

Pre-Live Testing

for Call Credit Optimus Azure project

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Revision History

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| --- | --- | --- | --- |
| Date | Changes | Version | Author |
| 02/07/2018 | Draft version | 0.1 | Ryan Stephens |
| 04/07/2018 | First Release | 1.0 | Bartosz Kubiak |

# Executive Overview

Call Credit has engaged with Inframon as part of their strategy to migrate compute workloads into the Azure cloud platform. Inframon has developed extensive experience with both Azure and the Microsoft product suite over many years of working on similar engagements and have been requested to provide an accelerated deployment for Call Credit to transition to the use of Azure. This document details the DR failover and test plan for this initial deployment based on the technical and operational criteria needed to deliver a highly available and flexible architecture from Microsoft Azure.

## About Inframon

* Founding principles based on technical ability
* Agile organisation – cloud specialists to large global enterprises
* Proven track record with migration to public and private clouds
* Strong and credible relationships with Microsoft and supporting Microsoft technology

Inframon is a Microsoft Cloud transformation specialist with expert knowledge and skills across the range of Microsoft hybrid based services including System Center 2016, Operations Management Suite and Azure.

As a Microsoft Gold Cloud and Microsoft Azure Gold Cloud Partner we have a proven track record of helping our customers to leverage Microsoft hybrid Cloud based services and applications to transform and modernise their operations and processes.

Now in its 11th year, Inframon was founded from an infrastructure perspective and bases its principles around recruiting great people and maintaining a strong technical and business focus. Both founders have strong technical backgrounds and the company has a history of supporting Microsoft on their enterprise accounts around Microsoft Systems Center.

Inframon has fast gained its reputation as the best in systems set-up with expertise at mastering the latest Microsoft innovations, gaining momentum and equipping customers to move from their legacy computing platforms and transforming them into cloud operating models.

A trusted agile partner helping our customers move to the cloud

Our customers want to move to cloud – a new world with a whole different set of complexities – and they want to partner with an expert who will help them manage that process. Inframon does exactly that, creating governance and control frameworks to manage and support the whole cloud journey, wrapping strategy and consultancy around the service together with our valued professionalism and expertise.

At Inframon we forge close relationships with our customers helping them with every step of the technology lifecycle – from vision and strategy, hardware, software and licensing, consulting through to support and managed services. Inframon prides itself on its ability to work with large enterprise organisations as well as SMEs to take them on their cloud transformation journey.

Inframon – Your Hybrid Cloud Management specialist

To meet the increasing complex needs of its customers Inframon has designed and developed the Hyper Cloud Platform, a technology that provides a highly automated and orchestrated control and governance framework, delivering self-service capability while maintaining control over all your cloud based assets.

# Assumptions:

## Pre-failover testing

* The Ensono design has been used, changes to the design may affect the DR capabilities and the tests required.
* The DNS records are pointing towards an Azure Traffic Manager profile.
* The environment has been fully deployed and has been configured as per the design.

# Out of scope:

The Callcredit “optimus” application is manged by call credit’s IT team, therefore is out of scope for this failover and test plan. Please refer to internal Callcredit documentation for application specific testing.

# DR Failover information

When services failover to the DR site, known as “UK-B” (Currently located in the Azure region “UK West”) all incoming connections will be directed to this site using Azure Traffic Manager.

These services are automatically made aware of the DR failover as they utilise health heartbeats to monitor services.

Each tier of the application has a secondary node within an Availability Set, which ensures the secondary node is within a separate part of the data centre, with different hypervisor, power and storage.

The Recovery time Objective (RTO) for a full DR failover is expected to be 4 hours or less, and this time starts once the decision to failover to DR has been made, and the first step in the DR failover process document is initiated.

Service health in DR will be confirmed by completing all test steps, and the RTO timer will be stopped upon successful completion of all tests.

The first step in failover is to initiate the process form the console and wait for the virtual machines to boot up. Once booted, the traffic manager and load balancers will require up to 10 minutes to complete their changes to direct all traffic to the DR site. Additional time may be required to allow for internal DNS propagation delays.

# Web Teir Tests

### Web Tier VM Failure Tests

The web tier for live is separated to three different subnets which is fronted by an Azure Application Gateway (Web Application Firewall). The Application Gateway has internal health probes which test that the backend pools and ensures that traffic is being routed to them, failure in-doing so will result in the Application Gateway reporting a 502 error. The first test would be take offline one of the nodes and ensure traffic is routing successfully to the secondary node through the application gateway. This can be tested directly through the Application Gateway by editing the windows host file to point the URL to the public IP of the Application Gateway.

* Update Windows host file to point towards the application gateway public ip and flush DNS cache, therefore directly testing traffic failover on the application gateway.
* Browse to the page and ensure that traffic routing is working, you should be able to reach the backend site.
* Stop and deallocate the primary node, which will shut down the VM and deallocates it from the hypervisor, this will simulate the VM going offline.
* Then clear local browser cache and ensure the web application is still reachable.

### Web Tier Region Failure Test

The Traffic is being manged by Azure Traffic Manager which is a geographic DNS management solution. This product ensures that DNS doesn’t need to be updated in the event of a failover which avoids DNS propagation and issues with customers caching the DNS record. This works by having backend pools which point towards two different regions, the traffic is then routed to a secondary region in the event of a failover. To test this the DNS record must be pointed towards the Traffic Manager profile and the Traffic Manager profile must be pre-configured with the backend pools and health probes:

* Using Azure Site Recovery, select the test DR option to failover the web tier traffic. This will deploy the replicated VM’s within the secondary region (UK West).
* As this is a test DR situation this won’t change the Traffic Manager configuration, therefore we will need to simulate the failure by decollating the web tier VM’s within the primary region.
* Now check Traffic Manager and the primary region should be reporting as “Degraded”, if so now test browsing to the URL of the application to see if traffic is successfully being routed to the secondary region.

### Web Tier Failover Test Output

|  |  |  |
| --- | --- | --- |
| Test | Expected Failure Results | Expected Pass Results |
| Deallocate VM and ensure traffic is still being routed. | You will receive a 502-error message page and will not be able to access the web application. | Traffic will be successfully routed to the secondary node and you will still be able to access the application. |
| Traffic Manager Testing | You will be unable to access the application and will likely only receive the maintenance page. | The Traffic will be routed to the secondary region. |
|  |  |  |

# Application Tier Failover

### Application Tier VM Failure Test

Each part of the application tier has two nodes within the same region which is fronted an Azure Internal Load Balancer, which will route the traffic to the available application server. The below test takes the primary application server offline to ensure that the VM successfully fails over to the secondary node within the primary region:

* Stop and deallocate the primary node, which pull shutdown the VM and deallocates it from the hypervisor, this will simulate the VM going offline.
* Then ensure with the team responsible for the application tier that the application is still functioning as expected.

### Application Tier Region Failure Test

The application tier is being protected by Azure Site Recovery, which is replicating the VM to storage within the secondary Azure region (UK West). The below test replicates fail’s over the application sever to the secondary region:

* Force a failover using Azure Site Recovery to the secondary region.
* Then handover to application team to test the VM and ensure the application is working.

### Application Tier Failover Test Output

|  |  |  |
| --- | --- | --- |
| Test | Expected Failure Results | Expected Pass Results |
| Deallocate VM and ensure traffic is being routed to secondary application server and verify that application continues to function correctly. | Traffic is not being routed to the secondary server and/or application is not functioning correctly. | Traffic is routed to secondary application server and the application is functioning correctly. |
| Azure Site Recovery Failover | The Application is not functioning correctly after the failover. | The application is functioning correctly after the failover. |
|  |  |  |

# Database Tier Failover

### Database Tier Primary Region Failover Test

The database tier has been configured within an Availability Group SQL cluster with two fully synchronise nodes within the primary region and a secondary asynchronies replication to a sever within UK West. In front of the primary nodes is an Azure Internal Load Balancers which shares the same IP as the primary SQL listener, this is required within Azure to route traffic to active node. Due to limitations with connection drivers within the application the “MultiSubnet” feature will need to be disabled. This will affect the DR as this feature automatically fails over to the secondary SQL listener in the event of failure, therefore will require a manual internal DNS update to failover to secondary region. The below test forces a database failover within the primary region. This test simulates a VM failure within the primary region:

* Log into SQL Management Studio and connect to the primary SQL listener.
* Expand AlwaysOn High Availability and the Availability groups node.
* Right click the availability group and select failover.
* Then select the secondary node within the primary region, this will initiate a forced failover within the primary region.
* Then test the web and application tiers to ensure they are still functioning correctly.

### Database Tier Region Failure Test

The secondary region (UK West) active node within the same cluster as primary region UK South. The below test failovers over the database to a secondary region. This simulates a region failure:

* Log into SQL Management Studio and connect to the primary SQL listener.
* Expand AlwaysOn High Availability and the Availability groups node.
* Right click the availability group and select failover.
* Then select the third node within the secondary region node then press failover, this will initiate a forced failover to the secondary region.
* Then open DNS Management and update the internal DNS SQL Listener to point towards the IP of the secondary region SQL listener, this is due to the MultiSubnet feature not being compatible with the application.
* Then login to the application and web tiers and ensure the DNS record has been updated, you may need to flush the DNS cache on the servers.
* Then test the web and application tiers to ensure they are still functioning correctly.

### Data Tier Failover Test Output

|  |  |  |
| --- | --- | --- |
| Test | Expected Failure Results | Expected Pass Results |
| Force Database failover within primary region. | Web and Application Tiers no longer able to access the database. | Web and Application Tiers continued to function. |
| Force Database failover to the secondary region. | Web and Application Tiers no longer able to access the database. | Web and Application Tiers continued to function. |
|  |  |  |