecture: web, application, and database.

Web Tier

Overview: Because Dynamics CRM is a web application, all user activity is directed by HTTP or HTTPS to this tier of servers.

Scalability and Resiliency: The web tier horizontally scales to increase availability by adding additional web servers that reside behind the Microsoft Azure load balancer (external or internal). Microsoft Azure provides an autoscale service for stateless roles like the web tier that can turn on and turn off (deallocate or allocate) pre-created servers to accommodate increased or decreased load. When virtual machines are in the deallocated state you do not pay for the compute time of that virtual machine.

Application Tier

Overview: A variety of application servers can be deployed in a Dynamics CRM environment, depending on business requirements. These servers generally host one or more application server roles.

Scalability and Resiliency: The application tier is scaled horizontally with the addition of multiple application servers that share the workload between the Dynamics CRM front-end and back-end server processes.

Database Tier

Overview: The database tier uses Microsoft SQL Server to store all Dynamics CRM data and configuration. Additionally, the database tier hosts SQL Reporting Services, which provides Dynamics CRM with database reporting capabilities.

Scalability and Resiliency: The database tier can be implemented using Microsoft SQL Server's AlwaysOn functionality to provide high availability and disaster recovery capabilities. You can take advantage of the ease with which vertical scaling can be applied to Azure Virtual Machines.

Deploying Virtual Machines into Availability Sets

For each workload tier you should deploy multiple virtual machine instances in an availability set. Configuring availability sets for each logical tier provides Azure the information needed for your application architecture, so availability is ensured during a scheduled host update and all of your virtual machines are not restarted simultaneously. It also distributes the virtual machines in each tier across two fault domains (redundant and separate physical hardware) in the data center for physical redundancy.

Note: When using the newer Azure Resource Manager model an availability set will deploy across three fault domains.

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Deployment Availability

Dynamics CRM 2015 is generally deployed in one of these two configurations, depending on how users are allowed to access the Dynamics CRM application:

- From anywhere on the Internet, using Internet Facing Deployment (IFD)
- From within the corporate network

Deployment Scenarios

The following deployment scenarios are designed to give you flexibility in the areas of availability, performance, and cost, depending on your requirements:

- Two-tier single server configuration
- Standard configuration
- High–performance, high–availability configuration

Installed Components

Front-End Server Components

The following components are installed on the front-end server:

- Dynamics CRM web application
- Dynamics CRM web services

Back-End Server Components

The following components are installed on the back-end server:

- Dynamics CRM Asynchronous Service
- Dynamics CRM Sandbox Service

Database Server Components

The following components are installed on the database server:

- Microsoft SQL Server
- SQL Reporting Services

Email Router Components

The following component is installed on the email router server:

- Dynamics CRM Email Router Service

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Two-Tier Single Server Configuration Architecture

A two-tier, single server architecture contains all of the components that make up the Dynamics CRM installation installed on a single server.

Components

The following components are installed on a single Dynamics CRM virtual machine:

- Dynamics CRM application server (includes all application server roles)
- Email router (optional)

The following component is installed on the SQL Server VM:

- Microsoft SQL Server (including SQL Reporting Services)

Uses and Recommendations

A two-tier configuration is generally reserved for development, testing, or pilot programs. While you can use this configuration as a production environment, it is recommended that you keep the number of users and devices low, typically fewer than 30–50, depending on the server's workload.

The main consideration is that this configuration provides no redundancy, so any failure or scheduled maintenance of Azure virtual machines, an application component, or the server itself, will take the entire system offline.

Suggested VM Configuration

Role(s)	Instance Type	Cores	Memory	Storage
Dynamics CRM	A3	4	7 GB	OS: 127 GB (Standard)
SQL Server	DS4[1]	8	28 GB	OS: 127 GB (Standard)[2] SQL Data: 127 GB (P10 Premium)[3] SQL Logs: 127 GB (P10 Premium)

[1] The instance size should be determined based on I/O factors presented earlier.

[2] The operating system (OS) drive will also contain all of the Microsoft Dynamics CRM and Microsoft SQL Server application files.

[3] Azure Premium Storage is required if using Dynamics CRM in a production environment.

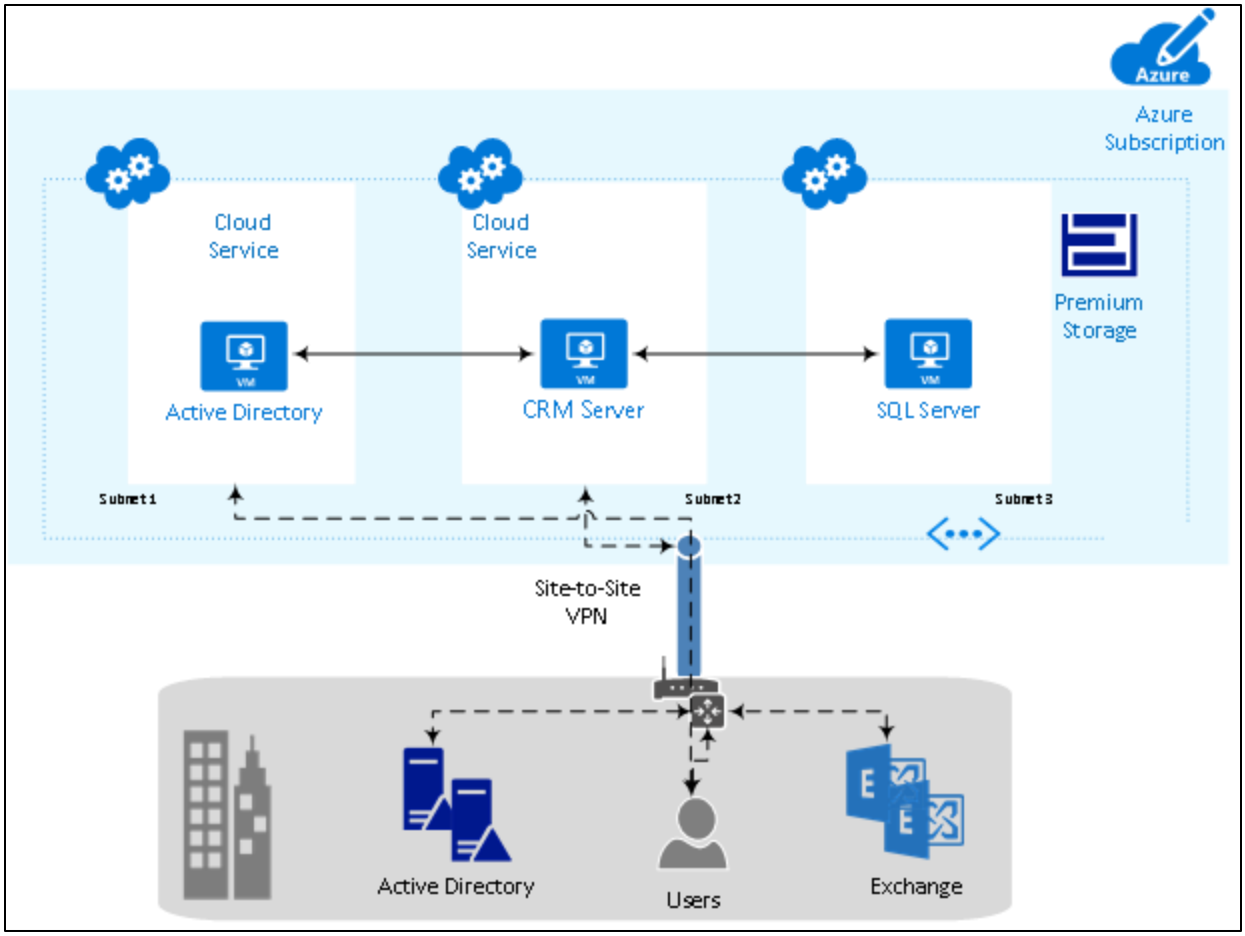

Figure 1. Two-tier, single server configuration with user access from on-premises

In the example depicted in Figure 1, users can access the CRM server using its host name, which should resolve to its internal IP address assuming Active Directory is set up correctly with the Azure Virtual Network. A public endpoint could also be opened to allow external users access, but this would require a supporting Azure AD deployment.

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Standard Configuration Architecture

The standard two–tier architecture is the most common Dynamics CRM architecture, and can comfortably support 50–100 users, depending on final configuration and workload.

Components

The following components are installed:

- Dynamics CRM application server (includes all application server roles)
- Microsoft SQL Server (including SQL Reporting Services)
- Email Router (optional)

Uses and Recommendations

This configuration can be used in a production environment with the caveat that, without redundancy, there will be down time during scheduled maintenance for Azure Virtual Machines or during hardware or software failures.

Suggested VM Configuration

Role(s)	Instance Type	Cores	Memory	Storage
Dynamics CRM	A3[1]	4	7 GB	OS: 127 GB (standard)
SQL Server	DS4	8	28 GB	OS: 127 GB (Standard)[2] SQL Data: 1 TB (P20 Premium)[3] SQL Logs: 127 GB (P10 Premium)
Email Router (optional)	A2	2	3.5 GB	OS: 127 GB (Standard)

[1] The instance size should be determined based on I/O factors presented earlier.

[2] The operating system (OS) drive will also contain all of the Microsoft SQL Server application files.

[3] Azure Premium Storage is required if using Dynamics CRM in a production environment.

This configuration takes into account maximum system availability through the use of three availability sets. This allows you to benefit from the 99.95% availability SLA.

Eliminating availability sets and using individual virtual machines to host CRM components would lower your overall solution cost, but also eliminate the availability SLA and subject the underlying components to hardware failures and Hyper–V host updates, which would negatively impact overall system availability.

Each tier of the solution resides in its own subnet within the same virtual network. Network Security Groups could be used to restrict traffic between the subnets, allowing only network traffic required to support the solution. This limits exposure of the virtual network to security threats that originate on the Internet and come through the Dynamics CRM front-end server.

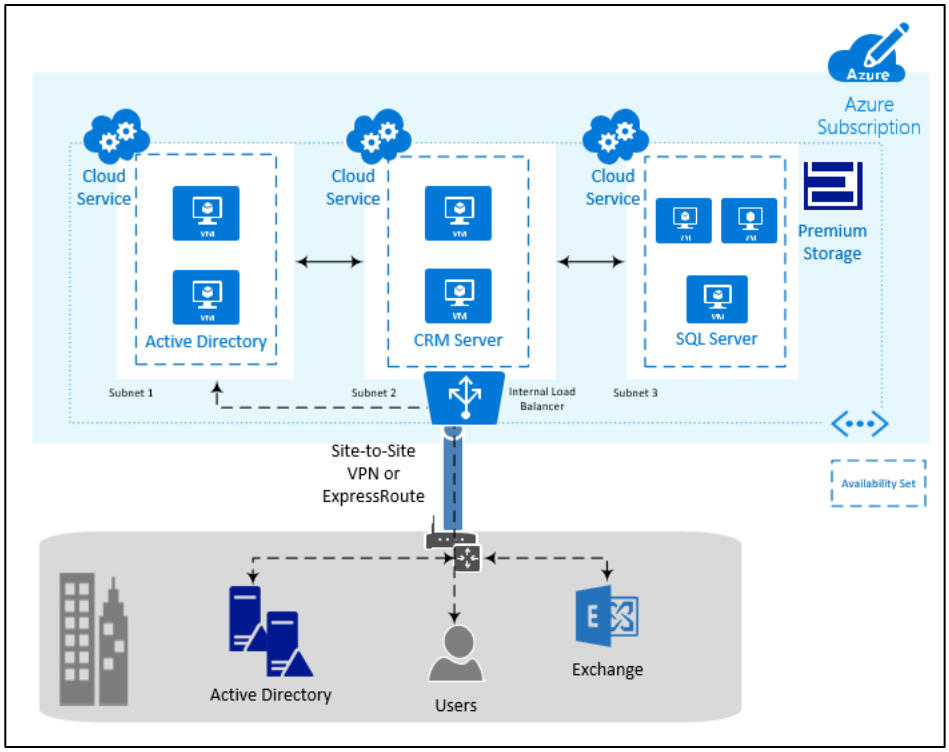

Figure 2. Standard configuration using internal load balancing

In the example depicted in Figure 2, because the CRM web servers are deployed behind an internal load-balancer, users can only access the CRM server from the internal network.

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High-Performance, High Availability Configuration Architecture

Figure 3 below demonstrates the recommended architecture for large enterprise organizations that require high availability and high performance.

This design shows the use of existing internal Active Directory Services authentication for Dynamics CRM 2015. Active Directory Federation Services will also be required when you need to allow devices external to your domain to connect to your CRM system.

Components

The following components are installed:

- Dynamics CRM application servers (front-end servers)
- Dynamics CRM application server (back-end servers)
- Microsoft SQL Server (including SQL Reporting Services) configured with SQL Server AlwaysOn Availability groups.
- Email Router (optional)

Uses and Recommendations

This configuration can be used in a production environment where system availability is an absolute requirement.

Suggested VM Configuration

Role(s)	Instance Type	Cores	Memory	Storage
Dynamics CRM (Front-End Server)	A3	4	7GB	OS: 127 GB (Standard)
Dynamics CRM (Back-End Server)	A4	8	14GB	OS: 127 GB (Standard)
SQL Server	DS14	16	112GB	OS: 127 GB (Standard) SQL Data: 1 TB (P30 Premium SQL Logs: 1 TB (P30 Premium)
Email Router (optional)	A2	2	3.5GB	OS: 127 GB (Standard)

This configuration takes into account maximum system availability through the use of four availability sets. This allows you to benefit from the 99.95% availability SLA.

Each tier of the solution resides in its own subnet within the same virtual network. Network Security Groups can be used to restrict traffic between the subnets, limiting it only to network traffic required to support the solution. This limits exposure of the virtual network to security threats that originate on the Internet and come through the Dynamics CRM Front–end server.

The throughput of the SQL Server tier can be easily increased by creating multiple disks and configuring them in a storage space. This allows SQL to distribute IO operations across each disk and increase the number of IOPS.

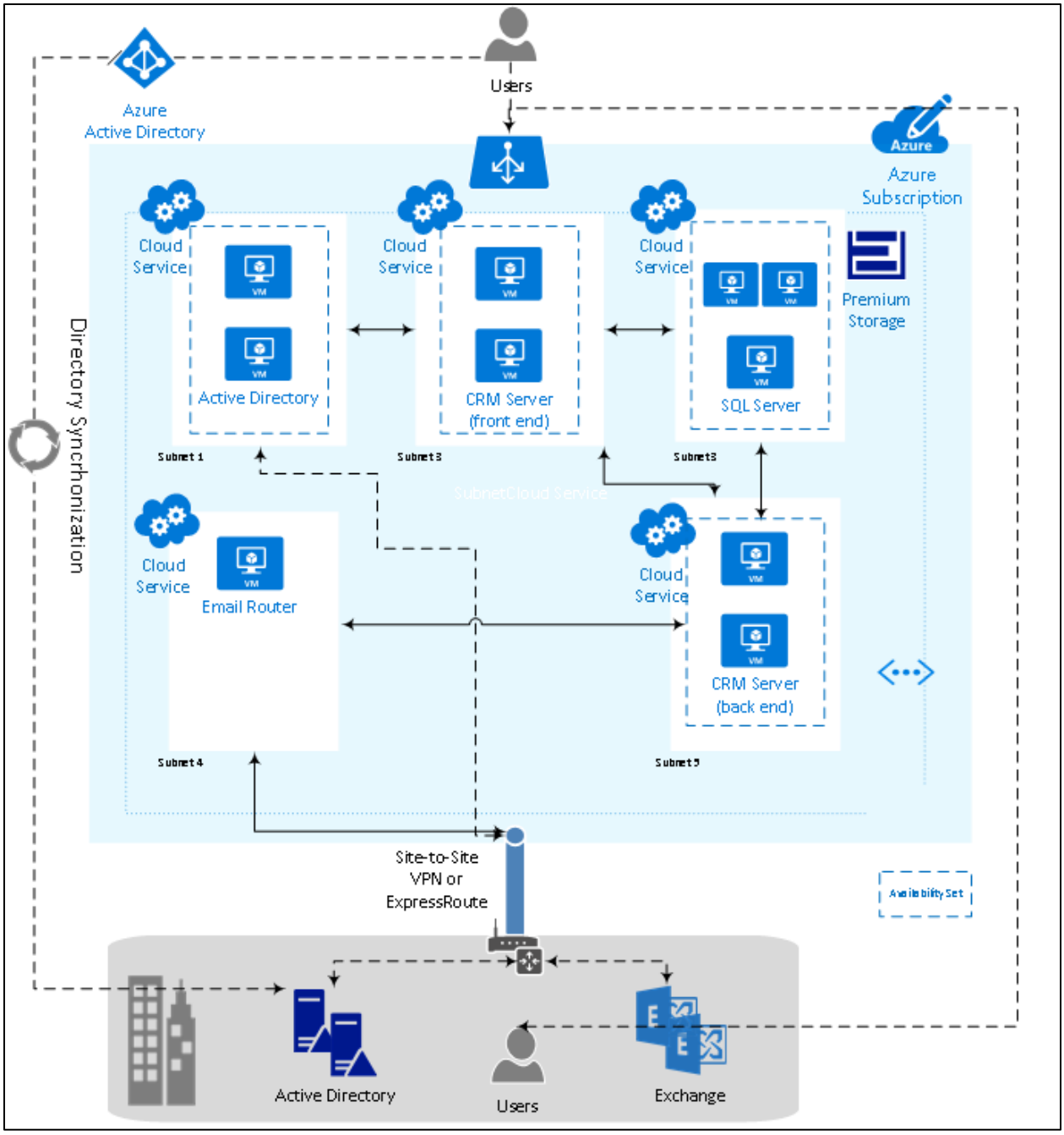

Figure 3. High-performance, high availability configuration using internal load balancing

In the example depicted in Figure 3, users can access the CRM server using a load balancer configured for external access and authenticated against a Microsoft Azure Active Directory tenant.

Management and Maintenance

The Microsoft Azure Management Portal has built-in monitoring, diagnostics, and alerting capabilities to monitor your deployment. Using the Azure Preview Portal you can easily create dashboards that show the current utilization of your virtual machines from a number of performance metrics like CPU, network, and disk activity, as well as monitoring the connection state between your hybrid network (if configured).

Microsoft Operations Management Suite (OMS) is a service that allows you to easily monitor whether your servers have current updates or malware signatures, and also has great functionality for searching web and event logs. OMS includes a solution gallery with built-in queries for workloads like SQL Server.

Microsoft System Center Operations Manager (SCOM) is another option typically used to monitor and manage a Microsoft-based infrastructure. SCOM includes Operations Manager agents for Windows Server, SharePoint Server, and SQL Server by default. In addition, a Management Pack for Dynamics CRM 2015 is also available that allows you to monitor Dynamics CRM.

You can install SCOM within your Azure-based infrastructure or using the intranet scenario, Operations Manager works as it does in an on-premises installation, because your VPN arrangement effectively extends the enterprise network into the Azure cloud. You just connect to the Azure VMs as you would any other group of servers. You may want to install a SCOM Gateway Server, to consolidate the communication from the Azure VMs to your SCOM management server to reduce overall network traffic.

Additional Information

For additional information and resources, please see the following documents:

- Deploying an Active Directory Forest in an Azure Virtual Network
- Deploying an Active Directory Replica in an Azure Virtual Network
- Virtual Machine and Cloud Service Sizes for Azure
- Tutorial: Listener Configuration for AlwaysOn Availability Groups
- Azure Premium Storage, now generally available
- Premium Storage: High-Performance Storage for Azure Virtual Machine Workloads
- Performance Best Practices for SQL Server in Azure Virtual Machines
- Management Pack for Dynamics CRM 2015
- Using SSDs in Azure VMs to store SQL Server TempDB and Buffer Pool Extensions
- Failover Clustering and AlwaysOn Availability Groups (SQL Server)
- Network Security Groups

Summary

Azure's Infrastructure-as-a-Service removes barriers typically associated with deploying a Dynamics CRM implementation, and provides a supported platform for development and test. While IaaS offers more flexibility and control than Dynamics Online SaaS, it does require more planning and testing. Be sure to follow the links included throughout this document for guidance as you adopt Azure for use with Dynamics CRM 2015.