

Bootcamp-Project 4

MULTI-REGION DISASTER RECOVERY SETUP WITH TRAFFIC
MANAGER

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Introduction

In today's cloud-native environments, building highly available and resilient applications is a fundamental requirement for businesses. This project focuses on designing and implementing a **multi-region disaster recovery solution** using **Microsoft Azure** services. The goal is to deploy a web application across two Azure regions, ensuring business continuity even during regional outages. The architecture uses **Azure Traffic Manager** for intelligent traffic distribution, **Azure App Services** for hosting the web application instances, **Azure SQL Database with Geo-Replication** for backend resiliency, and **Azure Storage with Geo-Redundant Storage (GRS)** for data durability.

The project also includes simulating a regional failure to validate the disaster recovery strategy, setting up monitoring and alerting mechanisms with **Azure Monitor**, and generating a report analyzing failover behaviour and system response times.

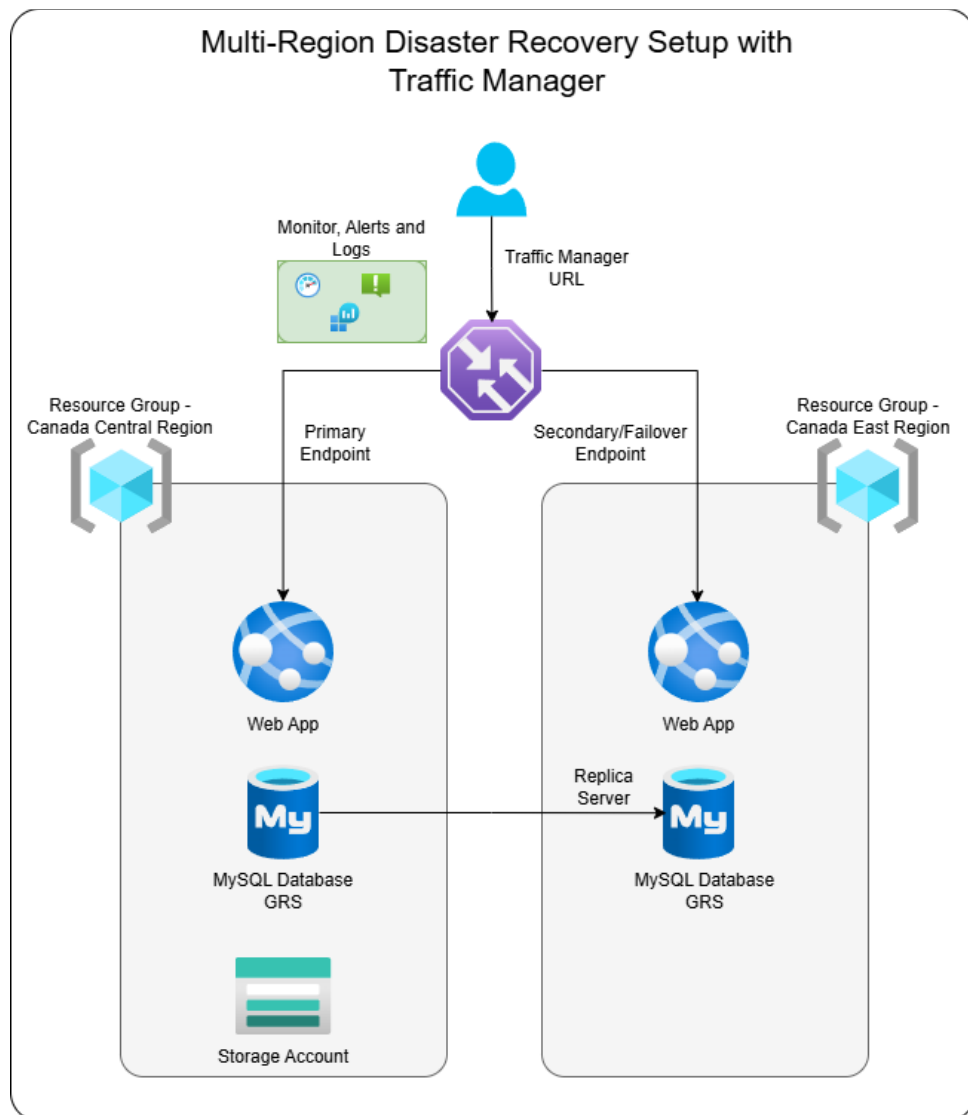
Project Objectives

- **Multi-Region Deployment:** Deploy instances of a web application in two separate Azure regions (East US and West US).
- **Backend Resiliency:** Configure Azure SQL Database Geo-Replication and Azure Storage Account with GRS to ensure data redundancy.
- **Traffic Management:** Set up Azure Traffic Manager with priority-based routing to automatically failover traffic to the secondary region during outages.
- **Failover Simulation:** Perform a controlled failover by stopping the primary web app and validate automatic traffic redirection.
- **Monitoring and Alerting:** Enable Azure Monitor, set up alerts for endpoint health, and collect diagnostic logs for tracking system behaviour.
- **Reporting:** Generate a basic report summarizing the failover event, response time, and system logs for validation.

Expected Outcome

This project will achieve a working, resilient multi-region web application setup on Azure. The web application will automatically reroute traffic to a healthy secondary region during primary region failures, ensuring minimal downtime and uninterrupted service availability. Backend databases and storage will remain consistent and available across regions through geo-replication. Monitoring and alerting systems will provide real-time visibility into system health and performance.

Architecture Diagram



Solution Steps

1. App Deployment

- A. Creation of Resource groups in Two different regions (Canada Central and Canada East)

Resource groups ...

Default Directory

+ Create Manage view Refresh Export to CSV Open query Assign tags Group by none

You are viewing a new version of Browse experience. Some features may be missing. Click here to access the old experience.

Filter for any field... Subscription equals all Location equals all Add filter

Name	Subscription	Location
BCPP4-CanadaCentral	Azure subscription 1	Canada Central
BCPP4-CanadaEast	Azure subscription 1	Canada East
DefaultResourceGroup-null	Azure subscription 1	Canada East

B. Creation of Web Apps in both the regions.

App Services

Default Directory

+ Create Manage Deleted Apps Manage view Refresh Export to CSV Open query Assign tags Start Restart Stop Delete Group by none

You are viewing a new version of Browse experience. Some features may be missing. Click here to access the old experience.

Filter for any field... Subscription equals all Resource Group equals all Type equals all Location equals all Add filter

Name	Status	Location	Pricing Tier	App Service Plan	Subscription	App Type
bcpp4-canadacentral	Running	Canada Central	Standard	ASP-BCPP4CanadaCentra...	Azure subscription 1	Web App
bcpp4-canadaeast	Running	Canada East	Standard	ASP-BCPP4CanadaEast-9...	Azure subscription 1	Web App

C. Deploy the sample .NET web app into the web app created in both the regions

Code Repository: <https://github.com/merranbo1989/BCP-P2.git>

Home > App Services > bcpp4-canadacentral

Web App

Search

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Microsoft Defender for Cloud
- Events (preview)
- Recommended services (preview)
- Log stream
- Resource visualizer
- Deployment
- Settings
- Performance
- App Service plan

Essentials

Resource group (move) : bcpp4-canadacentral

Status : Running

Location (move) : Canada Central

Subscription (move) : Azure subscription 1

Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbc3aac

Tags (edit) : Add tags

Default domain : bcpp4-canadacentral.azurewebsites.net

App Service Plan : ASP-BCPP4CanadaCentral-b0dd (S1: 1)

Operating System : Windows

Health Check : Not Configured

GitHub Project : https://github.com/merranbo1989/BCP-P2

JSON View

Properties

Web app

Name : bcpp4-canadacentral

Publishing model : Code

Runtime Stack : Dotnet - v9.0

Deployment Center

Deployment logs

Last deployment : Successful on Monday, April 28, 10:29:52 AM Refresh

Deployment provider : GitHubAction

bcpp4-canadacentral.azurewebsites.net

BlazorApp1

Home

Counter

Weather

About

Hello, world!

Welcome to My New .NET WebApp - Mohanramrajan.

bcpp4-canadaeast

Web App

Search

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Microsoft Defender for Cloud
- Events (preview)
- Recommended services (preview)
- Log stream
- Resource visualizer
- Deployment
- Deployment slots
- Deployment Center
- Settings

Essentials

Resource group (move) : BCPP4-CanadaEast

Status : Running

Location (move) : Canada East

Subscription (move) : Azure subscription 1

Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbc3aac

Tags (edit) : Add tags

Default domain : bcpp4-canadaeast.azurewebsites.net

App Service Plan : ASP-BCPP4CanadaEast-972b (S1: 1)

Operating System : Windows

JSON View

Properties

Web app

Name : bcpp4-canadaeast

Publishing model : Code

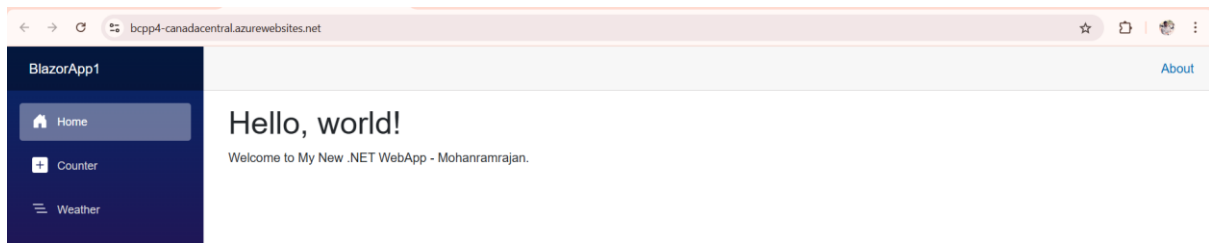
Runtime Stack : Dotnet - v9.0

Deployment Center

Deployment logs

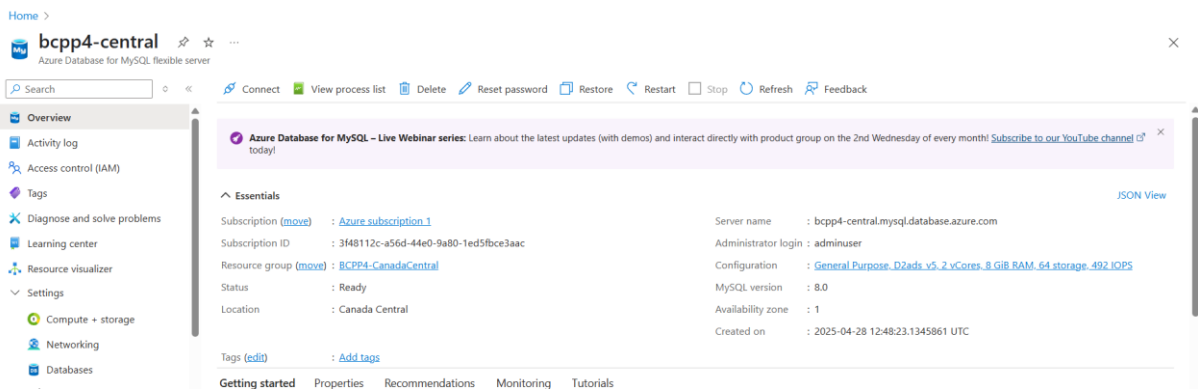
Last deployment : Successful on Monday, April 28, 10:36:08 AM Refresh

Deployment provider : GitHubAction

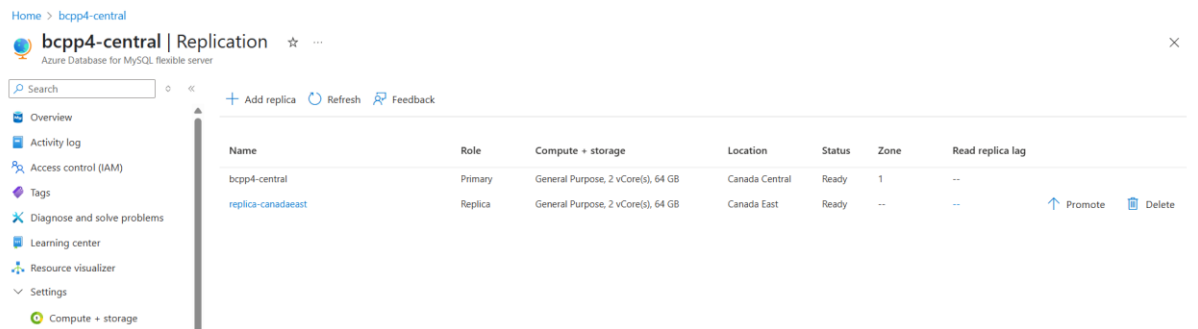


2. Backend Set-up

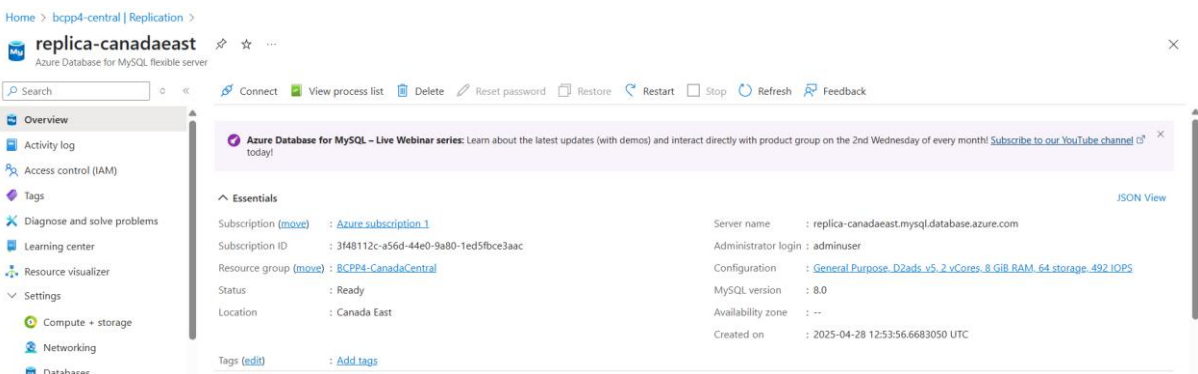
A. Creation of Azure SQL flexible server in “Canada Central (Primary)” region with GRS option enabled.



B. Use replication option to deploy a replica of this server into the secondary region (“Canada East”).



C. Check if the replicated server is provisioned in the secondary region



Home > bcpp4-central | Replication > replica-canadaeast

replica-canadaeast | Replication ☆ ...
Azure Database for MySQL flexible server

Search

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Learning center
Resource visualizer

+ Add replica Refresh Feedback

Name	Role	Compute + storage	Location	Status	Zone	Read replica lag
bcpp4-central	Primary	General Purpose, 2 vCore(s), 64 GB	Canada Central	Ready	1	--
replica-canadaeast	Replica	General Purpose, 2 vCore(s), 64 GB	Canada East	Ready	--	--

Promote Delete

3. Storage Account

A. Create a Storage Account in the Primary region with GRS option enabled.

bcpp4mystorageacc ☆ ...
Storage account

Search

Overview
Activity log
Tags
Diagnose and solve problems
Access Control (IAM)
Data migration
Events
Storage browser
Storage Mover

Upload Open in Explorer Delete Move Refresh Open in mobile CLI / PS Feedback

Essentials

Resource group (move) : BCPP4-CanadaCentral
Location : canadacentral
Primary/Secondary Loca... : Primary: Canada Central, Secondary: Canada East
Subscription (move) : Azure subscription 1
Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbce3aac
Disk state : Primary: Available, Secondary: Available
Tags (edit) : Add tags

Performance : Standard
Replication : Read-access geo-redundant storage (RA-GRS)
Account kind : StorageV2 (general purpose v2)
Provisioning state : Succeeded
Created : 4/28/2025, 8:49:48 AM

Properties Monitoring Capabilities (7) Recommendations (0) Tutorials Tools + SDKs

B. Upload a static file (.txt or .png) to ensure the availability

Home > bcpp4mystorageacc | Containers

mycontainer ...
Container

Search

Overview
Diagnose and solve problems
Access Control (IAM)
Settings

Upload Change access level Refresh Delete Change tier Acquire lease Break lease View snapshots Create snapshot Give feedback

Authentication method: Access key (Switch to Microsoft Entra user account)
Location: mycontainer

Search blobs by prefix (case-sensitive) Show deleted blobs

Add filter

Name	Modified	Access tier	Archive status	Blob type	Size	Lease state
BCPP4-DRS.drawio.png	4/28/2025, 8:51:17 AM	Hot (Inferred)		Block blob	78.85 KiB	Available

4. Traffic Manager Profile

A. Create a new Traffic Manager profile in Azure with routing method selected as "Priority"

bcpp4-trfm ☆ ...
Traffic Manager profile

Search

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Resource visualizer
Settings
Locks

Enable profile Disable profile Refresh Move Delete profile

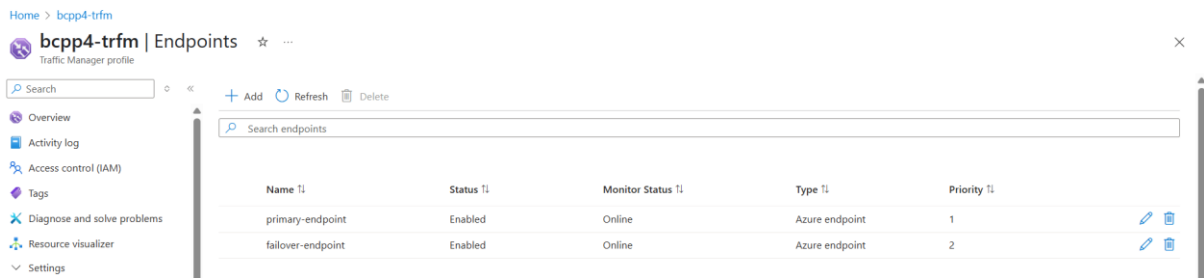
Essentials

Resource group (move) : BCPP4-CanadaCentral
Subscription (move) : Azure subscription 1
Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbce3aac
Status : Enabled
Location : global
Tags (edit) : Add tags

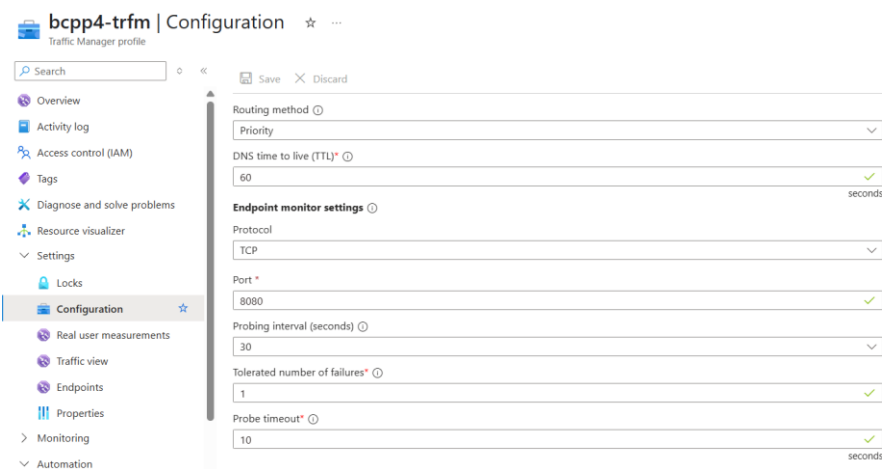
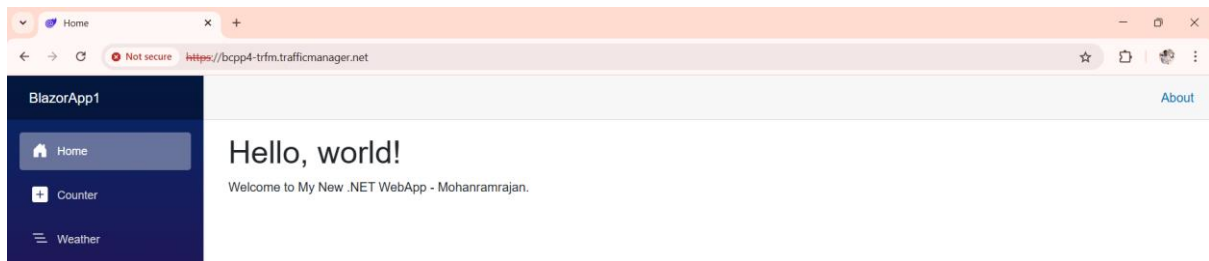
DNS Name : http://bcpp4-trfm.trafficmanager.net
Monitor Status : Online
Routing Method : Priority
Endpoints : 2

Get Started Tutorials Tools + SDK

B. Add the endpoints for Primary (Canada Central), and Secondary (Canada East) App services.

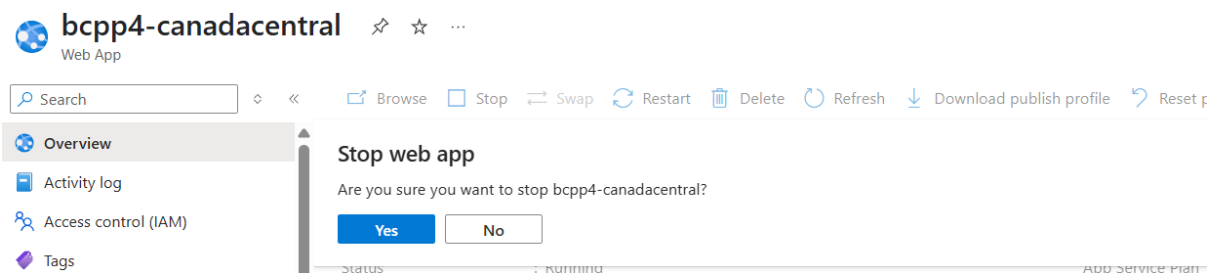


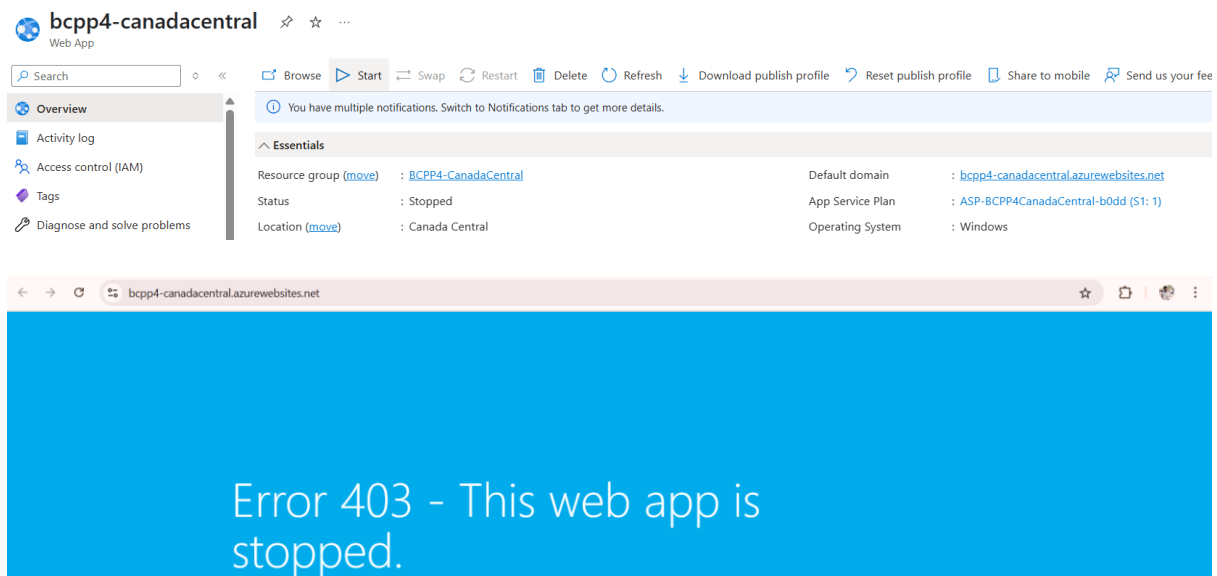
- C. Check the Traffic Manager URL (<https://bcpp4-trfm.trafficmanager.net/>) to see if the application is launching successfully



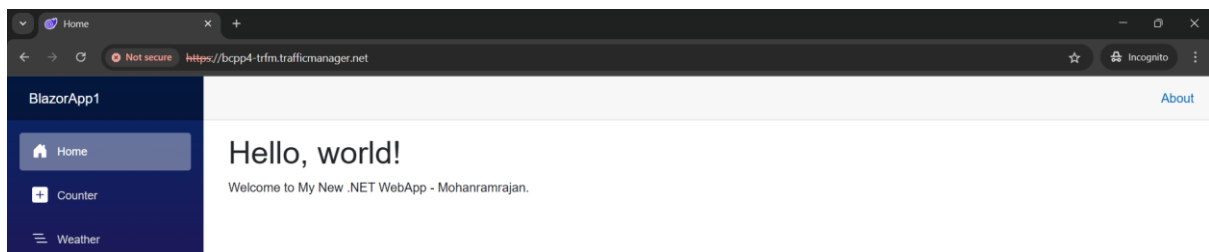
Failover Simulation

- A. Manually stop the Primary App service in Canada Central region





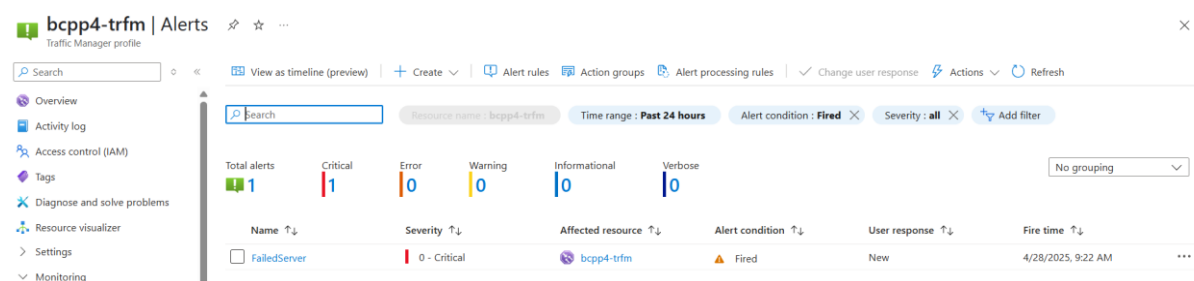
- B. Now launch the Traffic Manager URL: <https://bcpp4-trfm.trafficmanager.net/>, The application hosted in the secondary region (Canada East) should be routed by the traffic manager.



Monitoring & Alerts

A. Alerts and Action Groups

1. Creation of Alerts, Conditions, and Action Groups to notify the user about the failure



Home > bcpp4-trfm | Alerts >

FailedServer

Metric alert rule

Search Edit Disable Duplicate Delete Refresh

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- History
- Resource visualizer
- Settings
- Alert rule configuration
- Automation
- Help

Essentials

Resource group (move) : BCPP4-CanadaCentral
Location (move) : Global
Subscription (move) : Azure subscription 1
Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbc3aac
Tags (edit) : Add tags

Severity : 0 - Critical
Description : -

Scope

Resource	Hierarchy
bcpp4-trfm	Azure subscription... > bcpp4-canadacen...

Actions

Name	Contains actions
Fallover	1 Email

Conditions

Name	Time series monitored	Estimated monthly cost
ProbeAgentCurrentEndpo...	1	\$0.10

Add or remove favorites by pressing Ctrl+Shift+F

Home > bcpp4-trfm | Alerts > Action groups >

Action groups

Create Columns

Search

Name ↑

Fallover

Failover

Action group

Search Edit Disable Test Delete Refresh

Overview

- Activity log
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- Resource visualizer
- Settings
- Automation
- Help

Essentials

Resource group (move) : BCPP4-CanadaCentral
Location (move) : Global
Subscription (move) : Azure subscription 1
Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbc3aac
Tags (edit) : Add tags

Display name : bcpp4fail

Notifications

Type	Name	Value
Email	Email	merranbo@gmail.com

bcpp4-trfm | Diagnostic settings

Traffic Manager profile

Search Refresh Feedback

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

Diagnostic settings are used to configure streaming export of platform logs and metrics for a resource to the destination of your choice. You may create up to five different diagnostic settings to send different logs and metrics to independent destinations. [Learn more about diagnostic settings](#)

Diagnostic settings

Name	Storage account	Event hub	Log Analytics workspace	Partner solution	Edit setting
bcpp4-diagnosticdata	-	-	bcpp4-law	-	Edit setting

[Add diagnostic setting](#)

bcpp4-law

Log Analytics workspace

Search Delete

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Logs
- Resource visualizer
- Settings
- Tables

Essentials

Resource group (move) : bcpp4-canadacentral
Status : Active
Location : Canada Central
Subscription (move) : Azure subscription 1
Subscription ID : 3f48112c-a56d-44e0-9a80-1ed5fbc3aac
Tags (edit) : Add tags

Workspace Name : bcpp4-law
Workspace ID : 02ef9953-c82a-401f-83ba-6f4c205bd33d
Pricing tier : Pay-as-you-go
Access control mode : Use resource or workspace permissions
Operational issues : [OK](#)

The Log Analytics agents (MMAOMS) used to collect logs from virtual machines and servers will no longer be supported from August 31, 2024. Plan to migrate to Azure Monitor Agent before this date. [Learn more about migrating to Azure Monitor Agent](#)

bcpp4-law | Insights

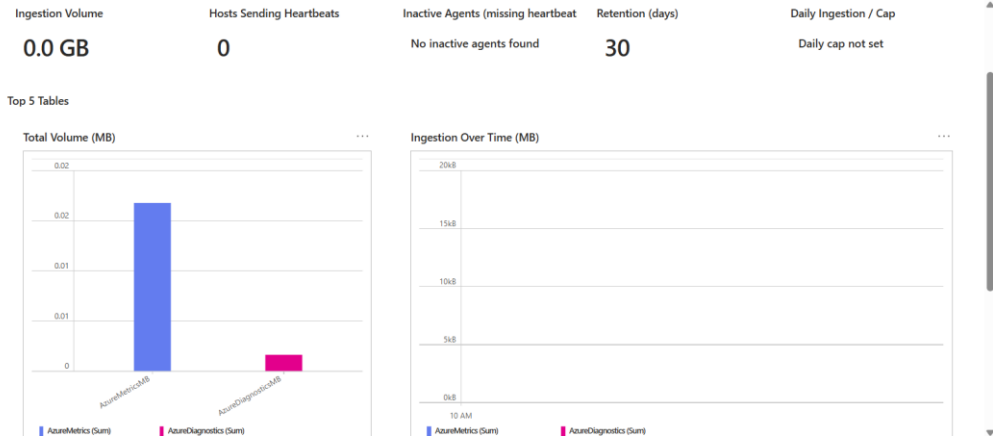
Log Analytics workspace

Search

Workbooks Customize Auto refresh: Off

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- Resource visualizer
- Settings
- Classic
- Monitoring
- Insights**
- Alerts
- Metrics
- Diagnostic settings
- Advisor recommendations
- Workbooks

Add or remove favorites by pressing Ctrl+shift+F



bcpp4-trfm | Logs

Traffic Manager profile

Search

New Query 1* +

Save Share Queries hub

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- Diagnostic settings
- Logs**
- Automation
- CLI / PS
- Tasks
- Export template

User Query Time range: Last 24 hours Show: 1000 results Add Simple mode

Results Chart

TimeGenerated [UTC]	EndpointName_s	Status_s	ResultDescription	SubscriptionId	ResourceId
4/28/2025, 2:56:56.800 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:56.374 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:50.682 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:46.403 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:44.512 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:43.292 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:40.411 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:39.256 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:36.996 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:26.374 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:16.403 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:14.512 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac
4/28/2025, 2:56:13.292 PM	failover-endpoint	Down	The operation has timed out.	3f48112c-a56d-44e0-9a80-1ed5fbc3aac	/subscriptions/3f48112c-a56d-44e0-9a80-1ed5fbc3aac

bcpp4-trfm | Metrics

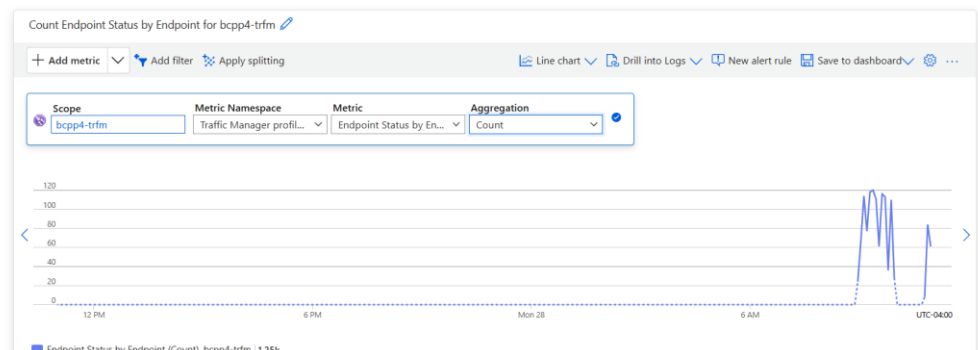
Traffic Manager profile

Search

New chart Refresh Share

Local Time: Last 24 hours (Automatic - 5 minutes)

- Overview
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- Tags
- Diagnose and solve problems
- Resource visualizer
- Settings
- Monitoring
- Alerts
- Metrics**
- Diagnostic settings
- Logs
- Automation
- CLI / PS





Fired:Sev0 Azure Monitor Alert FailedServer on
bcpp4-trfm (microsoft.network/
trafficmanagerprofiles) at 4/28/2025 1:22:49
PM

[View the alert in Azure Monitor >](#)

[Investigate >](#)

Summary

Alert name	FailedServer
Severity	Sev0
Monitor condition	Fired
Affected resource	bcpp4-trfm

Conclusion

This project successfully demonstrates the design and implementation of a highly available, multi-region disaster recovery setup using Microsoft Azure services. By leveraging **Azure Traffic Manager**, **Azure App Services**, **Azure SQL Database with Geo-Replication**, and **Azure Storage with GRS**, the solution ensures business continuity and minimizes service disruptions during regional outages.

Through controlled failover testing and proactive monitoring with **Azure Monitor** and alerts, the project validates the resilience and responsiveness of the system. This hands-on exercise not only highlights best practices for building fault-tolerant cloud applications but also reinforces the importance of automated failover strategies, continuous monitoring, and geo-redundant architecture in achieving high availability and disaster recovery goals in modern cloud environments.