Cognizant CLOUD SERVICES

Blueprint – Azure DB for MySQL

Revision History

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1. Scope

This document provides the blueprint for the MySQL offered by Azure. This contains the below.

1. Service Usage
2. Provisioning Scripts
3. Support Objectives
4. Monitoring metrics
5. Monitoring Setup Scripts

2. Overview

Azure Database for MySQL is a relational database service based on the open source MySQL Server engine. It is a fully managed database as a service offering capable of handling mission-critical workload with predictable performance and dynamic scalability. Develop applications with Azure Database for MySQL leveraging the open source tools and platform of your choice.

See the following link for more details: https://docs.microsoft.com/en-us/azure/mysql/

3. Service Usage

3.1 Best Practices

- Port 3306 to be opened to enable Outbound traffic
- Wherever possible, use VNET service endpoints to reduce traffic from / to a subnet
- If client is hosted in an Azure VM instance, then disable connect to Azure Services. If client is hosted on Azure PaaS environment, then enable connect to azure services
- Refer https://docs.microsoft.com/en-us/azure/mysql/howto-migrate-online for migration of MySQL to Azure using Azure Database Migration Service
- Refer https://docs.microsoft.com/en-us/azure/mysql/howto-data-in-replication to synchronize data from a primary MySQL server running outside Azure into a replica in the Azure MySQL

3.2 Microsoft SLA

99.99%. Refer https://azure.microsoft.com/en-us/support/legal/sla/mysql/v1_0/.

3.3 Recommended tiers for enterprise usage

- General purpose
- Memory optimized

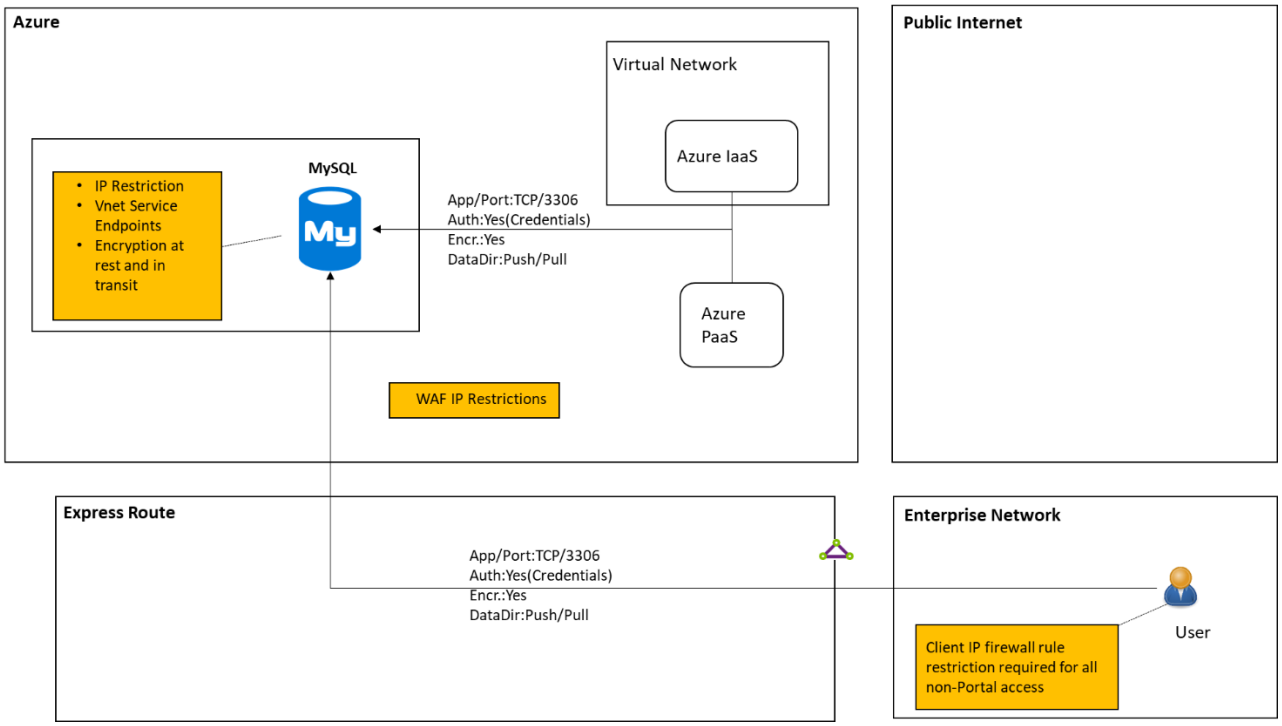
3.4 Limitations

- Currently, once the MySQL instance has been provisioned, the tiers can't be changed
- Server storage size can't be decreased currently
- Major version upgrades of the MySQL engine are not supported

3.5 Additional Notes

- By default, all access to database is blocked. Access can be enabled only by adding required firewall rules.
- Server is marked read-only if the free storage space is less than 5 GB or 5% of the provisioned storage which is less.
- VNET service endpoints are available for General purpose & memory optimized pricing tiers.
- By default, SSL connections are enforced between MySQL instance and client applications.
- Azure MySQL provides automatic backup and point in time restore up to 35 days.

3.6 Service Usage Diagram



4. Provisioning Script

The below ARM template is to be used to provision an instance of the service.

This consists of the below parameters

Parameter Name	Description
administratorLogin	Enter the MySQL Admin user name

administratorLoginPassword	Give the admin password.
location	Enter the MYSQL Location
serverName	Enter the server Name
skuTier	Enter the MYSQL Storage Tier
skuFamily	Enter the MYSQL Compute Generation
skuCapacity	Enter the MYSQL server Compute Generation Virtual Cores
storageSizeMB	Enter the storage size in MB's
version	Enter the MYSQL Version
backupRetentionDays	Enter the MYSQL Back up retention days
geoRedundantBackup	Enter the Storage geoRedundantBackup
enableSSL	Enable ssl enforcement or not when connect to server
diagnosticSettingName	Name of the Diagnostic Settings account
diagnosticRetentionDays	Retention days for diagnostic logs
diagnosticStorageAccountName	Name of the Storage Account in which Diagnostic Logs should be saved
serviceTags	Service Tags for the resource to categories

Template Script

```
{
  "$schema": "http://schema.management.azure.com/schemas/2014-04-01-
preview/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
    "administratorLogin": {
      "type": "string"
    },
    "administratorLoginPassword": {
      "type": "securestring"
    },
    "location": {
      "type": "string",
      "defaultValue": "North Central US",
      "allowedValues": [
        "North Central US",
        "South Central US"
      ],
      "metadata": {
        "description": "Enter the MYSQL Location."
      }
    },
    "serverName": {
      "type": "string"
    },
    "skuTier": {
      "type": "string",
      "defaultValue": "Basic",
      "allowedValues": [
        "Basic",
        "GeneralPurpose",
        "MemoryOptimized"
      ],
      "metadata": {
        "description": "Enter the MYSQL Storage Tier."
      }
    },
    "skuFamily": {
      "type": "string",
      "defaultValue": "Gen4",
      "allowedValues": [
        "Gen4",
        "Gen5"
      ],
      "metadata": {
        "description": "Enter the MYSQL Compute Generation."
      }
    },
    "skuCapacity": {
      "type": "int",
      "defaultValue": 2,
      "allowedValues": [ 1, 2, 4, 8, 16, 32 ],
      "metadata": {
        "description": "Enter the MYSQL server Compute Generation Virtual Cores."
```

```
    }
  },
  "storageSizeMB": {
    "type": "int",
    "defaultValue": 5120
  },
  "version": {
    "type": "string",
    "defaultValue": "5.7",
    "allowedValues": [
      "5.6",
      "5.7"
    ],
    "metadata": {
      "description": "Enter the MYSQL Version."
    }
  },
  "backupRetentionDays": {
    "type": "int",
    "defaultValue": 7,
    "minValue": 7,
    "maxValue": 35,
    "metadata": {
      "description": "Enter the MYSQL Back up retention days."
    }
  },
  "geoRedundantBackup": {
    "type": "string",
    "defaultValue": "Disabled",
    "allowedValues": [
      "Disabled",
      "Enabled"
    ],
    "metadata": {
      "description": "Enter the Storage geoRedundantBackup."
    }
  },
  "enableSSL": {
    "type": "string",
    "defaultValue": "Enabled",
    "allowedValues": [
      "Disabled",
      "Enabled"
    ],
    "metadata": {
      "description": "Enable ssl enforcement or not when connect to server"
    }
  },
  "diagnosticSettingName": {
    "type": "String",
    "metadata": {
      "description": "Name of the Diagnostic Settings account"
    }
  },
  "diagnosticRetentionDays": {
    "type": "int",
```

```
      "defaultValue": 90,
      "metadata": {
        "description": "Retention days for diagnostic logs"
      }
    },
    "diagnosticStorageAccountName": {
      "type": "String",
      "metadata": {
        "description": "Name of the Storage Account in which Diagnostic Logs
should be saved."
      }
    },
    "serviceTags": {
      "type": "object"
    }
  },
  "variables": {
    "tierSymbol": {
      "Basic": "B",
      "GeneralPurpose": "GP",
      "MemoryOptimized": "MO"
    },
    "skuName": "[concat(variables('tierSymbol')[parameters('skuTier')], '_',
parameters('skuFamily'), '_', parameters('skuCapacity'))]"
  },
  "resources": [
    {
      "name": "[parameters('serverName')]",
      "apiVersion": "2017-12-01-preview",
      "type": "Microsoft.DBforMySQL/servers",
      "location": "[parameters('location')]",
      "tags": "[parameters('serviceTags')]",
      "sku": {
        "name": "[variables('skuName')]"
      },
      "properties": {
        "version": "[parameters('version')]",
        "administratorLogin": "[parameters('administratorLogin')]",
        "administratorLoginPassword":
"[parameters('administratorLoginPassword')]",
        "SslEnforcementEnum": "[parameters('enableSSL')]",
        "storageProfile": {
          "storageMB": "[parameters('storageSizeMB')]",
          "backupRetentionDays": "[parameters('backupRetentionDays')]",
          "geoRedundantBackup": "[parameters('geoRedundantBackup')]"
        }
      }
    },
    {
      "type": "Microsoft.DBforMySQL/servers/providers/diagnosticsettings",
      "name": "[concat(parameters('serverName'),
'/Microsoft.Insights/',parameters('diagnosticSettingName'))]",
      "apiVersion": "2017-05-01-preview",
      "properties": {
        "name": "[parameters('diagnosticSettingName')]",
        "storageAccountId": "[parameters('diagnosticStorageAccountName')]",
```

```
        "metrics": [
          {
            "category": "AllMetrics",
            "enabled": true,
            "retentionPolicy": {
              "enabled": true,
              "days": "[parameters('diagnosticRetentionDays')]"
            }
          }
        ]
      },
      "dependsOn": [
        "[concat('Microsoft.DBforMySQL/servers/', parameters('serverName'))]"
      ]
    }
  ]
}
```

5. Support Objectives

Below are the objectives to be fulfilled while providing support for instances of Azure DB for MySQL.

1. Provision MySQL Azure DB
2. De-provision MySQL Azure DB
3. One-time onboarding (Monitoring & Tags)
4. Tag updates
5. Firewall Rules management
6. Toggle SSL connection enforcement
7. Manage Server parameters
8. Pricing tier management (Disabled as of now)
9. Restore from backup restore point.

6. Monitoring Metrics

This section details the metrics which are to be monitored for instances of Azure DB for MySQL.

6.1 Recommended Metrics

The following metrics are recommended to be enabled by default.

Metrics	Category	OperatorType	Threshold	Unit	Frequency
CPU Percentage	Performance	>=	Production: 65%	Percent	5M

			Development: 85%		
IO percent	Performance	>=	Production: 60% Development: 80%	Percent	5M
Storage percent	Information	>=	75%	Percent	5M
Total failed connections	Information	>=	1	Count	5M
Memory percent	Information	>=	Production: 65% Development: 85%	Percent	5M
Server Log storage percent	Information	>=	0.8	Percent	5M
Server Log storage used	Information	>=	1.7 GB	Bytes	5M
Server Log storage limit	Information	>=	2 GB	Bytes	5M

6.2 Optional Metrics

The following monitoring metrics are optional and can be enabled on a need basis.

Metrics	Category	OperatorType	Threshold	Unit	Frequency
Storage used	Information	>=	4 GB	Bytes	5M
Storage limit	Information	>=	10 GB	Bytes	5M
Total active connections	Information	>=	75% of max connectors	Count	5M

7. Monitoring Metrics Setup Script

This section provides a single script which can setup all the recommended metrics for monitoring.

```
{
  "$schema": "https://schema.management.azure.com/schemas/2015-01-
01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
    "CPUPercentage alertName": {
      "type": "string",
      "metadata": {
        "description": "Name of alert"
      }
    },
    "IOPercent alertName": {
      "type": "string",
      "metadata": {
        "description": "Name of alert"
      }
    },
    "StoragePercent alertName": {
      "type": "string",
      "metadata": {
        "description": "Name of alert"
      }
    },
    "TotalFailedConnections alertName": {
      "type": "string",
      "metadata": {
        "description": "Name of alert"
      }
    },
    "MemoryPercent alertName": {
      "type": "string",
      "metadata": {
```

```
    "description": "Name of alert"
  }
},
"ServerLogStorage alertName": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"ServerLogStorageUsed alertName": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"ServerLogStorageLimit alertName": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"SubscriptionName": {
  "type": "string",
  "metadata": {
    "description": "Name of the subscription"
  }
},
"alertDescription": {
  "type": "string",
  "defaultValue": "",
  "metadata": {
    "description": "Description of alert"
  }
```

```
    },
    "isEnabled": {
      "type": "bool",
      "defaultValue": true,
      "metadata": {
        "description": "Specifies whether alerts are enabled"
      }
    },
    "resourceId": {
      "type": "string",
      "defaultValue": "",
      "metadata": {
        "description": "Resource ID of the resource emitting the metric that will
be used for the comparison"
      }
    },
    "sendToServiceOwners": {
      "type": "bool",
      "defaultValue": false,
      "metadata": {
        "description": "Specifies whether alerts are sent to service owners"
      }
    }
  },

  "resources": [
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('CPUPercentage alertName')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('CPUPercentage alertName')]",
```

```
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "cpu_percent"
          },
          "operator": "GreaterThanOrEqual",
          "threshold": "85",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Warning",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
```

```
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('IOPercent alertName')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('IOPercent alertName')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "io_consumption_percent"
          },
          "operator": "GreaterThanOrEqual",
          "threshold": "80",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {
```

```
            "severity": "Warning",
            "subscriptionname": "[parameters('SubscriptionName')]"
          }
        }
      ]
    }
  },
  {
    "type": "Microsoft.Insights/alertRules",
    "name": "[parameters('StoragePercent alertName')]",
    "location": "[resourceGroup().location]",
    "apiVersion": "2016-03-01",
    "properties": {
      "name": "[parameters('StoragePercent alertName')]",
      "description": "[parameters('alertDescription')]",
      "isEnabled": "[parameters('isEnabled')]",
      "condition": {
        "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
        "dataSource": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
          "resourceUri": "[parameters('resourceId')]",
          "metricName": "storage_percent"
        },
        "operator": "GreaterThanOREqual",
        "threshold": "75",
        "windowSize": "PT5M",
        "timeAggregation": "Average"
      },
      "actions": [
        {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
```

```
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Information",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('TotalFailedConnections alertName')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('TotalFailedConnections alertName')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "connections_failed"
          },
          "operator": "GreaterThanOrEqual",
```

```
          "threshold": "1",
          "windowSize": "PT5M",
          "timeAggregation": "Total"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Warning",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('MemoryPercent alertName')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('MemoryPercent alertName')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
```

```
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "memory_percent"
          },
          "operator": "GreaterThanOrEqual",
          "threshold": "85",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Information",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('ServerLogStorage alertName')]",
```

```
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('ServerLogStorage alertName')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "serverlog_storage_percent"
          },
          "operator": "GreaterThanOrEqual",
          "threshold": "80",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Information",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
```

```
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('ServerLogStorageUsed alertName')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('ServerLogStorageUsed alertName')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "serverlog_storage_usage"
          },
          "operator": "GreaterThanOrEqual",
          "threshold": "1.7",
          "windowSize": "PT5M",
          "timeAggregation": "Total"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
```

```
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Information",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('ServerLogStorageLimit alertName')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('ServerLogStorageLimit alertName')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "serverlog_storage_limit"
          },
          "operator": "GreaterThanOrEqual",
          "threshold": "2",
          "windowSize": "PT5M",
          "timeAggregation": "Total"
```

```
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Information",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    }
  ]
}
```